Dr. Ambedkar Institute of technology, Bengaluru-56

Department of Computer Science & Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. Siddaraju

Department of Computer Science & Engineering

Professor & Head
Department of Computer Science & Engineerin
Dr. Ambedkar Institute of Technology
Bangalore-560 056.

2017 Syllabus

200 CREDITS SCHEME

Third Semester

Sl. No	Subject Title	Subject Code	No. of Credits
1.	Discrete Mathematics & Numerical Methods	MA31CS	4:0:0
2.	Logic Design	CS31	4:0:0
3.	Data Structures with C	CS32	4:0:0
4.	Unix and Shell Programming	CS33	3:0:0
5.	Computer Organization	CS34	3:0:0
6.	Python Programming	CS35	3:0:0
7.	Data Structures with C Laboratory	CSL36	0:0:1.5
8.	Logic Design Laboratory	CSL37	0:0:1.5
9.	Python Programming Laboratory	CSL38	0:0:1
10.	Functional English (Mandatory)	EN39	------
	TOTAL		**25**

Fourth Semester

Sl. No	Subject Title	Subject Code	No. of Credits
1.	Probability, Queuing Theory & Reliability	MA41	3:1:0
2.	Graph Theory & Combinatorics	CS41	3:0:0
3.	Algorithms Design Techniques	CS42	4:0:0
4.	Object oriented Programming with C++	CS43	4:0:0
5.	Advanced Computer Architecture and Parallel Processing	CS44	4:0:0
6.	System Software	CS45	3:0:0
7.	OOP with C++ Laboratory	CSL46	0:0:1.5
8.	Algorithm Design Techniques Laboratory	CSL47	0:0:1.5
9.	Unix Shell Programming and System Software Laboratory	CSL48	0:0:1
10.	Employability Skills	EN49	-----
	TOTAL		**26**

FIFTH Semester

V SEMESTER												
Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PC	CS51	Software Engineering	CSE	4	--	--	04	50	50	100	4
2	PC	CS52	Java & J2EE	CSE	4	--	--	04	50	50	100	4
3	PC	CS53	Operating System	CSE	4	--	--	04	50	50	100	4
4	PC	CS54	Database Management System	CSE	4	--	--	04	50	50	100	3
5	PE	CS55	Data Communication Networks	CSE	4	--	--	04	50	50	100	3
6	PC	CS56	Theoretical Foundation of Computer Science	CSE	4	--	--	04	50	50	100	4
7	PC	CSL57	Database Application Laboratory	CSE	--	--	3	03	50	50	100	1.5
8	PC	CSL58	Networks Lab	CSE	--	--	3	03	50	50	100	1.5
9	PC	CSL49	Java & J2EE Lab	CSE	--	--	2	02	50	50	100	1
				TOTAL	**24**	**00**	**8**	**32**	**450**	**450**	**900**	**26**

Note: Hu: Humanities, PC: Professional Core, MC: Mandatory Course,

SIXTH Semester

VI SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week: Theory Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	HS	HS03	Management & Entrepreneurship	Hu	4	--	--	04	50	50	100	4
2	PC	CS61	Unix System Programming	CSE	3	--	--	03	50	50	100	3
3	PC	CS62	Compiler Design	CSE	4	--	--	04	50	50	100	4
4	PC	CS63	Web Technologies	CSE	3		--	03	50	50	100	3
5	PE	CS64	Computer graphics & Visualization	CSE	3	--	--	03	50	50	100	3
6	OE	CS65X	Elective I(Group – A)	CSE	4	--	--	04	50	50	100	4
7	PC	CSL66	Computer graphics & Visualization lab	CSE	--	--	2	02	50	50	100	1.5
8	PC	CSL67	Web Technologies Laboratory	CSE	--	--	2	02	50	50	100	1.5
9	PC	CSP68	Mini Project	CSE				03	50	50	100	2
				TOTAL	**21**	**00**	**4**	**28**	**450**	**450**	**900**	**26**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

<table>
<tr><th colspan="3">Electives</th></tr>
<tr><td>Course code</td><td>Professional Electives -2</td><td>Open Elective -A</td></tr>
<tr><td>CS651</td><td>Distributed operating system</td><td rowspan="4">Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.

Selection of an open elective is not allowed provided,
The candidate has studied the same course during the previous semesters of the programme.
The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
A similar course, under any category, is prescribed in the higher semesters of the programme.
Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.</td></tr>
<tr><td>CS652/MA61</td><td>Numerical Methods & Computation</td></tr>
<tr><td>CS653</td><td>Mobile Adhoc Networks</td></tr>
<tr><td colspan="2"></td></tr>
</table>

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Seventh Semester

VII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PC	CS71	Android Programming	CSE	3	--	--	03	50	50	100	3
2	PC	CS72	Cloud Computing	CSE	3			03	50	50	100	3
3	PE	CS73X	Elective II(Group – B)	CSE	4			04	50	50	100	4
4	PE	CS74X	Elective III(Group – C)	CSE	3	--	--	03	50	50	100	3
5	PC	CSL75	Android Programming Laboratory	CSE	--	--	3	03	50	50	100	1.5
6	PC	CSL76	Cloud Computing Laboratory	CSE	--	--	3	03	50	50	100	1.5
7	PC	CSP77	Project Work –Phase I	CSE	--	--	3	03	50	50	100	-
8	OE	CSEY	IDE – I (Group – A)*		4	--	--	04	50	50	100	4
				TOTAL	**13**	**--**	**4**	**26**	**400**	**400**	**800**	**20**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Electives

Course code	Elective II(Group – B)- 4 Credits
CS731	Wireless Sensor Networks
CS732	Advanced Algorithms
CS733	Neural Networks

Course code	Elective III(Group – B)- 3 Credits
CS741	Simulation & Modeling
CS742	Digital Image Processing
CS743	Software Testing
CS744	Cyber Forensics

Open Elective -B

Students can select any one of the open electives (Please refer to consolidated list of Dr. AIT for open electives) offered by any Department.

Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

CMEP: Cost Management of Engg Projects, OSHA: Occupational Safety and Health Administration

7th SEMESTER

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
Wireless Sensor Networks	CSE01	4
Storage Area Network	CSE02	4
Unix Shell Programming	CSE03	4

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Eighth Semester

VIII SEMESTER													
Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	PE	CS81X	Elective IV(Group – D)	CSE	3	--	--	03	50	50	100	3
2	PE	CS82X	Elective V(Group – E)	CSE	4	--	--	03	50	50	100	4
3		HS04	Intellectual Propriety Rights(IPR)	HU	2	--	--	03	50	50	100	2
4	PRO JECT	CSP83	Project Work – Phase II	CSE	--	--	--	02	50	50	100	12
5	SEM INA R	CSS84	Seminar	CSE	--	--	--	02	50	50	100	2
6	OE	CS85Y	IDE – II(Group – B)*		4	--	--	04	50	50	100	4
				TOTAL	13	--	--	17	300	300	600	27

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Electives

Elective IV(Group – D) - [3 credits]	Open Elective –D,E
1)Object Technology→CS811 2) Big data Analytics→CS812 3) Artificial Intelligence & Machine Learning→CS813 **Elective V(Group – E) - [4 credits]** 1)Cryptography & Network Security→CS821 2)Internet of Things→CS822 3)Wireless Cellular Networks→CS823	Students can select any one of the open electives (Please refer to consolidated list of Dr. AIT open electives) offered by any Department. Selection of an open elective is not allowed provided, • The candidate has studied the same course during the previous semesters of the programme. • The syllabus content of open elective is similar to that of Departmental core courses or professional electives. Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

CMEP: Cost Management of Engg Projects, OSHA:Occupational Safety and Health Administration

8th SEMESTER
INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
Internet of Things	CSE04	4
Object Oriented Modeling And Design	CSE05	4

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Sub Title : COMPUTER CONCEPTS AND C PROGRAMMING		
Sub Code:CS13/CS23	**No. of Credits: 4 =3:0:0:1(L-T-P-S)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:
The objectives of this course are to:

1) Provide students with the formal notations for solving a problem and make them learn the syntax of C language, thereby writing code with good programming style.
2) Extend students knowledge about different operators in C, computer hardware and software, operating system and networking principles.
3) Understand and appreciate the use of arrays, strings, functions, structures and union in C.
4) Explore data file processing.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Computer System, Fundamentals of Problem Solving, Introduction to C Language -** The Computer defined, Basic parts and structure of a computer. Steps for program development: Algorithm, Flowchart, Structure of a C Program, Creating & Running a program. Programming examples. **Selection – Making Decisions, Repetition –**Two-way selection, Multiway-selection, Concept of a loop, Pretest and posttest loops, Jumps in loops, Programming examples.	14
2	**Arrays** -Using arrays in C, Bubble Sort, Selection Sort, Linear Search, Binary search. Two-dimensional Arrays, Multi-dimensional arrays. **Strings -** String concepts, C strings, String manipulation functions, Programming examples.	14
3	**Introduction to Pointers, Functions**- Pointers, Designing structured programs, Functions in C, User-defined Functions, Categories of Functions, parameter passing mechanisms, Arrays & Functions, Storage classes, Programming examples.	12
4	**Introduction to Structures and Unions -** Basics of Structures, typedefinition, Array of Structures, Unions. **File Processing in C -** Opening and closing files, reading from and writing to files, File handling functions: fseek( ), ftell( ), fread( ), fwrite( ).	12
Self Study	**Essential computer hardware and software:** I/O Devices, System software, Application Software; **Operating system:** Definition, purpose/functions of OS, Types of OS. **Networks:** Uses of computer Networks, Types of Networks and Network topologies.	

	Operators in C: Assignment, Arithmetic, relational, logical, bitwise, conditional, increment and decrement operators.	

Course Outcomes:
At the end of the course, the students will be able to

CO1: Design, Write and execute C programs for simple applications.
CO2: Obtain knowledge about computer hardware and software, operating system and networking principles.
CO3: Understand and appreciate the use of arrays, strings, functions, structures and union in C.
CO4: Explore data file processing.

Cos	Mapping with POs
CO1	PO1,PO2,PO3
CO2	PO1,PO2,PO4,PO9,PO12
CO3	PO1,PO2,PO4,PO9,PO12
CO4	PO1,PO2,PO4,PO9,PO12
CO5	PO1,PO2,PO4,PO9,PO12

TEXT BOOK:

1. Behrouz A. Forouzan, Richard F. Gilberg "Computer Science: A Structured Approach Using C", 3rd Edition, Cengage Learning, 2013.

   ISBN-13: 9780534491321 / ISBN-10: 0534491324
2. Vikas Gupta : "Computer Concepts & C Programming", Dreamtech Press 2013.
   ISBN-13: 9788177229981 / ISBN-10: 8177229982

REFERENCE BOOKS/WEBLINKS:

1. Peter Norton: "Introduction to Computers", 7th Edition, Tata McGraw Hill, 2010.
   ISBN 10: 0070671206 / ISBN 13: 9780070671201
2. E. Balagurusamy: "Programming in ANSI C", 4th Edition, Tata McGraw Hill, 2007.
3. Brian W. Kernighan and Dennis Ritchie: "The C Programming Language", 2nd Edition, PHI, 1998.
4. Yashavant P. Kanetkar : "Let Us C" , 5th Edition (https://letuscsolutions.files.wordpress.com/2014/09/let-us-c.pdf)

FACULTY INCHARGE:

1. Asha Rani K P

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Sub Title : COMPUTER PROGRAMMING LAB		
Sub Code:CSL16/CSL26	**No. of Credits:1.5=0 : 0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

The objectives of this course are:

1) Provide a comprehensive study of the C programming language.
2) To learn and acquire art of computer programming.
3) Understand the syntax of data types, decision making, looping constructs, arrays, functions, structures and unions.

1.	**(**a) Write a program in C to find and output all the roots of a given quadratic equation, for non-zero coefficients. b)Write a C program to compute the value for sine series $\sin x = \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n+1)!} x^{2n+1} = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \cdots \text{ for all } x$
2.	a) Write a C program to read a number and check whether a given number is prime or not. Display the result with suitable message. b) Write a program in C to input N integer numbers into a single dimension array, sort them in to ascending order using bubble sort technique, and then to print both the given array and the sorted array with suitable headings.
3.	a) Write a C program to find the factorial of a given number. Display the result with suitable headings. b) Write a program in C to input N integer numbers in ascending order into a single dimension array, and then to perform a binary search for a given key integer number and report success or failure in the form of a suitable message.
4.	a) Write a program in C to reverse a given four digit integer number and check whether it is a palindrome or not. Output the given number and the reversed number separately with suitable message. b) Write a program in C to input N integer numbers into a single dimension array, sort them in to ascending order using selection sort technique, and then to print both the given array and the sorted array with suitable headings.
5.	a) Write a program in C to evaluate the given polynomial f(x) = $a^4\ x^4 + a^3\ x^3 + a^2\ x^2 + a^1\ x^1 + a^0$ for given value of x and the coefficients using Horner's method. b) Write a program in C to find the trace and norm of the given matrix. Display the resultant matrix with suitable messages.
6.	a) Write a C program to generate Fibonacci series for a given value of N. Display the result with suitable messages. b) Write a function reverses (s) in C to reverse the string s in place. Invoke this function from

	the main for different strings and print the original and reversed strings.
7.	a) Write a program in C to input N integer numbers in a single dimension array, and then to perform a Linear search for a given key integer number and report success or failure in the form of a suitable message. b) Write a program in C to read two matrices A (M x N) and B (P x Q) and to compute the product of A and B if the matrices are compatible for multiplication. The program is to print the input matrices and the resultant matrix with suitable headings and format if the matrices are compatible for multiplication, otherwise the program must print a suitable message. (For the purpose of demonstration, the array sizes M, N, P, and Q can all be less than or equal to 3)
8.	a) Write a C program to maintain a record of 'n' student details using array of structures with four fields (Roll No., Name, Marks and Grade). Assume appropriate data type for each field. Print the details of the student, given the student name as input. (Using string built-in functions) b) Write a recursive C program to find the factorial of a given number. Display the result with suitable headings.
	Note: In the practical examination the student has to select one question and both a, b should be executed. All the questions listed in the syllabus have to be included in the lots. The change of question has to be considered, provided the request is made for the same, within half an hour from the start of the examination.

Course Outcomes:
At the end of this lab session, the student will

CO1: Understand the basic terminology used in computer programming.
CO2: Write, compile and debug programs in C language.
CO3: Design programs involving decision structures, loops and functions. Identify the type of looping constructs to be used and use one and two dimensional arrays for solving problems.
CO4: Recognize different types of functions and string handling functions.

Cos	**Mapping with POs**
CO1	PO1,PO2,PO3
CO2	PO1,PO2,PO4,PO9,PO12
CO3	PO1,PO2,PO4,PO9,PO12
CO4	PO1,PO2,PO4,PO9,PO12

<u>FACULTY INCHARGE:</u> ASHA RANI K P

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Sub Title : LOGIC DESIGN		
Sub Code: CS31	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1 Understand the basic digital principles and working of various logic gates, and different techniques for simplification of Boolean function.

2. Understand combinational logic circuits, design and applications.

3. Understand Flip Flops, synchronous and Asynchronous sequential circuits.

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Digital Principles, Digital Logic** The Basic Gates: NOT, OR, AND, Universal Logic Gates: NOR, NAND, implementation of circuits using NAND and NOR, Combinational logic, Truth table representation, canonical forms, Karnaugh maps, minimization of complete Boolean functions and incomplete Boolean functions using K-Map.	10
2	**Digital Principles, Digital Logic Contd.,:** Quine-McCluskey method, determination of prime implicants, prime implicates, finding minimal sum and minimal product using QM-method. **Combinational Logic:** Adder, subtractor, code convertors, magnitude comparator.	10
3	**Data processing circuits:** Multiplexers, Demultiplexers, Decoder, Encoders, Programmable logic devices, Programmable Array Logic, Programmable Logic Arrays.	10
4	**Latches and Flip Flops:** Introduction, Set Reset Latch, Gated Latch, Clocked D FLIP-FLOP, Edge-triggered D FLIP-FLOP, S-R FLIP FLOP, T FLIP FLOP,JK FLIP-FLOP, JK Master-slave FLIP-FLOP, Flip- Flop characteristics equations and excitation table.	11
5	**Registers and counters**: Introduction, registers, shift registers, ripple counters, synchronous counters, **Fundamentals of sequential design**: general models for sequential circuits, Design of Synchronous Sequential Circuit, Model Selection, State Transition Diagram, State Synthesis Table, Design Equations and Circuit Diagram.	11

Note 1: unit 1, 2, 3 will have one question each.

Note 2: Unit 4 and Unit 5 will have internal choice.

Note 3: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
This course uses assigned readings, lectures and homework to enable the students to:

1. Understand the working of various logic gates, K-map, Quine-McCluskey method and flip flops and demonstrate the minimization of combinational functions using various techniques like K-map, Quine-McCluskey method.
2. Analyze and Design different combinational circuits.
3. Analyze and design different sequential circuits using flip flops, synchronous sequential circuits using Mealy and Moore model.

Cos	Mapping with POs
CO1	PO1,PO2,PO3,PO4,PO5,PO12
CO2	PO1,PO2,PO3,PO4,PO5,PO12
CO3	PO1,PO2,PO3,PO4,PO5,PO12

Text Book:

1. Fundamentals of logic design, Charles H.Roth, Jr.Cengage Learning, 5th edition, 2012. (Listed topic only from Units -4, 5, 6, 9, 11, 12, 13)
   ISBN: 978-1-133-62847-5
2. M Morris Mano: Digital Logic and Computer Design, 10th Edition, Pearson, 2008.
   ISBN: 978-8-120-30417-8
3. (Listed topic only from Units – 4, 6, 7)

Reference Books:

1. R D Sudhaker Samuel: Illustrative Approach to Logic Design, Sanguine-Pearson, 2010.
2. Donald P Leach, Albert Paul Malvino & Goutam Saha: Digital Principles and Applications, 7th Edition, Tata McGraw Hill, 2010.
3. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss: Digital Systems Principles and Applications, 10th Edition, Pearson Education, 2007.

FACULTY NAME:

ARATHI P	M S VINUTHA
Assistant Professor	**Assistant Professor**

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Sub Title : DATA STRUCTURES WITH C		
Sub Code:CS32	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:
The objectives of this course are to:

1. Understand the concept of pointers, arrays, structures and unions, dynamic memory allocation.
2. To design and implement some examples that comes under linear data structures.
3. Compare and implement the different kinds of linked list by studying its pros and cons.
4. Understand and implement trees, its types and comparison with other data structures.
5. Design and implement various sorting techniques.

UNIT No	Syllabus Content	No of Hours
1	**BASIC CONCEPTS:** Pointers and Dynamic Memory Allocation, **ARRAYS and STRUCTURES:** Arrays, Dynamically Allocated Arrays, Structures and Unions, Sparse Matrices, Representation of Multidimensional Arrays.	**10**
2	**STACKS AND QUEUES:** Stacks, Stacks Using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions-Evaluation of Postfix Expression, Conversion from infix to postfix.	**10**
3	**LINKED LISTS:** Singly Linked list, Linked Stacks and Queues, Circular Linked List. Polynomials-Adding Polynomials, Circular List representation of polynomials with header node, Doubly Linked Lists with header node.	**11**
4	**TREES-1:** Introduction, Binary Trees-Properties, representation, Binary Tree Traversals-Inorder, Preorder, Postorder, Level order, Heaps-Max heap, Min heap.	**10**
5	**TREES – 2:** Binary Search Trees-Insertion, Deletion, Searching, Selection Trees - Winner trees, Loser Trees, Forests. **GENERAL SORTING ALGORITHMS:** Bubble sort, Selection sort, Insertion sort, Heap sort, Bucket sort, Shell sort.	**11**

Note 1: unit 1, 2, 4 will have one question each.
Note 2: Unit 3 and Unit 5 will have internal choice.
Note 3: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
CO1: Apply advance C programming techniques such as pointers, dynamic memory allocation, structures to developing solutions for problems such as polynomials, sparse matrix etc..
CO2: Able to understand and apply data structure such as stacks, queues, with its different forms to solve various computing problems using C-programming language.
CO3: Able to implement different linked list data structure and handle operations like searching, insertion, deletion, traversing mechanism etc. and use it to solve appropriate problems.
CO4: Know tree representations, especially Binary tree, with traversal, construction and its advantage and disadvantages and means to overcome.
CO5: Understand Binary search trees with its various applications. Implement different types of sorting and decide which technique is best depending upon the requirement.

Cos	**Mapping with POs**
CO1	PO1,PO2,PO3,PO4,PO6
CO2	PO1,PO2,PO3,PO4,PO6
CO3	PO2,PO3,PO6
CO4	PO1,PO2,PO3,PO4,PO6
CO5	PO1,PO2,PO3,PO4,PO5

TEXT BOOK:

1. Horowitz, Sahni, Anderson-Freed: Fundamentals of Data Structures in C, 2nd Edition, University Press, 2014.
   ISBN-13: 9780929306407 / ISBN-10: 0929306406

REFERENCE BOOKS/WEBLINKS:

1. Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Delmar Learning India Pvt 2013.
2. Robert Kruse & Bruce Leung: Data Structures & Program Design in C, Pearson Education, 2014.

FACULTY INCHARGE:

1. Harish G
2. Asha Rani K P

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Sub Title : Unix and Shell Programming		
Sub Code:CS33	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:

1. Understand the UNIX Architecture, File systems and use of basic Commands.
2. Use of editors and Networking commands.
3. Understand Shell Programming and to write shell scripts.
4. Understand and analyze Process Creation, Control & Relationship
   1.

UNIT No	Syllabus Content	No of Hours
1	**Introduction** - Why UNIX?, Computer System, The UNIX Environment, UNIX Structure, Accessing Unix, Commands, Common Commands, Other Useful Commands. **File Systems-** Filenames, File types, Regular Files, Directories, File System Implementation, Operations Unique to Directories, Operations Unique to Regular Files, Operations Common to Both. Security and File Permission – Users and Groups, Security Levels, Changing permissions, User masks, Changing Ownership and group.	08
2	**Filters –** filters and pipes, concatening files, display and beginning of files, cut and paste, sorting, translating characters, files with duplicated lines, count characters, words or lines, comparing files.**Communications** – User Communication, Electronic Mail, Remote Access, File Transfer.	08
3	**The Basic vi Editor**–Editor Concepts, The Vi editor, Modes, Commands, Command Categories, Local Commands in vi, Range commands in vi, Global Commands in vi, Rearrange Text in vi. **Regular expressions** – Atoms, operators. **Grep** – operation, grep family, searching for file content	09
4	**Process –** process basics, ps: process status, System processes, Mechanism of process creation, Internal and external commands, process states and zombies, Running jobs in background, nice:job execution with low priority, killing processes with signals, job control, at and batch: execute later, cron: Running job periodically, time: Timing processes.	08
5	**Introduction to Shells-** Unix Session , Standard Streams , Redirection, Pipes, tee command, Command execution, Quotes, Command substitution, Job Control, Aliases, Variables, predefined variables, Options, Shell/Environment Customization. **Shell Programming** – Basic Script Concepts, Expressions, Decisions: Making Selections, Repetition, Special Parameters and variables, Changing Positional Parameters,	09

	Argument Validation, Debugging Scripts, Script Examples.	

Note 1: Unit 3 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
CO1: Understand UNIX OS basic features and its file system
CO2: Interpret UNIX Commands, communication, Shell basics, and shell environments
CO3: Understand UNIX process control, relationships, commands and utilities
CO4: Design and develop shell programming

Cos	Mapping with POs
CO1	PO1,PO2,PO3,PO5
CO2	PO1,PO2,PO3,PO5
CO3	PO1,PO2,PO3,PO5
CO4	PO1,PO2,PO3,PO5

TEXT BOOK:

1. Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming- Cengage Learning – India Edition. 2009.
2. Sumitabha Das: UNIX – Concepts and Applications,4th Edition, Tata McGraw Hill.

REFERENCE BOOKS/WEBLINKS:

1. Richard Blum , Christine Bresnahan : Linux Command Line and Shell Scripting Bible, 2ndEdition , Wiley,2014
2. M.G. Venkateshmurthy: UNIX & Shell Programming, Pearson Education.
3. Yashvanth Kanetkar:Unix shell programming, BPB publications, 2003 edition

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Sub Title : Computer organization		
Sub Code:CS34	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives: This course will enable students to

1. Understanding the basic structure and operation of a digital computer.
2. Understand the basics concepts of I/O and memory.
3. Understand arithmetic operations and the process of instruction execution.

UNIT No	Syllabus Content	No of Hours
1	**Basic Structure of Computers:** Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement, Historical Perspective **Machine Instructions and Programs:** Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines. Additional instructions, Encoding of machine instructions	10
2	**Input/Output Organization:** Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Direct Memory Access, Buses, Interface Circuits	08
3	**Memory System:** Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Cache Memories – Mapping Functions, Replacement Algorithms, Virtual Memories	08
4	**Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations.	08
5	**Basic Processing Unit:** Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Microprogrammed Control.	08

Note 1: Unit 1 and Unit 4 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
At the end of this course the students will be able to:

CO1: Acquire knowledge of –

- The basic structure of computers & machine instructions and programs.
- Input/output Organization such as accessing I/O Devices, Interrupts.
- Memory system basic Concepts, Cache Memories and Virtual Memories.

CO2: Analyze and perform arithmetic operations using different algorithm for signed and unsigned numbers.

CO3: Understand the Concepts of Basic Processing Unit, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control and Micro programmed Control.

Cos	**Mapping with POs**
CO1	PO1,PO2,PO3,PO12
CO2	PO1,PO2,PO3,PO12
CO3	PO1,PO2,PO3,PO12

TEXT BOOK:

1. **Carl Hamacher, ZvonkoVranesic, SafwatZaky**: Computer Organization, 5th Edition, Tata McGraw Hill, 2011.(Listed topics only from Chapters 1, 2, 4, 5, 6, 7)

REFERENCE BOOKS/WEBLINKS:

1. **William Stallings**: Computer Organization & Architecture, 8th Edition, PHI, 2013.

2. **David A. Patterson, John L. Hennessy**: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier, 2009.

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Sub Title : PYTHON PROGRAMMING		
Sub Code:CS35	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 42**

Course objectives:

1. To Learn Syntax and Semantics and create Functions in Python.
2. To Handle Strings and Files in Python.
3. To Understand Lists, Dictionaries and Regular expressions in Python.
4. To Implement Object Oriented Programming concepts in Python
5. To Build Web Services and Introduction to Network Programming in Python.

UNIT No	Syllabus Content	No of Hours
1	**Why should you learn to write programs**. **Variables, expressions and statements, Conditional execution**, **Functions**	8
2	**Iteration, Strings**, **Files**	8
3	**Lists, Dictionaries**, **Tuples**, **Regular Expressions**	9
4	**Classes and objects, Classes and functions, Classes and methods**	8
5	**Networked programs, Using Web Services**	9

Note 1: Unit 3 and Unit 5 will have internal choice. One question each from units 1, 2 and 4

Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.

Assignment - 2 from units 3 and 4.

Assignment - 3 from unit 5.

Course Outcomes:

CO1: Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.

CO2: Demonstrate proficiency in handling Strings and File Systems.

CO3: Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.

CO4: Interpret the concepts of Object-Oriented Programming as used in Python.

CO5: Implement exemplary applications related to Network Programming and Web Services in Python.

COs	Mapping with POs
CO1	PO1, PO2,PO4,PO5
CO2	PO1, PO2,PO4,PO5
CO3	PO1, PO2,PO4,PO5
CO4	PO1, PO2,PO4,PO5
CO5	PO1, PO2,PO4,PO5,PO6

TEXT BOOK:

1) Charles R. Severance, **“Python for Everybody: Exploring Data Using Python 3”,** 1st Edition, CreateSpace Independent Publishing Platform, 2016. (http://do1.dr-chuck.com/pythonlearn/EN_us/pythonlearn.pdf)
2) Allen B. Downey, **"Think Python: How to Think Like a Computer Scientist,** 2nd Edition, Green Tea Press, 2015. (http://greenteapress.com/thinkpython2/thinkpython2.pdf)

REFERENCE BOOKS / WEBLINKS:

1) Mark Lutz, **“Learning Python”,** 5th Edition, O’Reilly Media, 2013. (**ISBN-13:** 978-9351102014)
2) Wesley Chun, **“Core Python Applications Programming”,** Prentice Hall, 3rd Edition, 2012. (**ISBN-13:** 978-9332555365)
3) David Beazley and Brian K. Jones,”**Python Cookbook”,** 3rd Edition, O’Reilly Media, 2013. (**ISBN-13:** 978-9351101406)

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Sub Title : DATA STRUCTURES WITH C LAB		
Sub Code:CSL36	**No. of Credits:1.5=0 : 0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

The objectives of this course are:

1. To develop skills to design and analyze simple linear and non linear data structures.
2. To Strengthen the ability to identify and apply the suitable data structure for the given real world problem by developing algorithms for manipulating stacks, queues, linked lists, trees.
3. To understand recursion concept.
4. To explore sorting techniques.

1.	**(SORTING) →** Write a C program to sort the given 'n' elements using i) Insertion Sort ii) Bucket Sort
2.	**(SEARCH IN SPARSE MATRIX)→**Design, develop, and execute a program in C to read a sparse matrix of integer values and to search the sparse matrix for an element specified by the user. Print the result of the search appropriately. Use the triple <row, column, value> to represent an element in the sparse matrix
3.	**(STACKS)→**Write a C Program to construct a stack of integers and to perform the following operations on it: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow, stack underflow, and stack empty.
4.	**(INFIX TO POSTFIX)→**Design, develop, and execute a program in C to convert a given valid parenthesized infix arithmetic expression to postfix expression and then to print both the expressions. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).
5.	**(EVALUATE A POSTFIX EXPRESSION)→**Design, develop, and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).
6.	**(QUEUE)→**Design, develop, and execute a program in C to simulate the working of a queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display
7.	**(CIRCULAR QUEUE)→**Write a C Program to simulate the working of a circular queue of integers using an array. Provide the following operations:

	a. Insert b. Delete c. Display
8.	
9.	**(STACKS USING SINGLY LINKED LIST)→**Write a C Program using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow and stack empty.
10.	**(QUEUES USING SINGLY LINKED LIST)→**Write a C program using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations: a. Insert b. Delete c. Display The program should print appropriate messages for queue full and queue empty.
11.	**(POLYNOMIAL ADDITION USING LINLKED LIST)→**Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
12.	**(DOUBLY LINKED LIST)→**Design, develop, and execute a program in C to implement a doubly linked list where each node consists of integers. The program should support the following operations: i. Create a doubly linked list by adding each node at the front. ii. Insert a new node to the left of the node whose key value is read as an input. iii. Delete the node of a given data if it is found, otherwise display appropriate message. iv. Display the contents of the list. (Note: Only either (a,b and d) or (a, c and d) may be asked in the examination)
13.	**(TREES)→**Write a C Program a. To construct a binary search tree of integers. b. To traverse the tree using all the methods ▪ Inorder, Preorder, Postorder. c. To display the elements in the tree.
14.	**(MAX HEAP CREATION)→**Design, develop, and execute a program in C to create a max heap of integers by accepting one element at a time and by inserting it immediately in to the heap. Use the array representation for the heap. Display the array at the end of insertion phase.
15.	**(RECURSION)→**Write recursive C Programs for

	a. Searching an element on a given list of integers using the Binary Search method. b. Solving the Towers of Hanoi problem.

Course Outcomes:
At the end of this lab session, the student will

CO1: Be able to design & analyse the appropriate data structure for given problem.
CO2: Be capable to identify the appropriate data structure for given problem.
CO3: Be able to Solve a problem using Recursion.
CO4: Be able to compare different sorting techniques.

Cos	Mapping with POs
CO1	PO1,PO2,PO3,PO4, PO9, PO12
CO2	PO1,PO2,PO3,PO4, PO9, PO12
CO3	PO1,PO2,PO3,PO4, PO9, PO12
CO4	PO1,PO2,PO3,PO4, PO9, PO12

<u>FACULTY INCHARGE:</u> HARISH.G

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Sub Title : LOGIC DESIGN LAB		
Sub Code: CSL37	**No. of Credits:1.5=0 : 0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course Objectives:

This course will help students to achieve the ability to:

1. Design and implement different logic design circuits using components like logic gates, multiplexer, decoder, flip-flops IC's.
2. Use of computer-aided design tools for simulation.

Detailed Syllabus

Expt No.	Experiment List
1	**a) Given a 4-variable logic expression, simplify it using K-Map and realize using universal gates.** **b) Simulate the simplified logic expression using VHDL and verify its working.**
2	**a) Design and implement a combinational circuit (Adder, Subtractor, Magnitude Comparator) using logic gates.** **b) Simulate the above combinational circuit using VHDL and verify its working. .**
3	**a) Given a 4-variable logic expression, simplify it using Entered Variable Map and realize the simplified logic expression using 8:1 multiplexer IC.** **b) Simulate 4:1 multiplexer using VHDL and verify its working.**
4	a) **Realize given Boolean expression using 3:8 Active low output decoder.** b) **Simulate 2:4 Decoder using VHDL and verify its working**
5	**a) Realize Master Slave JK Flip Flop using NAND gates.** **(OR)** **b) Simulate D Flip Flop using VHDL and verify its working.**
6	**a) Design and implement a ring counter using 4-bit shift register and demonstrate its working.** **b) Simulate switched tail counter using VHDL and verify its working.**

7	**a) Design and implement an asynchronous counter using decade counter IC to count up from 0 to n (n<=9) and demonstrate its working.** .
8	**a) Design and implement a mod-n (n<8) synchronous up counter using J-K Flip-Flop ICs and demonstrate its working.** **OR** **b) Simulate mod-8 counter using VHDL and verify its working.**

Course Outcomes:

Students are expected to do the following.

1. Understand, Analyze, Design, and implement different combinational and sequential logic circuits.
2. Simulation and analysis of logic circuits using VHDL.

Co's	**Mapping with POs**
CO1	PO1,PO2,PO3,PO4,PO5,PO12
CO2	PO1,PO2,PO3,PO4,PO5,PO12

FACULTY NAME:

ARATHI P
Assistant Professor

M S VINUTHA
Assistant Professor

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Sub Title : Python Programming Laboratory		
Sub Code:CSL38	**No. of Credits:1=0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 = 100**	

Course objectives:

1. To Handle Lists, Dictionaries and Tuples in Python.
2. To Implement Object Oriented Programming Concepts in Python.
3. To build programs with Regular Expressions in Python

1	a)	Write a program to • Determine whether the given string is a palindrome or not using slicing (::-1) and without using slicing. • Convert a string to camel case. E.g.: If the given string is "This is a test", the output should be "ThisIsATest" • Find the number of vowels and consonants in a given string
	b)	Validate a given date. Input date in the format dd/mm/yyyy. Check also for leap year.
2	a)	Write a function which gets no: of strings using variable no: of arguments and, - find unique characters in each string. (hint: use set())
	b)	Given n, generate Pascal triangle for n rows. Use list of lists. If n = 5, output should be 1 1 1 1 2 1 1 3 3 1 1 4 6 4 1 Check : str.format for formatting and replication operator to get # of spaces
3	a)	Write a function which concatenates all given strings to a single string. User can specify sep - default should be comma. User can specify first string - default should be 'result: '
	b)	Create a dictionary for words and their meanings. Write functions to add a new entry (word: meaning) , search for a particular word and retrieve meaning, given meaning find words with same meaning , remove an entry, display all words sorted alphabetically. [Program must be menu driven]
4	a)	Given a file “stateinfo.txt” containing names of the state and cities separated by “:”, create a file for each state named as “statename”.txt containing names of cities in that state. Sample input file “stateinfo.txt” is attached. Steps to follow: Walk through the file. Create a dictionary whose key is the state name and value is the file handle. Write city names into the file. Do close all the files at the end of processing using values in dictionary.

	b)	Consider the string 'brontosaurus'. Write Pythonic code that implements and returns the functionality of histogram using dictionaries for the given string. Also, write the function print_hist to print the keys and their values in alphabetical order from the values returned by the histogram function.
5	a)	Write Pythonic code to construct a Linked list dynamically based on user input and display it. For e.g., if the user enters 100 then 100 nodes needs to be created.
	b)	Given a path, traverse the path and display all files and subdirectories in each level till the deepest level. Also display total number of files and subdirectories.
6	a)	Create a class called MyStack which supports push, pop and display operations. • Implement the stack class using a list. Specify the upper bound of the size while creating the stack object. • Provide exception handling mechanism for stack overflow and stack underflow.
	b)	Create a class to represent city which contains a list of places to see. • Provide methods to create the object with just the city name or with city name and places (stored as list) • Provide methods to add a place of visit, to remove place of visit, to display all places of visit. • Add exceptional handling so that remove does not crash if the given place is not in the city
7	a)	Given an input file which contains list of names, phone numbers and email-ids separated by spaces in the following format:- Alex 80-23425525 alex234@yahoo.com Emily 322-56775342 em_44@gmail.com Grace 20-24564555 softech_grace@rediffmail.com Phone number contains 3 or 2 digit area code and a hyphen followed by 8 digit number Perform the following using regular expressions:- • Find all names having phone numbers with 3 digit area code. • Find the total number of people having Gmail id. • Find user name part of email id for all people whose name start with 'G' or 'E' and ends with 'y'
	b)	Do the following using regular expressions:- • Find all occurrences of a word in a multiline string. The search must be case insensitive. Also find and display the starting index of each matched word in the input string. • Given a line of text find all characters other than vowels and space characters. • Given a list of strings find all strings that start with a digit or an underscore.
8	a)	Given an input file, do the following using regular expression and create an output file. • Remove extra whitespaces between two words. • Insert a white space after the end of a sentence (after . or ? or !). • First letter of each sentence should be upper case • Remove consecutive duplicate words.

	b)	Write Pythonic code to display the Fibonacci sequences up to nth term where n is provided by the user.

Course Outcomes:
CO1: Implement the concepts of object-oriented programming as used in Python.
CO2: Demonstrate the use of several core data structures: Lists, Dictionaries and Tuples
CO3: Use of Python Regular Expression capabilities for data verification.

COs	**Mapping with POs**
CO1	PO1, PO2, PO4, PO5
CO2	PO1, PO2, PO4, PO5
CO3	PO1, PO2, PO4, PO5

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Sub Title : GRAPH THEORY AND COMBINATORICS		
Sub Code: CS41	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:

1. Illustrate the main concepts of graphs theory, representation of graphs, basic classes of graph and concepts of Inclusion- Exclusion principle.
2. Identify and apply graph algorithms to solve graph related problems.
3. Use Inclusion-Exclusion principles to solve problems.

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Introduction to graph Theory:** Definitions and Examples, Matrix representation of graphs, Sub graphs, Complements, Vertex Degree, theorems, Graph Isomorphism, Walks and their classification, operations on graph, connected and disconnected graph, Euler Trails and Circuits.	9
2	**Planar Graphs:** Planar Graphs, Hamilton path and cycle, Euler theorem, Platonic solids, Homeomorphic graph, Detection of planarity, Dual of a graph, Graph coloring, Chromatic polynomial: decomposition and multiplication theorem.	8
3	**Trees:** Definitions, Properties, and Examples, Routed Trees, Traversal and Sorting, Spanning Tree-DFS & BFS, Weighted Trees, Prefix Codes, optimal tree: Huffman's procedure.	8
4	**Optimization:** Minimal Spanning Trees – The algorithms of Kruskal's and Prim's, cut-set, connectivity, Transport Networks – Max-flow Min-cut Theorem, Dijkstra's Shortest Path Algorithms.	8
5	**The Principle of Inclusion and Exclusion:** The Principle of Inclusion and Exclusion, Generalizations of the Principle, Derangements – Nothing is in its Right Place, Rook Polynomials: n*n board, expansion formula, product formula, Arrangement with forbidden position.	9

<u>NOTE1</u>: Unit 1 and Unit 5 will have internal choice.

NOTE2: One questions each from units 2, 3 and 4.
NOTE3: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

CO’s	Mapping with PO’s
1	**PO1,PO2,PO3,PO4,PO5,PO6,PO12**
2	**PO1,PO2,PO3,PO4,PO5,PO6,PO12**
3	**PO1,PO2,PO3,PO4,PO5**

Text Book:

1. Ralph P. Grimaldi, B V Ramana: Graph theory and Combinatorics, 5th Edition, Pearson Education, 2013 (Listed Topics only from Unit-1, 2, 3, 4, 6.)
   ISBN: 978-81-317-9738-9.
2. Geir Agnarsson & Raymond Geenlaw: Graph Theory Modeling, Applications, and Algorithms, 4TH impression Pearson Education, 2012 (Listed Topics only from Unit-2, 4)
   ISBN: 978-81-317-1728-8.

Reference Books:

1. Gary Chartrand, Ping Zhang: Introduction to graph theory, Tata McGraw Hill, Eight edition, 2012.
2. Robin J Wilson: Introduction to Graph Theory, Pearson, 4th Edition, 2009.

FACULTY NAME: M S VINUTHA

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Sub Title : Algorithm Design Techniques		
Sub Code:CS42	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 52**

Course objectives:
1 Present fundamental concepts for algorithm design and provide necessary background for writing algorithms in a formal way. 2. Identify for a problem adequate algorithm design strategies. 3. Present fundamental concepts and techniques for complexity analysis of algorithms. 4. Design, implement and test an appropriate algorithm for different application problems.

UNIT No	**Syllabus Content**	**No of Hours**
1	Introduction : Notion of Algorithm, Review of Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithms Brute Force Approaches: Introduction, Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching.	10
2	Divide and Conquer: General Method, Binary Search, Merge Sort, Quick Sort and its performance. The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm; Single Source Shortest Path problem.	10
3	Decrease and Conquer Approaches : Introduction, Insertion Sort, Depth First Search and Breadth First Search, Topological Sorting, Algorithms for generating Combinatorial objects Space-Time Tradeoffs: Introduction, Sorting by Counting, Sorting by Distribution method, Input Enhancement in String Matching.	10
4	Dynamic Programming: The General Method, Warshall's Algorithm, Floyd's Algorithm for All-Pairs Shortest Paths Problem, Optimal 0/1 Knapsack problem, The Traveling Salesperson problem Transform and Conquer: Presorting, Balanced Search Trees, Problem Reduction	11
5	Coping With Limitations Of Algorithmic Power: Backtracking: n - Queens problem, Subset – Sum Problem. Approximation Algorithms for NP-Hard Problems – Traveling Sales person Problem, Knapsack Problem. Branch-and-Bound: Assignment Problem, Knapsack Problem, Traveling Salesperson Problem.	11

Note 1: Unit 4 and Unit 5 will have internal choice.

Note 2: **Three assignments are evaluated for 5 marks:**

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand asymptotic notations to analyze the performance of algorithms

CO2: Identify the differences in design techniques and apply to solve optimization Problem.

CO3: Apply algorithms for performing operations on graphs and trees.

CO4: Solve novel problems, by choosing the appropriate algorithm design technique for their solution and justify their selection

CO5: Analyze deterministic and nondeterministic algorithms to solve complex problems

Cos	**Mapping with POs**
CO1	PO1,PO5
CO2	PO1,PO2,PO4,PO5
CO3	PO1,PO2,PO4,PO5
CO4	PO1,PO2,PO4,PO5
CO5	PO1,PO2,PO4,PO5

TEXT BOOK:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3^{nd}Edition, Pearson Education, 2012. ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2^{nd}Edition, University press, 2008. ISBN 10: 8173716129 , ISBN 13: 9788173716126

REFERENCE BOOKS / WEBLINKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2^{nd} Edition, PHI, 2010.
2. R.C.T. Lee, S.S. Tseng, R.C. Chang &Y.T.Tsai: Introduction to the Design and Analysis of Algorithms A Strategic Approach, Tata McGraw Hill, 2005.
3. Parag Himansu Dev , Himansu Balachandra Dev, Design and Analysis of algorithms, Pearson Education.2008
4. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

FACULTY INCHARGE:

1. Asha

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Sub Title : Object-Oriented Programming with C++		
Sub Code:CS43	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

1. Understand the philosophy of object-oriented design and the concepts of encapsulation, abstraction, inheritance, and polymorphism.
2. Implement the concept of constructors and destructors.
3. Design and test the implementation among objects using a class hierarchy and inheritance.
4. Identify the relationship between the run time polymorphism and compile time polymorphism.
5. Implement file I/O operations and exception handling mechanisms.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Overview of C++, Sample C++ program, Different data types, operators, expressions, and statements, arrays and strings, pointers & user-defined typesFunction Components, argument passing, inline functions, function overloading, recursive functions. **Classes & Objects – I:** Class Specification, Class Objects, Scope resolution operator, Access members, Defining member functions, Data hiding, Static data members.	10
2	**Classes & Objects –II:** Functions, Friend functions, Passing objects as arguments, Returning objects, Arrays of objects, Dynamic objects, Pointers to objects, Constructors, Destructors, Parameterized constructors, Copy constructors, Generic functions and classes, Applications **Operator overloading** using friend functions such as +, - , pre-increment, post-increment, [ ], overloading <<, >>. **Inheritance – I:** Base Class, Inheritance and protected members, Protected base class inheritance, Inheriting multiple base classes.	11
3	**Inheritance – II:** Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes. **Virtual functions, Polymorphism:** Virtual function, Calling a Virtual function through a base class reference, Virtual attribute is inherited; Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding. .	11
4	**I/O System Basics, File I/0:** C++ stream classes, Formatted I/O, I/O manipulators, fstream and the File classes, File operations.	10
5	**Exception Handling, STL:** Exception handling fundamentals, Exception handling options **STL**: An overview, containers, vectors, lists, maps.	10

Note 1: **Unit 2 and Unit 3 will have internal choice. One question each from Unit 1,Unit 4 and Unit 5.**

Note 2: **Three assignments are evaluated for 5 marks:**

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
CO1.Create classes, objects, members of a class and the relationships among them needed to solve a specific problem.
CO2. Identify function templates and class templates and create applications using them.
CO3. Understand and demonstrate the concept data encapsulation and inheritance.
CO4. Apply the concept of polymorphism with virtual functions.
CO5. Understand the concept of streams in C++ and various I/O manipulators.

Cos	**Mapping with POs**
CO1	PO1,PO2
CO2	PO1,PO2,PO4,PO5,PO6
CO3	PO1,PO2,PO5
CO4	PO1,PO2,PO5,PO6
CO5	PO1,PO2,PO5

TEXT BOOK:

1. Herbert Schildt: The Complete Reference C++, 5th Edition, Tata McGraw Hill, 2012.

REFERENCE BOOKS/WEBLINKS:

1. Stanley B.Lippmann, JoseeLajore: C++ Primer, 5th Edition, Addison Wesley, 2013.
2. E Balagurusamy : Object Oriented Programming with C++, 6th Edition, Tata McGraw Hill, 2013.
3. Paul J Deitel, Harvey M Deitel: C++ for Programmers, Pearson Education, 2009.

FACULTY INCHARGE:

1. Suresha D
2. Praveena M V

Professor & Head
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Subject Title : : **ADVANCED COMPUTER ARCHITECTURE AND PARALLEL PROCESSING**		
Subject Code : CS44	No. of Credits :4=4 : 0 : 0 (L-T-P)	No. of lecture hours/week : 4
Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours :52

Course Objectives:

1. Understand different kinds of architectures and types of interconnection networks.
2. Learn the architecture of shared memory.
3. Learn about way of message passing.
4. Understand the parallel processing at instruction level, parallel virtual machine and its programming.

Unit No.	Syllabus Content	No.of Hours
1	**Introduction to Advanced Computer Architecture and parallel processing:** Four Decades of Computing, Flynn's Taxonomy of Computer Architecture , SIMD Architecture , MIMD Architecture , Interconnection Networks. **Multiprocessors Interconnection Networks:** Interconnection Networks Taxonomy, Bus-Based Dynamic Interconnection Networks, Switch-Based Interconnection Networks, Static Interconnection Networks.	11
2	**Shared Memory Architecture:** Classification of Shared Memory Systems, Bus-Based Symmetric Multiprocessors, Basic Cache Coherency Methods, Snooping Protocols, Directory Based Protocols, Shared Memory Programming.	10
3	**Message Passing Architecture :** Introduction to Message Passing, Routing in Message Passing Networks, Message Passing Programming Models, Processor Support for Message Passing, Message Passing Versus Shared Memory Architectures.	10
4	**Instruction Level Parallel Processor:** Evolution and overview of ILP processors, dependencies between instructions, Instruction scheduling, Preserving sequential consistency.	10
5	**Parallel Programming in the Parallel Virtual Machine:** PVM Environment and Application Structure, Task Creation, Task Groups, Communication among Tasks, Task Synchronization, Reduction Operations Work Assignment.	11

Note 1: Unit 1 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

At the end of the course the students will be able to

CO1: Understand computer architecture and parallel processing concepts.

CO2: Outline and implement the shared memory concepts.

CO3: Interprets the different message passing techniques.

CO4: Discuss the concepts of ILP and demonstrate the PVM programming concepts.

Cos	Mapping with POs
CO1	PO1,PO2,PO3,PO5, PO12
CO2	PO1,PO2,PO3,PO5, PO12
CO3	PO1,PO2,PO3,PO5, PO12
CO4	PO1,PO2,PO3,PO5, PO12

TEXT BOOK:

1. Hesham El-Rewini & Mostafa Abd-El-Barr, "Advanced Computer Architecture And Parallel Processing", John-Wiley, 2005.(Chapter 1,2,4,5-5.1,5.2,5.4,5.5,5.7,8)
2. Dezso Sima, Ternce Fountain, Peter Kacsuk, "Advaced Computer Architecture", Pearson Education, 2007.(chapter 4)

REFERENCE BOOKS/WEBLINKS:

1. David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture: A hardware/ software approach", Morgan Kaufmann /Elsevier Publishers.
2. William Stallings, "Computer Organization and Architecture, Designing for performance" Prentice Hall.
3. John L. Hennessy, David A. Patterson, "Computer Architecture A Quantitative Approach" Fifth Edition, Morgan Kaufmann /Elsevier Publishers.

Sub Title : SYSTEM SOFTWARE		
Sub Code:CS45	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours:42**

Course objectives:
This course will help students to achieve the following objectives:

1. Understand the fundamentals of machine architecture and identify the relationship between machine architecture and system software.

2. Analyze various assembler components of System Software.

3. Understand the importance of loaders and linkers in assembly level programming.

4. Identify macro features and process them in assembly level programming

5. Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC

Unit No.	Syllabus Content	No. of hours
1.	**Machine Architecture:** Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) – SIC Machine Architecture, SIC/XE Machine Architecture, SIC & SIC/XE Programming Examples. **Editors and Debugging Systems:** Text Editors - Overview of Editing Process, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities.	**08**
2.	**Assemblers-I:** Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation. **Assemblers-II:** Machine Independent Assembler Features – Literals, Symbol Definition Statements, Expression, Program Blocks, Control Sections and Program Linking, Assembler.	**09**
3.	**Loaders and Linkers:** Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation Loader, Program Linking, Algorithm and Data Structures for a Linking Loader, Dynamic Linking.	**08**
4.	**Macro Processor:** Basic Macro Processor Functions – Macro Definitions and Expansion, Macro Processor Algorithm and Data Structures, Machine-Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion, Keyword Macro Parameters.	**08**
5.	**Lex and Yacc-1:** Lex and Yacc - Structure of Lex Source , Using LEX - Regular Expression, Examples of Regular Expressions, Lex Program Examples, Parsing a Command Line, Parser-Lexer Communication. **Lex and Yacc-2:** Using YACC – Grammars, Recursive Rules, Shift/Reduce Parsing, A YACC Parser - The Definition Section, The Rules Section, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity, YACC programming Examples.	**09**

<u>Note 1:</u> Unit 2 and Unit 5 will have internal choice.
<u>Note 2:</u> Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
At the end of the course students should be able to: **CO1:** Identify the basic principles and architecture of machines. **CO2:** Design an algorithm to demonstrate the assembler functionalities **CO3:** Demonstrate the work of loading and linking in assembly level programming **CO4:** Identify macro features and process them in assembly level programming **CO5:** Design and develop programs using Compiler tools like LEX, YACC.

Cos	**Mapping with POs**
CO1	PO1,PO2,PO4
CO2	PO1,PO2, PO4
CO3	PO1,PO2, PO4
CO4	PO1,PO2, PO4
CO5	PO1,PO2, PO4,PO5

Text Books:

1. System Software: An Introduction to Systems Programming, Leland L. Beck,Manjula D, Pearson Education Asia 3rd Edition, 2013. **ISBN-13: 9788177585551**
2. Lex and Yacc, John.R.Levine, Tony Mason and Doug Brown, O'Reilly, SPD, 2nd Edition, 2014. **ISBN-13: 9788173660627**

Reference:

1. Systems Programming and Operating Systems, D.M. Dhamdhere, Tata McGraw Hill Second Edition, 2014. **ISBN-13: 9780074635797**
2. Systems Programming, John J. Donovan, Tata McGraw Hill Edition, 2014. **ISBN-13: 9780074604823**

<u>Faculty Name:</u> Prof. Asha K N

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Sub Title : Object-Oriented Programming with C++ Lab		
Sub Code:CSL46	**No. of Credits:1.5 =0 : 0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

1. Design and develop programs based on the principles of object-oriented programming.
2. Apply the concepts of data encapsulation, inheritance, Operator overloading, Polymorphism and Exception Handling.

1	Implement the following requirement: An electricity board charges the following rates to domestic users to discourage large conceptions of energy. 0 - 100 units : Rs 1.50 per unit 101 - 200 units : Rs 1.80 per unit Beyond 200 units: Rs 2.50 per unit All users are charged a minimum of Rs 50. If the total amount is more than Rs 300 then an additional surcharge of 15% is added. The C++ program must read the names of users, number of units consumed and display the calculated charges.
2	Design and implement a class STUDENT with attributes like: roll number, name, 3 tests marks. Implement member functions a) to read student data like name and test marks, b) to compute average marks (considering best two out of three test marks) and c) to display the student information. Declare an array of STUDENT objects in the main function, use static data member to generate unique student roll number.
3	Write a C++ program to create a class called COMPLEX and implement the following overloading functions ADD that return a COMPLEX number. i. s2 = s1. add (a) – where a is an integer (real part) and s1, s2 are complex numbers. ii. s3 = s1.add (s2) – where s1 ,s2 and s3 are complex numbers
4	Create a class called STRING using dynamic memory allocation technique and implement the following operations. Display the results after every operation by overloading the operator <<. i. STRING s1 = “Dr AIT” ii. STRING s2 = “Bangalore” iii. STIRNG s3 = s1 + s2 (Use copy constructor).
5	Create a class called Customer (doubly linked list) with member functions to insert a customer at the front of the list as well as to delete a customer from a particular position in the list. Demonstrate all the functions after creating a pointer to a customer list. (Implement destructors)
6	Create a template class called QUEUE with member functions to add an element and to delete an element from the queue. Implement a queue of integers and doubles.
7	Implement the concept of operator overloading: **C**reate a class called DATE. Accept two valid dates in the form dd/mm/yy. Implement the following using + , - and << operators. i. no_of_days = d1 – d2; where d1 and d2 are DATE objects, d1 >=d2 and no_of_days is an

	integer. ii. d2 = d1 + no_of_days; where d1 is a DATE object and no_of_days is an integer.
8	Create a class called Number which has the characteristics of a decimal number. Derive a class OCTAL, which has the characteristics of an octal number inheriting the decimal value from the Number class. Derive a class HEX, which has the characteristics of an hexadecimal number inheriting the decimal value from the Number class. Implement the following operations (operator overloading). i. int i = j + k where I is decimal , j is hexadecimal , k is OCTAL ii. int y = h + k ; where h is an OCTAL object and k is an integer. Display the Result by overloading the operator <<.
9	Design and implement a C++ program to create an abstract class - SHAPE to represent any shape in general. The class should have two pure-virtual functions to read dimensions and to compute the area. Create three derived classes - CIRCLE, RECTANGLE, and SQUARE by inheriting the features of class SHAPE. Implement the functions to read and compute the area. Add method to display the results as required. (Assume appropriate attributes).
10	Write a C++ program for custom exception handling. i. Implement a function to compute factorial of a given number. ii. Create a class "InvalidDataException" that contains the details about the exception – "Invalid data: negative number entered" iii. In the main function, accept a number from the user and throw an exception of type "InvalidDataException" if entered number is a negative number, else call the factorial function to compute the result. iv. Handle the exception.
11	Write a C++ program to create a vector of integers. Copy the vector contents into a list, sort the contents, then copy selected items into another vector (like elements less than 10 etc)

Note: In the examination *each* student picks one question from a lot of *all the* 12 Questions.

Course Outcomes: CO1. Create classes incorporating object-oriented techniques. CO2. Design, implement, test, and debug programs in an object-oriented programming language which are very much essential for software developments. CO3. Apply data abstraction, polymorphism, Inheritance operator overloading and exception handling for development of programs..

Cos	Mapping with POs
CO1	PO1,PO2,PO4,PO5
CO2	PO1,PO2,PO4,PO5,PO6
CO3	PO1,PO2,PO5,PO6

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Sub Title : Algorithm Design Techniques Laboratory		
Sub Code:CSL47	**No. of Credits:1.5= 0 :0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

1. To study about various designing paradigms of algorithms for solving real world problems

2. To analyze run time of algorithms and understand fundamental algorithmic problems

3. Make the students imbibe the art of writing elegant and efficient programs as well as debugging skills.

Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX / Windows environment.

1	Sort a given set of elements using Bubble Sort/Selection Sort and determine the time required to sort the elements. Plot a graph of number of elements versus time taken. Specify the time efficiency class of this algorithm The elements can be read from a file or can be generated using the random number generator.
2	Sort a given set of elements using the Quicksort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3	Implement Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
4	a. Obtain the Topological ordering of vertices in a given digraph. b. Compute the transitive closure of a given directed graph using Warshall's algorithm.
5	Implement 0/1 Knapsack problem using Dynamic Programming.
6	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
7	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
8	a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.
9	Find a subset of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6} and {1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.
10	Implement any scheme to find the optimal solution for the Traveling Salesperson problem.
11	Find Minimum Cost Spanning Tree of a given undirected graph using Prim’s algorithm.
12	Implement All-Pairs Shortest Paths Problem using Floyd's algorithm.
13	Implement N Queen's problem using Back Tracking.
14	Implement Horspool’s algorithm for String Matching using space & time tradeoff concept

<u>Note :</u> In the examination *each* student picks one question from the lot of *all* 14 questions.

Course Outcomes:
CO1: To analyze the complexities of various problems in different domains.
CO2: To design algorithms using Divide & Conquer, Greedy method , Dynamic programming, Decrease & Conquer, Backtracking method and recite algorithms that employ this strategy
CO3: To prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains.
CO4: To develop the efficient algorithms for the new problem with suitable designing techniques

Cos	Mapping with POs
CO1	PO1,PO2
CO2	PO1,PO2,PO3,PO5
CO3	PO1,PO2,PO4
CO4	PO1,PO3,PO4

TEXT BOOK:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3ndEdition, Pearson Education, 2012. ISBN 10: 0-13-231681-1 , ISBN 13: 978-0-13-231681-1

2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2ndEdition, University press, 2008. ISBN 10: 8173716129
ISBN 13: 9788173716126

REFERENCE BOOKS / WEBLINKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2010.
2. R.C.T. Lee, S.S. Tseng, R.C. Chang &Y.T.Tsai: Introduction to the Design and Analysis of Algorithms A Strategic Approach, Tata McGraw Hill, 2005.
3. Parag Himansu Dev , Himansu Balachandra Dev, Design and Analysis of algorithms, Pearson Education.2008
4. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

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Sub Title : UNIX SHELL PROGRAMMING AND SYSTEM SOFTWARE LABORATORY		
Sub Code:CSL48	**No. of Credits:1 =0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

This course will help students to achieve the following objectives:

1. Understand how the compiler tools LEX works and will be able to observe the use of regular expressions to match patterns and tokenize the input.
2. Understand the Syntax analysis phase through programming and the use of Context free Grammars for syntax checking.
3. Understand and use UNIX shell programming.

	PART-A **UNIX Shell Programming:**
	Design, develop, and execute the following programs
1	Write a script to back up list of files
2	Write a script that finds all soft links to a specific file.
3	Create a script that simulates the ls –l command but prints only three columns of our choice.
4	Create a script that finds each line in a file that contains a specified string.
	PART-B **LEX and YACC Programs:**
	Design, develop, and execute the following programs using LEX:
1	a) Program to count the number of characters, words, spaces and lines in a given input file. b) Program to count the numbers of comment lines in a given C program. Also eliminate them and copy the resulting program into separate file.
2	a) Program to recognize a valid arithmetic expression and to recognize the identifiers and operators present. Print them separately. b) Program to recognize whether a given sentence is simple or compound.
	Design, develop, and execute the following programs using YACC:
3	a) Program to recognize a valid arithmetic expression that uses operators +, -, * and /. b) Program to recognize a valid variable, which starts with a letter, followed by any number of letters or digits.
4	a) Program to evaluate an arithmetic expression involving operators +, -, * and /. b) Program to recognize strings 'aaab', 'abbb', 'ab' and 'a' using the grammar ($a^n b^m$, n>= 1, m>=0).

Instructions:

In the examination, one program has to be asked from Part A for a total of 20 marks and one programming exercise from Part B has to be asked for a total of 30 marks.

Course Outcomes:
At the end of the course students are able to:
CO1. Use compiler tools LEX C works and observe the use of regular expressions to match Patterns and tokenize the input.
CO2. Understand and designYACC programs for syntax checking.
CO3. Design Shell script.

Cos	**Mapping with POs**
CO1	PO1,PO2,PO4,PO5,PO12
CO2	PO1,PO2,PO4,PO5,PO12
CO3	PO1,PO2,PO4,PO5,PO12

<u>**Faculty Name:**</u> **Prof. Asha K N/ Prof. Srinivasa A H/Prof. Harish Kumar H C**

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Sub Title : Software Engineering		
Sub Code:CS51	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

1. Provide an understanding of the principles of software engineering in a broader system context and the notions of software engineering process, development and management.
2. Identify the processes, techniques and deliverables that are associated with requirement engineering including system requirement and system modeling.
3. Analyze the various steps involved in the design process and the different design approaches which include Architecture design and Object-oriented design.
4. Identify the different software development methods like agile method, software reuse and CBSE and also learn about Software evolution and maintenance.
5. Present an understanding of the software verification and validation process and test automation.

UNIT No	Syllabus Content	No of Hours
1	**Overview: Introduction:** FAQ's about software engineering, Professional and ethical responsibility. **Socio-Technical systems:** Emergent system properties; Systems engineering. **Critical Systems:** Introduction, Types, A simple safety-critical system; System dependability; Availability and reliability. **Software Processes:** Models, Process iteration, Process activities; The Rational Unified Process; Computer Aided Software Engineering.	11
2	**Requirements: Software Requirements:** Functional and Non-functional requirements; User requirements; System requirements; Interface specification; The software requirements document. **Requirements Engineering Processes:** Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management. **Case Study:** Analyzing a system and specifying the requirements.	11
3	**System Models:** System Models: Context models; Behavioral models; Data models; Object models. **Design: Architectural Design:** Architectural design decisions; System organization; Modular decomposition styles; Control styles. **Object-Oriented Design:** Objects and Object Classes; An Object-Oriented design process; Design evolution.	10
4	**Development: Rapid Software Developmen**t: Agile methods; Extreme programming; Rapid application development. **Software Evolution:** Program evolution dynamics; Software	10

	maintenance; Evolution processes; Legacy system evolution.	
5	**Testing: Verification and Validation:** Planning; Software inspections; Automated static analysis; Verification and formal methods. **Software Testing:** System testing; Component testing; Test case design; Test automation. **Case Study:** Use of testing methodologies. **Management: Managing People:** Selecting staff; Motivating people; The People Capability Maturity Model.	10

Note 1: Unit 2 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes: At the end of the course the students should be able to:

CO1: Demonstrate an understanding of the principles and techniques of Software Engineering, Socio Technical systems, Software Processes and identify the types of Critical Systems.
CO2: Understand the activities in requirement engineering process and to identify the different types of System Models.
CO3: Applying the different Architectural and design methods and Identifying the modular decomposition and various control styles.
CO4: Understand the various methods of software development and identify the software evolution methods.
CO5: Formulate different testing methods and tools.

COs	Mapping with POs
CO1	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO11,PO12
CO2	PO1,PO2,PO3,PO4,PO5,PO6,PO7,PO8,PO10,PO11,PO12
CO3	PO1,PO2,PO3,PO4,PO5,PO6,PO8,PO11,PO12
CO4	PO1,PO2,PO3,PO4,PO6,PO7
CO5	PO1,PO2,PO5,PO6

TEXT BOOK:

1. Ian Sommerville: Software Engineering, 8th Edition, Pearson Education, 2012.
   ISBN - 978-0-321-31379-9
   (Chapters-: 1, 2, 3, 4, 6, 7, 8, 11, 14, 17, 21, 22, 23, 25)

REFERENCE BOOKS/WEBLINKS:

1. Roger. S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, McGraw Hill, 2007. ISBN - 978–0–07–337597–7
2. Pankaj Jalote: An Integrated Approach to Software Engineering, 3rd Edition, Narosa Publishing House, 2005. ISBN - 81-7319-702-4

FACULTY INCHARGE:

1. Praveena M V

SUBJECT TITLE: JAVA AND J2EE		
SUBJECTCODE:CS52	**No. of Credits:4=4:0: 0 (L-T-P)**	**No. of Lecture hours per week:4**
Exam Duration :3 hours	**CIE + Assignment+SEE = 45 + 5+50 =100**	**Total No. of Contact Hours:52**

Course objectives:
1. Introduce to the basic fundamentals of Java programming.
2. Concept of exception handling, multithreading and Event handling.
3. Utilize AWT and Swing components.
4. Perceive the usage of Database with JDBC, Java Bean and JSP.
5. Realize the concept of Servlets, RMI.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Java**: History and Evolution of java; An Over view of java; Introduction to Classes; Methods: Overriding, overloading methods; Inheritance; Package and Interface; Exception Handling. **The Applet Class:** Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; The HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument();The AudioClip Interface; The AppletStub Interface; Output to the Console. **Networking:** Networking Basics;the Networking Classes and Interfaces;TCP/IP Client Sockets;TCP/IP Server Sockets.	12
2	**Multi Threaded Programming:** Thread model;The Main Thread;Creating a Threads;Using isAlive() and join();Thread priorities;Synchronization; Interthead communication;Deadlock. **Event Handling:** Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes.	9
3	**Swings:** AWT classes; Window fundamentals;Swings: The origins of Swing; Two key Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; Exploring swing.	9
4	**Java 2 Enterprise Edition Overview, Database Access,Enterprise Java Beans:** Overview of J2EE and J2SE The Concept of JDBC; JDBC	9

	Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database;Statement Objects;ResultSet;Transaction Processing; Metadata, Data types; Exceptions. **Enterprise Java Beans:** Enterprise java Beans; Deployment Descriptors;Session java Bean,Entity Java Bean;Message-Driven Bean; The JAR File.	
5	**Servlets,JSP,RMI:** Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. **Java Server page(JSP)**: JSP ;JSP tags ;Tomcat; Request string; User sessions;Cookies;Session Objects . **Java Remote Method Invocation(RMI):**Remote Method Invocation concept; Server side,Client side.	13

Note 1: Unit 1 and Unit 5 will have internal choice.
Note 2: Two assignments are evaluated for 5 marks: Assignment – 1 from units 1 and 2.
Assignment - 2 from units 3, 4 and 5.

Course Outcomes:
CO1: Ability to Design compile & execute basic java application program and applet programs, and demonstrate the concepts of object oriented program.
CO2: Ability to Design of Socket Connection and Use the concepts of multithreading and event handling mechanism.
CO3: Construct an window based GUI applications using swings component.
CO4: Understand the concept of J2EE and J2SE, JDBC process, configure the database connection, and transaction processes and Design a servlet programs by using tomcat, and handling HTTP client and server request.

Cos	**Mapping with POs**
CO1	PO1,PO3,PO4
CO2	PO1,PO3,PO4
CO3	PO1,PO2,PO3,PO4,PO5,PO8,PO10
CO4	PO1,PO3,PO4, PO5,PO8,PO10

TEXT BOOKS:

1. Herbert Schildt: Java The Complete Reference, 9th Edition, Tata McGraw Hill, 2014.(Chapters 1, 2, 3, 4, 5, 6, 8,9, 10, 11,21,22,23,29,30,31).
   ISBN: 0071808558 / 9780071808552.
2. Jim Keogh: J2EE - The Complete Reference, Tata McGraw Hill, 2002.(Chapters 1, 5, 6, 11, 12, 15).
   ISBN: 9780070529120

REFERENCE BOOKS:

1. Y. Daniel Liang: Introduction to JAVA Programming, 8th Edition, Pearson Education, 2011.
   ISBN-13: 978-0-13-213080-6 / ISBN-10: 0-13-213080-7
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson.
   ISBN : 0-321-24575

Prepared By:

PUSHPAVENI H P
VEENA A

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

Sub Title : Operating System		
Sub Code:CS53	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

1. Understand the services of an operating system that provides to its users and system itself.
2. Understand the process concept and also apply the various CPU scheduling algorithms.
3. Compare methods for handling deadlocks and also recognize the classic synchronization Problems and provide solutions..
4. Describe the various memory management techniques and also the file system.
5. Understand secondary storage structure and Linux operating system.

1.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Operating Systems, System structures:** What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process Management**;** Memory management; Storage management; Protection and security; Distributed Systems: Special-purpose Systems; **System Structures:** Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Virtual machines;	10
2	**Process Management:** Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling;	10
3	**Process Synchronization:** Synchronization: The Critical section problem; Peterson’s solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors. **Deadlocks:** Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.	11
4	**Memory Management:** Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Page replacement; Allocation of frames; Thrashing. **File System:** File System: File concept; Access methods; Directory structure; File system mounting; File sharing;	10
5	**Secondary Storage Structures, Protection:** Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. **Case Study: The Linux Operating System**	11

Note 1: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1. Understand the operating system operations and operating system structures.
CO2. Analyze the process management and apply process scheduling algorithms.
CO3. Recognize the methods for handling deadlocks and also provide solution to the synchronization problems.
CO4. Identify the memory management techniques. Recognize the file systems and its directory structures.
CO5. Demonstrate the secondary storage structures and Linux operating system.

Cos	Mapping with POs
CO1	PO1,PO2
CO2	PO1,PO2,PO5
CO3	PO1,PO2,PO5
CO4	PO1,PO2,PO3
CO5	PO1,PO2,PO5,PO6

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Concepts, 8th edition, Wiley India, 2011.

REFERENCE BOOKS/WEBLINKS:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012.
2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010.
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011.

FACULTY INCHARGE:

1. Suresha D

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

Sub Title : DATABASE MANAGEMENT SYSTEM		
Sub Code:CS54	**No. of Credits: 3 = 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 42**

Course objectives:

1. To understand the different issues involved in the design and implementation of a database system.
2. To study the physical and logical database designs, database modeling, relational model.
3. To understand and use data manipulation language to query, update, and manage a database
4. To develop an understanding of essential DBMS concepts such as: database security, integrity and concurrency.

UNIT No	Syllabus Content	No of Hours
1	**Introduction** Introduction, An example, Characteristics of Database approach; Advantages of using DBMS approach; Data models, schemas and instances; three schema architecture and data independence; Database languages and interfaces; Classification of Database management systems. Entity-Relationship model; using High- Level conceptual Data Models for database Design; An example Database Application; Entity types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and structural Constraints; Weak Entity types; Refining the ER Design, ER to relational schema diagram mapping;	8
2	**Relational Model and Relational Algebra** Relational Model Concepts; relational Model constraints and Relational Database Schemas; update operations, Transactions and dealing with constraint violations; Unary Relational Operations; SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.	8
3	**SQL** Specifying basic constraints in SQL; schema change statements in SQL; Basic queries in SQL; More complex SQL queries-Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL.	9
4	**Database Design** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Cod Normal form, Properties of Relational Decompositions; Algorithms for relational	8

	Database Schema Design; Multi-valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form	
5	**Transaction Management** Transaction and System Concepts, Desirable Properties of Transactions, characterizing schedules based on Recoverability, Characterizing schedules based on Serializability. Two- Phase Locking Techniques for Concurrency Control, Concurrency Control based on Timestamp ordering.	9

Note 1: Unit 3 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand the basic concepts and architecture associated with DBMS.
CO2: Employ the conceptual and relational models to design large database systems.
CO3: Create, maintain and manipulate a relational database using SQL.
CO4: Apply normalization steps in database design and removal of data anomalies.
CO5: Apply the characteristics of database transactions and how they affect database integrity and consistency.

Cos	Mapping with POs
CO1	PO1,PO2
CO2	PO3,PO4
CO3	PO2,PO3,PO4,PO5
CO4	PO1,PO2,PO3,PO4
CO5	PO1,PO2

TEXT BOOK:

Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015
ISBN-10: 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS / WEBLINKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education,2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

FACULTY INCHARGE:

1. Asha
2. Veena Potdar

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Bangalore-560 056.

Sub Title : DATA COMMUNICATION NETWORKS		
Sub Code : **CS55**	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:

1. To understand the fundamental and advanced concepts of communication networks and OSI,TCP/IP model in depth

2. To understand and analyze the data link layer protocols and error correction and detection methods.

3. To understand and analyze packet switching networks and traffic management.

4. To understand the IP protocols.

5. To create the awareness of application layer protocols, internet routing protocols, and transport layer protocols.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to data communication and networking:** Data Communications, Networks, Layered Tasks, The OSI model, Layers in OSI model, TCP/IP Protocol suite.	8
2	**Error Control:** Error Detection & Correction: Linear block codes, Cyclic codes, Checksum. **Medium access:** Framing, Stop and wait protocol, Stop and wait ARQ, Random access, Channelization	9
3	**Packet-Switching Networks and Traffic management:** Datagram Networks, Virtual Circuit Networks, Shortest-path routing, Traffic management at the packet level; Traffic management at the flow level.	8
4	**IP protocols**: IPV4–addressing, header format, subnet addressing, fragmentation and reassembly; IPV6-addressing, header format.	8
5	**TCP,UDP and Internet Protocols** : User datagram protocol; Transmission control protocol; TCP congestion control; Internet routing protocols (RIP,OSPF); **Application layer :** DNS, Telnet, Electronic mail ,World wide web	9

Note 1: Unit 2 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand the concepts of communication networks, OSI, and TCP/IP model.

CO2: Apply the knowledge of error correction and detection algorithms; understand data link layer protocols and network access methods.

CO3: Understand the concepts of packet switching networks and traffic management and analyze them.

CO4: Understand the IP protocols.

CO5: Understand and analyze application layer protocols, internet routing protocols, and transport layer protocols.

Cos	Mapping with POs
CO1	PO1,PO2, PO6,PO12
CO2	PO1,PO2,PO4,PO6,PO12
CO3	PO1,PO2,PO4,PO6,PO12
CO4	PO1,PO2,PO4,PO6,PO12
CO5	PO1,PO2,PO4,PO6,PO12

TEXT BOOK:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, ISBN-13, 9780073250328,2014.
2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014.
3. Nader F. Mir: Computer and Communication Networks, 2nd Edition, ISBN-13: 978-0133814743, 2014.

REFERENCE BOOKS/WEBLINKS:

1. William Stallings: Data and Computer Communication, 10th Edition, Pearson Education, ISBN-13: 978-0133506488, 2013.
2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 5th Edition, The Morgan Kaufmann Series, ISBN-9780123850591, 2011.
3. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th edition, Pearson, ISBN 13: 9780132126953, 2011.

FACULTY NAME

Dr. MARY CHERIAN

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Sub Title:	Theoretical Foundation of Computer Science	
Sub Code:CS56	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives

The objective of the course is to

1. Present fundamental concepts and techniques for designing Automata.
2. Provide necessary background for formulating real-world problems to Finite state machines, construct regular expressions and convert between themselves.
3. Use the pumping lemma to demonstrate the non-regularity of languages.
4. Learn CFG's, Design Pushdown Automata for various context-free Grammars.
5. Know various Normal forms with Simplification of Grammar and Design Turing Machines and know its various types.

Unit No	Syllabus Content	No. of Hours
1	**Introduction to Finite Automata:** Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata An application of finite automata; **Finite Automata, Regular Expressions:** Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions.	11
2	**Regular Languages, Properties of Regular Languages:** Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata	10
3	**Context-Free Grammars And Languages :** Context –free grammars; Parse trees; Applications; Ambiguity in grammars and Languages.	10
4	**Pushdown Automata:** Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA’s and CFG’s; Deterministic Pushdown Automata	10
5	**Properties of Context-Free Languages:** Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs **Introduction To Turing Machine:** Problems that Computers cannot solve; The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines; Turing Machine and Computer.	11

Note 1: Unit 1 and Unit 5 will have internal choice.

Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.

Assignment - 2 from units 3 and 4.

Assignment - 3 from unit 5.

Course Outcomes

At the end of the course the student will be able to

CO1. Design different finite state machines for regular languages, make conversion between them, construct the regular expression and study its applications.

CO2. Obtain a minimized DFA , convert the given automata to regular expressions and vice-versa and prove languages not to be regular using pumping lemma.

CO3. Know basic definitions in Grammar, Write CFG's , Construct parse trees, find and remove ambiguity in grammars.

CO4. Study Pushdown Automata, Design NPDA and DPDA after the CFG conversion and convert PDA's to grammar.

CO5. Convert grammar to Various Normal Forms, and Simplify the Grammar, Prove that languages are not context free using pumping lemma. Design Turing machines and understand the working of various types of Turing machines.

Cos	**Mapping with POs**
CO1	**PO1,PO2,PO3,PO4,PO6**
CO2	**PO1, PO2, PO5**
CO3	**PO1, PO3, PO5**
CO4	**PO1 PO2, PO5**
CO5	**PO1, PO2, PO3, PO5, PO6**

Text Book

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation,
   (Chapters: 1.1, 1.5, 2.2 to 2.5, 3.1 to 3.3, 4, 5, 6, 7, 8.1 to 8.4, 8.6)
   Publisher: Pearson Education; Third edition (2011)
   ISBN-10: 8131762688
   ISBN-13: 978-8131762684

Reference Books

1. K.L.P. Mishra: Theory of Computer Science, Automata, Languages, and Computation, 3rd Edition, PHI, 2007.
2. Raymond Greenlaw, H.James Hoover: Fundamentals of the Theory of Computation, Principles and Practice, Morgan Kaufmann, 1998.
3. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007.
4. Kavi Mahesh: Theory of Computation, A Problem solving approach, Wiley-India.

FACULTY NAME: DR. HARISH G, VEENA POTDAR

Sub Title : DATABASE APPLICATIONS LABORATORY		
Sub Code:CSL57	**No. of Credits:1.5= 0 :0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:
1. Provide a strong formal foundation in database concepts and technology
2. Familiarize the students with the database environments towards an information-oriented data-processing oriented framework.
3. Understand the relational data model and systematic database design approaches covering conceptual design, logical design.
4. To present the concepts and techniques relating to query processing by SQL

PART – A

INSTRUCTIONS:
1. The exercises are to be solved in an RDBMS environment like Oracle or DB2.
2. Suitable tuples have to be entered so that queries are executed correctly.
3. Relevant queries other than the ones listed along with the exercises may also be asked in the examinations.
4. Questions must be asked based on lots.

1	Consider the following relations: STUDENT(snum: int, sname: string, major: string, level: string, age: int) CLASS(cname: string, meets at: time, room: string, fid: int) ENROLLED(snum: int, cname: string) FACULTY(fid: int, fname: string, deptid: int) The meaning of these relations is straight forward; for example, Enrolled has one record per student-class pair such that the student is enrolled in the class. Level is a two character code with 4 different values (example: Junior: JR etc) Write the following queries in SQL. No duplicate should be printed in any of the answers. (i) Find the names of all juniors (level=jr) who are enrolled in a class taught by Prof. Harshith. (ii) Find the names of all classes that either meet in room R128 or have five or more students enrolled. (iii) Find the names of all students who are enrolled in two classes that meet at the same time. (iv) Find the names of faculty members who teach in every room in which some class is taught. (v) Find the names of faculty members for whom the combined enrollment of the courses that they take is less than five. vi) Generation of suitable reports
2	The following relations keep track of airline flight information: FLIGHTS(no: int, from: string, to: string, distance: int, departs: time, arrives: time, price: real) AIRCRAFT(aid: int, aname: string, cruisingrange: int) CERTIFIED(eid: int, aid: int) EMPLOYEES(eid: int, ename: string, salary: int) Note that the employers relation describes pilots and other kinds of employees as well; Every pilot is certified for some aircraft and only pilots are certified to fly. Write each of the following queries in SQL (i) Find the names of aircraft such that all pilots certified to operate them have salaries more than 80,000. (ii) For each pilot who is certified for more than three aircrafts, find the eid and the maximum cruising range of the aircraft for which she or he is certified. (iii) Find the names of the pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt. (iv) For all aircraft with cruising range over 1000 Kms, find the name of the aircraft and the average salary of all pilots certified for this aircraft.

	vi) Generation of suitable reports
3	Consider the following database of student enrollment in courses and books adopted for each course. STUDENT (<u>regno</u>: string, name: string, major: string, bdate: date) COURSE (<u>course#</u>: int, cname: string, dept: string) ENROLL (<u>regno</u>: string, <u>course#</u>: int, <u>sem</u>: int, marks: int) BOOK_ADOPTION (<u>course#</u>: int, <u>sem</u>: int, book-ISBN: int) TEXT (<u>book-ISBN</u>: int, book-title: string, publisher: string, author: string) i) Create the above tables by properly specifying the primary keys and the foreign keys. ii) Enter at least five tuples for each relation. iii) Demonstrate how you add a new text book to the database and make this book be adopted by some department. iv) Produce a list of text books (include Course#, Book-ISBN, Book-title) in the alphabetical order for courses offered by the 'CS' department that use more than two books. v) List any department that has all its adopted books published by a specific publisher. vi) Generation of suitable reports.
4	The following tables are maintained by a book dealer. AUTHOR (<u>author-id</u>: int, name: string, city: string, country: string) PUBLISHER (<u>publisher-id</u>: int, name: string, city: string, country: string) CATALOG (<u>book-id</u>: int, title: string, author-id: int, publisher-id: int, category-id: int, year: int, price: int) CATEGORY (<u>category-id</u>: int, description: string) ORDER-DETAILS (<u>order-no</u>: int, <u>book-id</u>: int, quantity: int) i) Create the above tables by properly specifying the primary keys and foreign keys. ii) Enter atleast five tuples for each tables. iii) Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publication is after 2000. iv) Find the author of the book which has maximum sales. v) Demonstrate how you increase the price of books published by a specific publisher by 10%. vi) Generation of suitable reports
5	Consider the following database for a banking enterprise. BRANCH (<u>branch-name</u>: string, branch-city: string, assets: real) ACCOUNT (<u>accno</u>: int, branch-name: string, balance: real) DEPOSITOR (<u>customer-name</u>: string, <u>accno</u>: int) CUSTOMER (<u>customer-name</u>: string, customer-street: string, customer-city: string) LOAN (<u>loan-number</u>: int, branch-name: string, amount: real) BORROWER (<u>customer-name</u>: string, <u>loan-number</u>: int) i) Create the above tables by properly specifying the primary keys and foreign keys. ii) Enter at least five tuples for each relation. iii) Find all the customers who have at least two accounts at the main branch. iv) Find all the customers who have an account at all the branches located in a specific city. v) Demonstrate how you delete all account tuples at every branch located in a specific city. vi) Generation of suitable reports.

PART – B

A mini project should be implemented by the students in teams. The maximum size of a team can be 2 from the same batch. The students have to finalize a project topic by discussing with the faculty. The mini project must be carried out in the college only.

The tasks when implementing mini project would be:

1. Understand the complete domain knowledge of the application and derive the complete data requirement specification for the mini project.

2. Design the ER diagram for the application
3. Design Relational Scheme diagram for the application
4. Normalization of the relational design.
5. Implement minimum 5 quires for the application
6. Documentation & submission of report.

General guidelines:

- Database for the project - Oracle / MySQL/ DB2 / SQL Server etc.

Sample Mini Projects.

- Inventory Control System.
- Material Requirement Processing.
- Hospital Management System.
- Railway Reservation System.
- Personal Information System.
- Web Based User Identification System.
- Timetable Management System.
- Hotel Management System
- Placement management system
- Library management system

Note: In the examination, the marks will be evaluated based on Part A and project demonstration, project report and viva-voce.

Course Outcomes:
1. Understand underlying concepts of database technologies.
2. Design and implement a database schema for a given problem-domain.
3. Understand, analyze, and apply common SQL Statements including DDL, DML and DCL statements to perform different operations
4. Design and implement a database for a given problem according to well-known design principles that balance data retrieval performance with data consistency

Cos	Mapping with POs
CO1	PO2,PO3
CO2	PO2,PO3
CO3	PO1,PO3,PO4,PO5
CO4	PO3,PO4,PO5

TEXT BOOK:

Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015
ISBN-10: 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS / WEBLINKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education,2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

Sub Title : NETWORKS LAB		
Sub Code : CSL58	**No. of Credits: =0 : 0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	**Total No. of Contact Hours :**

Course objectives:

1. To understand the fundamental concepts of simulation of communication networks

2. To evaluate the UDP, TCP protocols through simulation

3. To analyze the algorithms for congestion control, shortest path routing, error checking and correction

4. To understand and evaluate the parameters to be configured for wired and wireless communication.

5. To apply socket programming and implement client-server communication.

	PART – A
1	Simulate a three nodes point-to-point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2	Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.
3	Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
4	Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and determine collision across different nodes.
5.	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.
6.	Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.
	PART – B
7	**Implement the following in C/C++:** Write a program for error detecting code using CRC-CCITT (16- bits).
8	Write a program for distance vector algorithm to find suitable path for transmission.
9	Write a program for congestion control using leaky bucket algorithm.
10	From a given vertex in a weighted connected graph, find shortest paths to other vertices using Link state algorithm.
11	Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present

Course Outcomes:

CO1: Understand the simulation of communication networks and measure and evaluate the error rate, throughput, data rate, packet drop.

CO2: Understand and analyze the transport layer protocols.

CO3: Analyze the algorithms for congestion control, shortest path routing, error checking and correction.

CO4: Evaluate the parameters to be configured for wired and wireless communication

CO5: Apply the knowledge of socket programming.

Cos	**Mapping with POs**
CO1	PO1,PO2,PO3,PO4,PO5
CO2	PO1,PO2,PO3,PO4,PO5
CO3	PO1,PO2,PO3,PO4,PO5
CO4	PO1,PO2,PO3,PO4,PO5
CO5	PO1,PO2,PO3,PO4,PO5

Note:

Simulation Exercises:

Experiments 1 to 6 shall be conducted using either NS-2/OPNET or any other suitable simulator

In the examination, a combination of one problem has to be asked from Part A for a total of 25 marks and one problem from Part B has to be asked for a total of 25marks. The choice must be based on random selection from the entire lots.

FACULTY NAME

Dr. MARY CHERIAN

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

SUBJECT TITLE:JAVA PROGRAMMING LAB		
SUBJECTCODE:CSL59	**No. of Credits:1=0 : 0 : 1 (L-T-P)**	**No. of Lecture hours per week:2**
Exam Duration :3 hours	**CIE + SEE = 50 + 50 =100**	

Course Objectives:

CO1: Design and develop programs based on the principles of object-oriented programming.
CO2: Apply the concepts of multithreading, interface, packages and ability to design Socket Connection.
CO3: Design and develop of GUI by applying the concepts of AWT and Applets.
CO4: Design and develop of JDBC connections and creating JSP by applying concept of servlets.

1. a) Design and implement a JAVA Program to demonstrate Constructor Overloading and Method overloading.

b) Write a JAVA program to implement Inner class and demonstrate its Access protections.

2. a) Write a JAVA program to demonstrate reusability using Inheritance.

b) Write a JAVA program to handle run-time errors using Exception Handling *(Using Nested try catch and finally)* mechanism.

3. a) Write a JAVA program to create five threads with different priorities. Send two threads of the highest priority to sleep state. Check the aliveness of the threads and mark which is long lasting.

b) Write a Java program using synchronized threads which demonstrate producer-consumer concepts.

4. a) Create an interface and implement it in a class in JAVA.

b)Write a program to make a package balance in which has account class with display_balance method in it. Import Balance package in another program to access display_Balance method of Account class.

5. a) Write JAVA Applet program which handles Mouse Event.

b) Write JAVA Applet program to Pass parameters and display the same.

6. Write a Swing application which uses **a)** JTabbed Pane **b)** Each tab should Jpanel which include any one component given below in each JPannel **c)** ComBox/List/Tree/RadioButton
7. a) Implement a JAVA Servlet Program to implement a dynamic HTML using Servlet *(user name and password should be accepted using HTML and displayed using a Servlet).* **b)** Design a JAVA Servlet Program to Download a file and display it on the screen *(A link has to be provided in HTML, when the link is clicked corresponding file has to be displayed on Screen).*
8. a) Design and implement a simple Client Server Application using RMI. **b)** Design and implement Client Server communication using socket programming *(Client requests a file, Server responds to client with contents of that file which is then display on the screen by Client).*
9. a) Design and Implement a Simple JDBC application program. **b)** Implement a JAVA Servlet Program to implement sessions using HTTP Session Interface.
10.a) Design a JAVA JSP Program to implement verification of a particular user login and display a welcome page. **b)** Design and implement a JAVA JSP Program to get student information through a HTML and create a JAVA Bean Class, populate Bean and display the same information through another JSP.

Course outcomes

CO1: Apply object oriented programming, exception handling and multithreading concepts in problem solving. **CO2:** Design and implement Applets, Parameterized Applets program and incorporating multithreading and event handling mechanisms. **CO3:** Use of Swings aspects in graphical interactive application development and JDBC for database transactions, Handling HTTP requests and responses. **CO4:** Develop applications using Socket connection and RMI and JSP.

Cos	Mapping with POs
CO1	PO1,PO3,PO4,PO5
CO2	PO1,PO3,PO4
CO3	PO1,PO3,PO4,PO5,PO9,PO11
CO4	PO1,PO3,PO4,PO5,PO9,PO11,PO12

Prepared By:

PUSHPAVENI H P

VEENA A

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Sub Title : Unix System Programming		
Sub Code:CS61	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:

1. To familiarize with POSIX and Unix standards
2. To familiarize with the UNIX kernel structure and system calls.
3. Able to produce programs similar to standard UNIX utilities using raw UNIX System.
4. TO manipulate system resources such as files, processes and system information.
5. Implement IPC and Signal process.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** The POSIX Standards, The POSIX.1 FIPS Standard, **UNIX Files:** File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.	8
2	**UNIX File APIs**: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.	8
3	**UNIX Processes:** The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes.	8
4	**Process Control:** Introduction, Process Identifiers, fork, vfork, exit, Zombie process,wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Interpreter Files, system Function. **Process Relationships:** Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal,Job control,Orphaned Process Groups.	9
5	**Signals:** Signals: The UNIX Kernel Support for Signals, signal sets, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, **Interprocess Communication :** Overview of IPC Methods, Pipes, popen, pclose Functions, FIFOs, Message Queues.	9

Note 1:Three assignments are evaluated for 5 marks: Assignment – 1 from units 1 and 2. Assignment - 2 from units 3, 4 and Assignment 3 from unit 5.

Course Outcomes:

1. Understand POSIX and UNIX standards to maximize portability of their applications

2. Understand UNIX kernel structure and system calls. These allow users to write sophisticated Applications to manipulate system resources and to design new operation systems.

3. Determine the basic IPC issues and techniques in UNIX system programming

Cos	Mapping with POs
CO1	PO1,PO2,P03,PO5
CO2	PO1,PO2,P03,PO5
CO3	PO1,PO2,P03,PO5

TEXT BOOK:

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999. (Chapters 1, 5, 6, 7, 8, 9, 10)

2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005.(Chapters 7, 8, 9, 13, 14, 15)

REFERENCE BOOKS/WEBLINKS:

1. Marc J. Rochkind: Advanced UNIX Programming, 2nd Edition, Pearson Education, 2005.

2. Maurice J Bach: The Design of the UNIX Operating System, Pearson Education, 1987.

3. Uresh Vahalia: UNIX Internals: The New Frontiers, Pearson Education, 2001.

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Sub Title: Compiler Design		
Sub Code:CS62	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives

The objective of the course is to

1. Present fundamental concepts and techniques for the design of a compiler.
2. Provide necessary background for writing algorithms for different language constructs in a formal way.
3. Identify the methods and strategies for parsing techniques along with its construction.
4. To enrich the knowledge of storage management and allocation strategies.
5. Optimize the intermediate code and generate its target language code.

Unit No.	Syllabus Content	No. of Hours
1	**Introduction:** Language Processors, The Structure of a Compiler, The Evolution of Programming Languages, The Science of Building a Compiler, Applications of Compiler Technology, Programming Language Basics.	10
2	**Lexical Analysis:** The Role Of Lexical Analyzer, Input Buffering, Specifications Of Tokens, Recognition Of Tokens. **Syntax Analysis:** Introduction, Context Free Grammars.	10
3	**Syntax Analysis:** Writing a Grammar, Top Down Parsing. Bottom Up Parsing.	10
4	**Syntax Analysis:** Introduction to LR Parsing, Simple LR Parser, More Powerful LR Parsers, Using Ambiguous Grammars. **Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation Order for SDD's, Application of Syntax Directed Translation, Syntax Directed Translation Schemes	11
5	**Run-Time Environments:** Storage Organization, Storage Allocation of Space, Access to Non Local Data on the Stack, Heap Management, Introduction to Garbage Collection. **Code Generation:** Issues In The Design Of Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks And Flow Graphs, Next-Use Information, A Simple Code Generator.	11

Note 1: Unit 4 and Unit 5 will have internal choice.

Note 2:Two assignments are evaluated for 5 marks: Assignment – 1 from units 1 and 2. Assignment - 2 from units 3, 4 and 5.

Course Outcomes

At the end of the course the student will be able to

CO1. Illustrate the structure of a compiler including its phases and components.

CO2. Design and implement Lexical Analyzer for programming constructs like keywords, operators, identifiers, delimiters, integers and fractions and have good knowledge about Grammars.

CO3. Acquire the working principles of parser with its types and extend the knowledge by parsing LL parser and Operator Precedence parser.

CO4. Design and describe the various LR parsers for a given CFG and also exemplify the

knowledge of language specifications using CFG by designing SDD's and SDT's.
CO5. Describe the storage organization of compiler's run time environment. Apply code optimization techniques to improve the performance of a program in terms of speed & space and demonstrate the use of memory/register allocation and instruction selection in code generation.

Cos	Mapping with POs
CO1	**PO1, PO6**
CO2	**PO1, PO3, PO5**
CO3	**PO1, PO3, PO5**
CO4	**PO1 P,2, PO3, PO5, PO6**
CO5	**PO1, PO2, PO5, PO6**

Text Book
1. Alfred W Aho, Monica S Lam, Ravi Sethi, and Jeffrey D Ullman, "**Compilers- Principles, Techniques and Tools**"

Publisher: Pearson Education; Second edition (1 January 2011)
ISBN-10: 8131759024
ISBN-13: 978-8131759028

Reference Books
1. Andrew W Apple, "**Modern Compiler Implementation in C**", Cambridge University Press, 1997.
2. Kenneth C Louden, "**Compiler Construction Principles & Practice**", Thomson Education, 1997.
3. Charles N Fischer, Richard leBlanc, Jr, "**Crafting a Compiler with C**", Pearson Education, 1991.

FACULTY NAME : HARISH G

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Sub Title : Web Technologies		
Sub Code:CS63	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:

1. To familiarized with terminologies, tools, protocols used in web
2. Identify a valid standards-conformant XHTML document involving a variety of elements Such as, Hyperlinks, images, lists, tables, and forms etc… and apply styles using CSS.
3. Analyze how JavaScript programs are used to create interactive web page including the Use of Event-handlers and the Document Object Model.
4. Create well-formed XML documents.
5. Design database driven web applications using a server-side scripting language.

UNIT No	Syllabus Content	No of Hours
1	**Fundamentals of Web, XHTML – 1:** Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links. **XHTML**: Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links.	08
2	**XHTML – 2, CSS:** Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The <span> and <div> tags, Conflict resolution.	08
3	**JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples. **JavaScript and DHTML Documents: JavaScript** and HTML Documents, Dynamic Documents with JavaScript: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification.	09
4	**Dynamic Documents with JavaScript:** Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements **XML:** Introduction, Syntax, Document structure, Document Type	09

	definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.	
5	**PHP:** Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking. Database Access: Relational databases, Architectures for database access, MySQL, Database access with PHP and MySQL.	08

Note1: **Three assignments are evaluated for 5 marks:**

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand terminologies, tools and protocols used in web.

CO2: Design, Understand and analyze static web pages.

CO3: Design.understand dynamic and interactive web pages.

CO4: Design and Describe the data and information.

CO5: Demonstrate the ability to retrieve data from a database and present it on a web page
.

Cos	Mapping with POs
CO1	PO1,PO2,PO5
CO2	PO1,PO2,PO3
CO3	PO1,PO2,PO3,PO5
CO4	PO1,PO2,PO4
CO5	PO1,PO2,PO3,PO5

Text Book:

1. Robert W. Sebesta: Programming the World Wide Web, 4th edition, Pearson education, 2012.

Reference Books:

1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to H program, 4th Edition, Pearson education, 2011.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2011.
3. Joyce Farrell, Xue Bai, Michael Ekedahl: The Web Warrior Guide to Web Programming, First edition, Thomson, 2010.

Web Links: http://www.w3schools.com

FACULTY INCHARGE:

1. Harish Kumar

Sub Title : COMPUTER GRAPHICS AND VISUALIZATION		
Sub Code:CS64	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:

This course will help students to achieve the following objectives:

1. Identify the software and hardware components of a computer graphics system,

2. Understand basics of OpenGL API's and write graphics programs with input interaction using mouse and keyboard.

3. Understand the concept of geometrical transformations, coordinate systems in graphics systems.

4. Understand Rasterization, clipping, hidden surface algorithms, and other implementation details and viewing of graphics primitives in three-dimensions.

5. Understand the rendering and Lighting techniques.

Unit No.	Syllabus Content	No. of hours
1.	**Introduction:** Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging Systems; The synthetic camera model; The programmer's interface; Graphics architectures; Programmable Pipelines; Performance Characteristics Graphics Programming: The Sierpinski gasket; Programming Two Dimensional Applications.	**7**
2.	**The OpenGL:** The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket; Plotting Implicit Functions. **Input and Interaction:** Interaction; Input devices; Clients and Servers; Display Lists; Programming Event Driven Input; Menus; Animating Interactive Programs; Design of Interactive Programs; Logic Operations.	**10**
3.	**Geometric Objects and Transformations:** Scalars, Points, and Vectors; 3-D Primitives; Coordinate Systems and Frames; Modeling a Colored Cube; Affine Transformations; Rotation, Translation and Scaling; Geometric Objects and Transformations; Transformation in Homogeneous Coordinates; Concatenation of Transformations; OpenGL Transformation Matrices.	**8**
4.	**Implementation:** Basic Implementation Strategies; Four major tasks; Clipping; Line-segment clipping; Polygon clipping; Rasterization; Bresenham's algorithm; Hidden-surface removal; **Viewing:** Classical and computer viewing; Viewing with a Computer; Positioning of the camera; Simple projections; Projections in OpenGL; Parallel-projection matrices; Perspective-projection matrices;	**10**

5.	**Lighting and Shading:** Light and Matter; Light Sources; The Phong Lighting model; Polygonal Shading; Light sources in OpenGL; Specification of materials in OpenGL;	**7**

Note 1: Unit 2 and Unit 4 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
At the end of the course students will be able to:

CO1: Describe the software and hardware components of a computer graphics system, Graphics Architecture and basics of OpenGL API's.
CO2: Identify the input and output devices of graphics system and design interactive graphics programs using OpenGL.
CO3: Explain the geometrical transformations in different coordinate systems.
CO4: Identify different types of viewing and projections in OpenGL and derive their matrix formulations and clipping, rasterization and hidden surface algorithms, and implement using OpenGL.
CO5: Apply the rendering and Lighting techniques to 3D graphics using OpenGL.

Cos	Mapping with POs
CO1	PO1,PO3,PO5
CO2	PO2,PO3,PO4,PO5
CO3	PO1,PO2,PO3
CO4	PO1,PO2,PO3
CO5	PO2,PO3

Text Books

1. Edward Angel: Interactive Computer Graphics A Top-Down Approach with OpenGL, 5th Edition, Pearson Education, 2013. **ISBN-13: 9788131797259**

Reference Books

1. Donald Hearn, Pauline Baker and Warren Carithers: Computer Graphics with OpenGL, 4th Edition, Pearson Education, 2015. **ISBN-13: 9789332518711**
2. F.S. Hill Jr.: Computer Graphics Using OpenGL, 3rd Edition, Pearson education, 2013. **ISBN-13: 9780131496705**

Faculty Name:

1. **Prof. Asha K N**
2. **Prof. Vinod Kumar K P**

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Sub Title : COMPUTER GRAPHICS AND VISUALIZATION LABORATORY		
Sub Code:CSL66	**No. of Credits:1.5=0 : 0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

This course will help students to achieve the following objectives:

1. Understand and explain the mathematical and theoretical principles of computer graphics eg: To draw basic objects like lines, triangles and polygons and apply animation, also model 3D objects using openGL built-in functions.
2. Use matrix algebra in computer graphics and implement fundamental algorithms and transformations involved in viewing models.
3. Write basic but complete graphics software systems projection models, illumination models and handling of hidden surfaces and clipping in computer graphics.

Sl. No.	**Design, develop, and implement the following programs in C / C++**
1.	a. Program to implement a FLYING KITE b. Create 2D Sierpinski gasket by recursive subdivision of triangle.
2.	a. Write a program to rotate a square. Rotate on mouse left-button clicks. On right click, stop rotation. b. Create 3D Sierpinski gasket by recursive subdivision of tetrahedron.
3.	a. Write a program to handle mouse events. Plot points in random colors by pressing the mouse left button. The display window must be cleared when you press the mouse right button. b. Write a program to demonstrate the usage of display lists. The list should define various geometric objects like square, rectangle, triangle.
4.	a. Write a program to create a font for the letter S of user input thickness. b. Write a program to perform rotation of a cube using vertex arrays.
5.	a. Write a program to create a font for the letter O of user input thickness b. Write a program to draw a color cube and allow the user to move the camera suitably to experiment with perspective viewing.
6.	a. Write a program to create a chessboard. b. Write a program, using OpenGL functions, to demonstrate properties of the light source along with properties of the surfaces of the solid object.
7.	a. Write a program to create a rotating wheel. b. Write a program to draw a square. Use popup menu with options to quit or resize the square. The resize option has submenu with increase size and decrease size as options. The increase size must double the size of the square and the decrease size option must reduce the size by 2. (half size).

8.	a. Write a program to display a hierarchical menu as below using popup menu. When an option is selected, display the option on output window. View ________ normal | _print |_web Edit__________ cut |_ copy |_paste b. Write a program to create a house like figure and rotate it about a given fixed point using OpenGL functions.
Note: One program from Part A (20 marks) and One program from Part B (30marks) should be executed.	

Course Outcomes:
At the end of the course students will be able to:

CO1: Model 3D objects and also able to animate using openGL built-in functions.

CO2: Use matrix algebra in computer graphics and implement fundamental algorithms and transformations involved in viewing models.

CO3: Design and Develop complete graphics software systems projection models, illumination models and handling of hidden surfaces and clipping in computer graphics.

Cos	**Mapping with POs**
CO1	PO1,PO2,PO3,PO5,PO12
CO2	PO1,PO2,PO3,PO5
CO3	PO1,PO2,PO3,PO5,PO12

Faculty Name: **Prof. Asha K N**
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Sub Title : Web Technologies Laboratory		
Sub Code:CSL67	**No. of Credits:1.5 =0 : 0 : 1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

This course will help students to achieve the following objectives:

1. Identify a valid standards-conformant XHTML document involving a variety of element types, Including hyperlinks, images, lists, tables, and forms using CSS.

2. Analyze how JavaScript programs are used to create interactive web page including the use of Event-handlers and the Document Object Model.

3. Implement well-formed XML documents and XSLT.

4. Design simple database driven web applications using a server-side scripting language

Unit No	Details
1	Develop and demonstrate a XHTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color, the<span>and<Div> tag.
2	Develop and demonstrate a XHTML file that includes JavaScript script for the following problems: a) ***Input:*** A number n obtained using prompt ***Output*:** The first n Fibonacci numbers b) ***Input:*** A number n obtained using prompt ***Output:*** A table of numbers from 1 to n and their squares using alert
3	Develop and demonstrate a XHTML file that includes JavaScript script that uses functions for the following problems: a***)*** ***Parameter:*** A string ***Output:*** The position in the string of the left-most vowel b) ***Parameter:*** A number ***Output:*** The number with its digits in the reverse order
4	**a)** Develop and demonstrate, using JavaScript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected. **b)** Modify the above program to get the current semester also (restricted to be a number from 1 to 8)
5	**a)** Develop and demonstrate, using JavaScript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible. **b)** Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.

6	Develop and demonstrate, using JavaScript script, a XHTML document that collects the Password (the valid format is: 7 to 16 characters which contain only characters, numeric digits, underscore and first character must be a letter, no embedded space is allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
7	**a)** Design an XML document to store information about a student in Dr.AIT. The information must include USN, Name, Branch, Year of Joining, and e-mail id. Make up sample data for 5 students. Create a CSS style sheet and use it to display the document. **b)** Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.
8	**a)** Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page. **b)** Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.
9	Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name. (using php)
Instructions: Student is required to solve one problem in the examination. The questions are allotted based on lots.	

Course Outcomes:
At the end of the course students are :

CO1: Design, Understand and analyze static web pages.

CO2: Design, Understand dynamic and interactive web pages.

CO3: Design well-formed XML documents and XSLT.

CO4: Demonstrate the ability to retrieve data from a database and present it on a web page

Cos	Mapping with POs
CO1	PO1,PO2,PO3
CO2	PO1,PO2,PO3,PO5
CO3	PO1,PO2,PO4
C04	PO1,PO2,PO3,PO5

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Sub Title : Distributed Operating System		
Sub Code:CS651	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

1. To explore distributed systems principles associated with communication, naming, synchronization, distributed file systems, system design, distributed scheduling,
2. To understand both foundational concepts and well as practical deployments.
3. To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
4. To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols.

UNIT No	Syllabus Content	No of Hours
1	**Fundamentals:** What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE).	10
2	**Message Passing**: Introduction, Desirable features of a Good Message Passing System, Issues in IPC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication.	10
3	**Remote Procedure Calls**: Introduction, The RPC Model, Transparency of RPC,Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance	10
4	**Distributed Shared Memory:** Introduction, General Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. **Synchronization:** Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms	11
5	**Resource Management:** Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load –	11

	Balancing Approach, Load – Sharing Approach. **Process Management:** Introduction, Process Migration, Threads. **Distributed File Systems:** Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions, Design Principles.	

Note 1: Unit 4 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes: After Completion of the course the students shall be able to

1. Understanding distributed systems concepts
2. Demonstrate an ability to apply theory and techniques to unseen problems.
3. Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system.
4. Explore the various resource management techniques for distributed systems

Cos	Mapping with POs
CO1	PO1,PO2,PO3
CO2	PO1,PO2,PO3,PO4
CO3	PO1,PO2,PO3,PO4
CO4	PO1,PO2,PO3,PO4

TEXT BOOK:

1. Pradeep. K. Sinha: Distributed Operating Systems: Concepts and Design, PHI, 2007.

REFERENCE BOOKS/WEBLINKS:

1. Andrew S. Tanenbaum: Distributed Operating Systems, Pearson Education, 2002.

FACULTY INCHARGE:

1. Harish Kumar

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Sub Title : MOBILE ADHOC NETWORKS		
Sub Code:CS653	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

1. To understand the fundamental and advanced concepts of Ad hoc Networks.

2. To understand the fundamental and advanced concepts of MAC layer protocols of Ad hoc Networks

3. To understand and analyze routing protocols of Ad hoc Networks.

4. To understand the Transport layer of Ad hoc Networks.

5. To create the awareness of QoS in Ad hoc Networks.

UNIT NO.	Syllabus Content	No of Hours
1	**Ad hoc wireless Networks**: Introduction, -Cellular and Ad Hoc Wireless Networks, Applications. Issues in Ad hoc wireless networks- Medium access, routing, multicasting, transport layer, pricing, Quality of service, self organization, security, addressing, energy management, scalability, deployment Ad hoc wireless internet.	10
2	**MAC:** MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad hoc wireless Networks, Classification of MAC protocols, Contention based protocols(MACAW,MACA-BI,MARCH). **MAC:** Contention based protocols with reservation mechanisms (D-PRMA, CATA, RTMAC). Contention-based MAC protocols with scheduling mechanism (DPS, DWOP), MAC protocols that use directional antennas.	11
3	**Routing- Routing protocols for Ad hoc wireless Networks**: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table driven routing protocols (DSDV,WRP,CGSR), On-demand routing protocols (DSR,AODV,TORA) **Routing:** Hybrid routing protocol, Routing protocols with effective flooding mechanisms, Hierarchical routing protocols, Power aware routing protocols.	11
4	**Transport Layer:** Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks(TCP-F,TCP-BUS,ATCP,SPLIT-TCP).	10

5	**QoS:** Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions(cluster TDMA), network layer solutions(Ticket based, TDR, QoS enabled AODV,OQR).	**10**

Note 1: Unit 2 and Unit 3 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand the fundamental and advanced concepts of Ad hoc Networks.

CO2: understand the fundamental and advanced concepts of MAC layer protocols of Ad hoc networks.

CO3: Understand and analyze routing protocols of Ad hoc Networks.

CO4: Understand the Transport layer concepts of Ad hoc Networks.

CO5: Create the awareness of QoS in Ad hoc Networks.

Cos	Mapping with POs
CO1	PO1,PO2, PO6,PO12
CO2	PO1,PO2,PO6,PO12
CO3	PO1,PO2,PO6,PO12
CO4	PO1,PO2,PO6,PO12
CO5	PO1,PO2,PO6,PO12

TEXT BOOK:

1. C. Siva Ram Murthy & B. S. Manoj, Ad hoc Wireless Networks Architectures and Protocols, ISBN: 978-81-317-0688-6, 2014.

REFERENCE BOOKS/WEBLINKS:

1. Stefano Basagni , Marco Conti , Silvia Giordano , and Ivan Stojmenovic, Mobile ad hoc networking , ISBN: 978-0-471-65688-3,2010 .
2. C.K. Toh: Adhoc Mobile Wireless Networks- Protocols and Systems, Prentice-Hall PTR, ISBN:0130078174,2007.
3. Jonathan Loo , Jaime Lloret Mauri and Jesús Hamilton Ortiz, Mobile ad hoc networks: current status and future trends, Kindle edition, ISBN 9781439856505 - CAT# K12654, 2011.

FACULTY NAME

Dr. MARY CHERIAN

	Course Title: Android programming		
	Course Code: CS71	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Learn and use Android application development platform for mobile devices. 2. Understand how Android application works, their life cycle, manifestation, intents and using external resources. 3. Design and use appropriate tools for android development including IDE, device emulator, and profiling tools. 4. Design applications to save data in SQLite. 5. To understand windows Mobile Programming for smart phones.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction To Android:** A Little Background; J2ME to Android; What is Android?; An Open-Platform for Mobile Development; Introducing the open handset alliance; Android Architecture (Layers of Android), Android: Android SDK Features; Why Develop for Mobile?; Variants of Android ;Types of Application developed using Android; Native Android Applications and Hybrid Application; Dalvik Virtual Machine; **Android Application Manifestation :**What is a .dex files; What is an .apk file; Basic Building Blocks of Android (Activities, Intents, Content Providers, Services Broadcast Receivers); Structure of Android Project; What Makes an Android Application?; Introducing the Application Manifest; Possibilities with Android; Drawable Resources; Resolution and Density Independence;	**08**
2	**Android Application Life Cycle:** Introducing the Android Application Class; Activity Life Cycle; Creating User Interfaces; The Android Application Life Cycle; Layout Managers (Linear Layout and Relative Layout); Hello World Android Application; View Click Handling; Let's Make a Toast; Fundamental Android UI Design, Introducing Views, Creating and Using Menus; Introducing Intents, Types of Intents; Creating Dialogs; Bundle; Shared Preferences; Types of Preferences; Storing and Retrieving Data from Shared Preferences. Working with Files (Reading and Writing Files). Asynchronous Tasks, Working with Threads;	**08**
3	**Introduction to Android Databases:** Introducing Android Databases Introducing SQLite, Working with SQLite Databases, OnCreate() and onUpgrade() methods. Cursors and Content Values, Creating a New Content Provider, Using Content Providers, Creating and Using an Earthquake Content Provider, Accessing Android Content Providers.	**08**

4	**Android Services:** Services in Android; Types of Services; Local Service; Remote Service; Intent Service. Broadcast Receivers; Types of Broadcasts; Creating a Broadcast Receivers; Introducing Notifications;	**07**
5	**Location Based Services**: Using Location-Based Services, Configuring the Emulator to Test Location-Based Services, Updating Locations in Emulator Location Providers, Selecting a Location Provider, Finding Your Location, Using Proximity Alerts, Using the Geocoder, Creating Map-Based Activities, Mapping Earthquakes Example Using Background Threads. **Multimedia an Sensors:** Playing Audio and Video, Recording Audio, Using the Camera and Taking Pictures, Telephony, Introducing SMS and MMS; Using Sensors and the Sensor Manager Using the Compass, Accelerometer, and Orientation Sensors, Controlling Device Vibration; Communicating to Web Services, Using Alarms; Working with Adapters	**11**

Self Study Component

Students will be carrying out an Android Application covering the above concepts.

Course Outcomes	Description	RBT Levels
CO1	Ability to understand the fundamentals of Android Application Framework.	
CO2	Ability to design and develop android applications with compelling user interface.	
CO3	Ability to demonstrate the storing of data on persistent storage.	
CO4	Analyze the problem to build their own mobile apps using Android's APIs.	
CO5	Ability to apply different packages and hardware resources to design a given application.	

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	1	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Professional Android 2 Application Development by Reto Meier, Wiley Publishing, 2010.
2. Pro Android by Sayed Y. Hashimi, Satya Komatineni, Apress, 2009.
3. Professional Android Application Development by Reto Meier, Wiley Publishing, 20009.

REFERENCE BOOKS:

Beginning Android by Mark Murphy, Apress, 2009.

2. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To, Addison-Wesley Professional; 2010.
3. The Busy Coders guide to Android development by Mark L Murphy, COMMONSWARE, 2009.

SELF STUDY REFERENCES/WEBLINKS:

1. Beginning Android 4 Application Development by Wei-Meng Lee, Worx Wiley Publishing, 2014. http://www3.ul.ie/ictlc/Android.pdf
2. Android Tutorial Simply Easy Learning, https://www.tutorialspoint.com//android/android_tutorial.pdf
3. https://www.coursera.org/learn/posacontent\
4. https://www.edx.org/xseries/java-android-beginners

COURSE COORDINATOR:	**1. Uma K M** **2. Lavanya Santhosh** **3. Veena A**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : Cloud Computing		
Sub Code: CS72	No. of Credits:4=4 : 0 : 0 (L-T-P)	No. of lecture hours/week : 4
Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours : 52

Course objectives:

1. To provide comprehensive view to different aspects of cloud computing like; service models, challenges & infrastructure.
2. Explore the various cloud computing applications & paradigms.
3. To introduce to cloud virtualization, with different type of virtualization.
4. To analyze how resource management and scheduling done in cloud computing.
5. To explore data storage systems in cloud computing.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Network centric computing and network centric content, Peer-to-peer systems, Cloud Computing: an old idea whose time has come, Cloud Computing delivery models & Services, Ethical issues, Cloud vulnerabilities, Challenges. **Cloud Infrastructure:** Amazon, Google, Azure & online services, open source private clouds. Storage diversity and vendor lock-in, intercloud, Energy use & ecological impact of data centers, service level and compliance level agreement, Responsibility sharing, user experience, Software licensing.	12
2	**Cloud Computing: Applications & Paradigms,** Challenges, existing and new application opportunities, Architectural styles of cloud applications, Workflows coordination of multiple activities, Coordination based on a state machine model -the Zoo Keeper, The Map Reduce programming model, Apache Hadoop, A case study: the GrepTheWeb application, Clouds for science and engineering, High performance computing on a cloud, cloud for biological research, Social computing, digital content, and cloud computing.	10
3	**Cloud Resource Virtualization:** Virtualization, Layering and virtualization, Virtual machine monitors, Virtual machines Performance and security isolation, Full virtualization and paravirtualization, Hardware support for virtualization Case study: *Xen* -a VMM based on paravirtualization, Optimization of network virtualization in *Xen* 2.0, *vBlades* -paravirtualization targeting a *x86-64* Itanium processor, A performance comparison of virtual machines, Virtual machine security, The darker side of virtualization, Software fault isolation.	12
4	**Cloud Resource Management and Scheduling:** Policies and mechanisms for resource management, Applications of control theory to task scheduling on a cloud, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, A utility-based model for cloud-based web services, Resource bundling, combinatorial auctions for cloud resources, Scheduling algorithms for	12

	computing clouds, fair queuing, Start time fair queuing, Cloud scheduling subject to deadlines, Scheduling mapreduce applications subject to deadlines.	
5	**Storage systems**: Storage models, file systems, databases, DFS, General parallel File system, GFS, Apache Hadoop, Locks & Chubby, TPS & NOSQL databases, Bigdata, Mega store.	06

<u>Note 1:</u> Unit 2 and Unit 3 will have internal choice. One question each from units 1, 4 and 5.
<u>Note 2:</u> Two assignments are evaluated for 5 marks: Assignment – 1 from units 1 and 2 and Assignment -2 from units 3 and 4.

Course Outcomes:
Upon successful completion of this course, the students will be able to

1. CO1: Obtain knowledge on different aspects of cloud computing like; service models, challenges & infrastructure.
2. CO2: Explore and Analyze different cloud computing applications & paradigms.
3. CO3: Analyze the importance of virtualization and different features of Virtual Machine (VM) in cloud computing
4. CO4: To explore and Analyze different mechanisms and polices used in resources management and scheduling.
5. CO5: To obtain knowledge on storage systems in cloud computing

Cos	**Mapping with POs**
CO1	PO1,
CO2	PO1, PO2,
CO3	PO1, PO2, PO3
CO4	PO1, PO2, PO3
CO5	PO1, PO2,

TEXT BOOKS:

1. Cloud Computing: Theory and Practice, Dan Marinescu, 1^{st} edition, MK Publishers, Elsevier print, 2013. ISBN: 978-0-12404-627-6

REFERENCES:

1. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Kai Hwang, Jack Dongarra, Geoffrey Fox. MK Publishers, Elsevier Print, ISBN: 978-0-12-385880-1
2. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, McGraw Fill, 2010. ISBN: 978-07-162695-6, MHID: 0-07-162695-6

<u>Faculty Incharge :</u>

1. Dr.Prakash . S
2. Praveena M.V

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : ANDROID PROGRAMMING lAB		
Sub Code:CSL75	**No. of Credits:1.5=0 : 0 :1.5 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

1. To Learn and acquire art of Android Programming.
2. To configure initial application, run in emulator.
3. Understand and implement Android's advanced User interface functions, audio video applications
4. Create, modify and query on SQlite database
5. Present different ways of sharing data through the use of services

1.	Write a program to create an Activity to read Employee Details (EmpId, Name,AGe,Address) from the user and to store database and create a menu with menu item (Show Details) on pressing menu details it must go to another activity with employee id search box and search button and display the employee details on the screen
2.	Write a program to create an activity with a text box and three buttons (save,open and create) open must allow to browse the text file from sdcard and must display the contents of the file on text box, save button must save the contents of the text box to file, create button must allow file user to create a new file and save the entered contents of the text box.
3.	Write a program to create an activity with a text boxes (date/time and note contents). Create a content provider to store date and time and note contents to the database. Create another program with the Button (Fetch Today Notes) on Press must access the note provider and display the notes stored for today's date.
4.	Write a program to create an activity with two buttons start and stop. OnPressing start button , the program must start the counter and must keep on counting until stop button is pressed.
5.	Create the program to receive the incoming SMS to the phone and put a notification on the screen, onputting the notification it must display the sender number and message

	content on screen.
6	Create a program to create a service that will put a notification on the screen every 5 sec
7.	Create an .aidl service to add, subtraction and multiplication and create another application with two buttons to read the inputs and three buttons add, subtract and multiply to call add, subtract and multiply operations on .aidl service.
8.	Create an activity like a phone dialler with (1,2,3,4,5,6,7,8,9,0,*,#) buttons and call and save button on pressing the call button it must call the phone number, and on pressing the save button it must save the number to the save number to the phone contact.

Course Outcomes:

CO1:Understand the android OS and fundamental concepts in Android Programming.
CO2: Demonstrate various components, layouts and views in creating Android applications
CO3: Design applications to save or to store data in SQLite
CO4: Demonstrate the sharing data with different applications and sending sms
CO5: Demonstrate how to write applications using services.

Cos	Mapping with POs
CO1	PO1, PO2,PO3,PO11
CO2	PO1, PO2,PO4,PO5,PO9,PO10,PO12
CO3	PO1, PO2,PO4,PO11
CO4	PO1, PO2,PO3,PO4,PO5,PO8,PO9
CO5	PO1, PO2,PO5,PO11,PO12

FACULTY INCHARGE:

1. LAVANYA SANTHOSH

2. HARPRITHA K M

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : Cloud Computing Lab		
Sub Code: CSL76	No. of Credits:1.5 =1.5 : 0 : 0 (L-T-P)	No. of lecture hours/week :

Course objectives:

1. To Install and understand Virtual Box by deploying web application
2. To get Hands on with Different Cloud services: Amazon, Microsoft Azure. Google apps
3. To Create and provision VMs on any Cloud Simulation environments, and execute different polices to understand the VM features

1. Case Study of VirtualBox: Install VirtualBox software and an operating system to it. Deploy a web application to read a text file and display it on the web browser.
2. Case Study of Amazon: Create a web application to enter the students' details like name, USN, semester, section and CGPA to a database and deploy it on Amazon EC2.
3. Case Study of Amazon: Create a web application to implement an online cart for adding items to a shopping cart and deleting it. Deploy it on Amazon EC2.
4. Case Study of Amazon: Create a web application to enter the faculty details like faculty ID, faculty name, and salary to a database and calculate the income tax to be paid by the faculty at the end of financial year and deploy it on Amazon S3.
5. Case Study of Azure: Create a web application to book a flight from a source to destination and store the status of flight, and departure timings on database.
6. Control panel software manager Application of hypervisors.
7. Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively.
8. Modeling and simulation Cloud computing environments, including Data Centers, Hosts and Cloudlets and perform VM provisioning using CloudSim: Design a host with two CPU cores, which receives request for hosting two VMs, such that each one requires two cores and plans to host four tasks units. More specifically, tasks t1, t2, t3 and t4 to be hosted in VM1, while t5, t6, t7, and t8 to be hosted in VM2. Implement space-shared allocation policy and time-shared allocation policy. Compare the results.

Course Outcomes:
Upon successful completion of this course, the students will be able to
To have clear case study on working of different Cloud services

CO1:. learn about Amazon EC2. Amazon Cloud computing platform, Amazon Web Services.

CO2: Microsoft Azure cloud computing platform and infrastructure, deploying and managing applications and services

CO3: Google Apps: Google Drive, Google Docs and Google Slides

CO4: To create and run VMs on any Virtualization Hypervisors.

Cos	**Mapping with POs**
CO1	PO1, PO2, PO3,
CO2	PO1, PO2, PO3
CO3	PO1, PO2, PO3
CO4	PO1, PO2,PO3

<u>**Faculty Incharge :**</u>

Dr.Nandini N

Sub Title : WIRELESS SENSOR NETWORKS		
Sub Code:CS731	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

1. Understand the challenges and applications of WSN
2. Analyze single node and network Architecture of WSN.
3. Classify MAC and link layer protocols in WSN
4. Understand the concept of Topology control in WSN
5. Explain routing protocols in WSN

UNIT NO.	Syllabus Content	No of Hours
1	**Introduction and Architecture** The vision of Ambient Intelligence, Application examples, Types of applications, Challenges for Wireless Sensor Networks, Applications for wireless sensor networks, enabling Technologies for Wireless Sensor Networks, Mobile ad hoc networks and wireless sensor networks. **Single-Node Architecture** - Hardware Components, Energy Consumption of Sensor Nodes (only Operation states with different power consumption, Relationship between computation and communication, Power consumption of sensor and actuators is included), Operating systems and execution environments (Except case study and other examples).	11
2	**Network Architecture** Sensor Network Scenarios, Optimization goals and figures of merit, Design principles of WSN, Service interfaces of WSNs, Gateway-concepts.	10
3	**Mac Protocols** Fundamentals of (wireless) MAC protocols, Contention based protocols, Schedule based protocols, The IEEE 802.15.4 MAC protocol (Only Network architecture and types/roles of nodes, Superframe structure). **Link Layer Protocols** Fundamentals, Error control (only Causes and characteristics of transmission errors, ARQ techniques, FEC techniques, Power control), framing.	11
4	**Topology control and Routing protocols** Motivation and basic ideas, The many faces of forwarding and routing, Gossiping and agent-based Unicast forwarding, Energy-efficient Unicast.	10
5	**Routing protocols contd...** Broadcast and multicast, Geographic routing, Mobile nodes	10

<u>Note 1:</u> Unit 1 and Unit 3 will have internal choice.

<u>Note 2:</u> Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.

Assignment - 2 from units 3 and 4.

Assignment - 3 from unit 5.

Course Outcomes:

1. Understand the basics and challenges of Wireless sensor Networks
2. Summarize single node and network architectures of Wireless sensor Networks.
3. Apply the knowledge of MAC and link layer protocols of wireless sensor networks.
4. Use Topology control and Routing protocols for solving the problems creatively.

COs	Mapping with POs
CO1	PO1,PO2, PO6,PO12
CO2	PO1,PO2,PO5,PO6,PO12
CO3	PO1,PO2,PO6,PO12
CO4	PO1,PO2,PO5,PO6,PO12

TEXT BOOKs:

1. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks"John-Wiley,First-Edition-2014,ISBN:978-0-470-09510-2. .

REFERENCE BOOKS/WEBLINKS:

1. Kazem Sohraby, Daniel Minoli, &Taieb Znati, "Wireless Sensor Networks-Technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

FACULTY INCHARGE:

1. Asha K N

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

Sub Title : Advanced Algorithms		
Sub Code:CS732	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

The objective of the course is to:

1. To understand how to design iterative and recursive algorithms for complex applications.
2. To design optimal solutions with respect to time and space.
3. To understand graph based algorithms and give optimal solutions.
4. To understand the significance of Modular arithmetic.

UNIT No	Syllabus Content	No of Hours
1	**Review of Analysis Techniques:** Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method.	11
2	**Graph Algorithms:** Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method.	11
3	**Number-Theoretic Algorithms:** Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem.	10
4	**String-Matching Algorithms:** Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata.	10
5	**Data structures:** Hash Tables, direct address tables, red-black trees: properties of red-black trees, rotations and insertion.	10

<u>Note 1:</u> Unit 1 and Unit 2 will have internal choice.

<u>Note 2:</u> Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

At the end of the course the student will be able to:

CO1: To Design optimal iterative and recursive algorithms for complex applications and compare the optimality of solutions.
CO2: Analyze a graph based application and design an algorithm to provide optimal solutions.
CO3: Analyze and compare the optimality of the algorithms with respect to time and space for string based applications.
CO4: Using modular arithmetic to build security aspects for software applications.

Cos	Mapping with Pos
CO1	PO1,PO2,PO3,PO4,PO6, PO7, PO12
CO2	PO1,PO2,PO3,PO4,PO6, PO7, PO12
CO3	PO1,PO2,PO3,PO4,PO6, PO7, PO12
CO4	PO1,PO2,PO3,PO4,PO6, PO7, PO8, PO12

TEXT BOOK:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010.
2. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.

REFERENCE BOOKS/WEBLINKS:

1. Ellis Horowitz, Sartaj Sahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007.

<u>Faculty : K R Shylaja</u>

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : Neural Networks		
Sub Code:CS733	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

The objectives of this course are to:

1) Understand the basic neuron models and learning algorithms.
2) Develop an Understanding of the concepts of Single Layer Perceptrons and multilayer perceptrons.
3) Understand the propagation learning and supervised learning.
4) Cultivate an ability to analyze the Self Organization mapping models.
5) Understand the concepts of Neuro Dynamics and Hopfield model.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** What is a Neural Network?, Human Brain, Models of Neuron, Neural Networks viewed as directed graphs, Feedback, Network Architectures, Knowledge representation, Artificial Intelligence and Neural Networks. **Learning Processes – 1:** Introduction, Error-correction learning, Memory-based learning, Hebbian learning,	**10**
2	**Learning Processes – 2 :** Competitive learning, Boltzamann learning, Credit Assignment problem, Learning with a Teacher, Learning without a Teacher, Learning tasks, Memory, Adaptation. Statistical nature of the learning process. **Single Layer Perceptrons:** Introduction, Adaptive filtering problem, Unconstrained optimization techniques, Linear least-squares filters, Least-mean square algorithm, Learning curves, Learning rate annealing techniques, Perceptron, Perceptron convergence theorem.	**11**
3	**Multilayer Perceptrons:** Introduction, Some Preliminaries, Back-propogation Algorithm, Summary of back propagation algorithm, XOR problem. Heuristics for making the back-propagation algorithm perform better, Output representation and decision rule, Computer experiment, Feature detection, Back-propagation and differentiation. Hessian matrix, Generalization, approximation of functions, Cross validation, Network pruning techniques, virtues and limitations of back-propagation learning, Accelerated convergence of back propagation learning, Supervised learning.	**11**
4	**Self Organization Maps** – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification, Hierarchal Vector quantilizer, contexmel Maps.	**10**

5	**Neuro Dynamics** – Dynamical systems, stavility of equilibrium states, attractors, neurodynamical models, manipulation of attractors' as a recurrent network paradigm. **Hopfield Models** – Hopfield models, computer experiment I.	**10**

Note 1: Unit 2 and Unit 3 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand the basic neuron models and various learning processes.

CO2: Students will be able to apply the techniques of Single Layer Perceptrons and multilayer perceptrons to design various algorithms.

CO3: Understanding the use of Self Organization Mapping techniques.

CO4: Understand and analyze Neuro Dynamics and Hopfield model.

Cos	Mapping with POs
CO1	PO1,PO2,PO5,PO6,PO10
CO2	PO1,PO2,PO5,PO8
CO3	PO1,PO4,PO5,PO6
CO4	PO1,PO2,PO3
CO5	PO2,PO5,PO6,PO9

TEXT BOOK:

1. **Simon Haykin:** Neural Networks - A Comprehensive Foundation, 2nd Edition, Pearson Education, 2013.
2. **Kishan Mehrotra, Chilkuri K. Mohan, Sanjay Ranka:** Artificial Neural Networks, Penram International Publishing, 2009.

REFERENCE BOOKS/WEBLINKS:

1. **B.Yegnanarayana**: Artificial Neural Networks, PHI, 2006.
2. **James A Freeman, David M skapura:** Neural Netowroks, Pearson Education, 2013.

Faculty Name: Dr. Siddaraju

Sub Title : SIMULATION AND MODELING		
Sub Code:CS741	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:

This Course will help students to achieve the following objectives,

1. Students understand the relevance of simulation in real-time applications.
2. The course provides an introduction to system modeling using both computer simulation and mathematical techniques. A wide range of case studies are examined using discrete evet simulation.
3. The student will obtain the knowledge and skills to conduct small simulation projects, consisting of input data analysis, model building, verification and validation.

UNIT No	Syllabus Content	No. of Hours
1	**Introduction to Simulation:** Application of Simulation as a tool to the context **(**When simulation is the appropriate tool and when it is not appropriate); Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. (Chapter 1) **Simulation Example:** Simulation of Queuing systems, Simulation of Inventory systems.(Chapter 2.1,2.2)	09
2	**General Principles:** Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling. (Chapter 3.1) **Simulation Software:** Simulation in Java; Simulation in GPSS. (Chapter 4.4,4.5)	08
3	**Statistical Models in Simulation:** Review of terminology and concepts; Useful statistical models; Discrete distributions; Continuous distributions. (Chapter 5.1,5.2,5.3,5.4) **Queuing Models:** Characteristics of Queuing systems; Queuing notation; Long-run measures of performance of queuing systems. (Chapter 6.1,6.2,6.3.1,6.3.2,6.3.3)	09
4	**Random-Number Generation:** Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers . (Chapter 7.1,7.2,7.3,7.4) **Random-Variate Generation:** Exponential Distribution, Poisson Distribution. (Chapter 8.1.1,8.2.1)	08

5	**Input Modeling :** Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests. (Chapter 9.1,9.2,9.3,9.4) **Verification and Validation of Simulation Models:** Model building, Verification and Validation; Verification of Simulation Models; Calibration and Validation of Models . (Chapter 10.1,10.2,10.3)	08

Note 1: Unit 1 and Unit 3 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

At the end of the course the student will be able to:

CO1. Acquire the knowledge about system simulation.
CO2. Analyze the real world systems using time-advance algorithm.
CO3. Exhibit the knowledge of probability distributions to model discrete systems.
CO4. Demonstrate techniques for random number generation and check the correctness.
CO5. Apply the input modeling technique for identifying and evaluation of distribution and also analyze the data produced by a model and test its validity with real systems.

Cos	Mapping with POs
CO1	**PO1, PO3,PO4, PO6**
CO2	**PO1, PO2, PO3, PO4, PO5, PO6, PO7**
CO3	**PO1, PO2, PO3, PO4, PO6, PO7**
CO4	**PO1, PO2, PO4, PO5, PO6**
CO5	**PO1, PO2, PO3, PO4, PO5**

Text Book

1. **Discrete-Event System Simulation** – Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol, Pearson Education, 2007.(Chapters **1**; **2.1,2.2**; **3.1**; **4.4,4.5**; **5.1,5.2,5.3,5.4**; **6.1,6.2,6.3.1,6.3.2,6.3.3**; **7.1,7.2,7.3,7.4**; **8.1.1,8.2.1**; **9.1,9.2,9.3,9.4**; **10.1,10.2,10.3**)

ISBN: 978-81-7758-591-9

Reference Book

1. Averill Law, **— Simulation modeling and analysis",** MGH, 4th edition, 2007
2. Seila, Ceric, &Tadikamalla, **—Applied simulation modeling"**, Cengage, 2009.
3. N. Viswanadham, Y. Narahari, **—Performance modeling of automated manufacturing systems"**, PHI, 2000.
4. Frank L. Severance, **—System modeling and simulation"**, Wiley, 2009

FACULTY NAME: SMITHA SHEKAR B

Sub Title : Digital Image Processing		
Sub Code:CS742	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:
The objectives of this course are to:

1. Understanding the concept of Digital image processing and Applications.
2. Study of the concept of Image fundamentals. Such as Sampling and Quantization, zooming and shrinking.
3. Understand the concept of Image Enhancement using Spatial domain and Frequency domain.
4. Study about the concept of Multi resolution, Wavelet transformation.
5. Understand the concept of Image segmentation and object recognition.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Origins of Digital Image Processing, examples, Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Image analysis and computer vision, spatial feature extraction, transform features, Edge detection, gradient operators, compass operators, stochastic gradients, line and spot detection.	9
2	**Digital Image Fundamentals:** Elements of Visual Perception, A Simple Image Formation Model, Basic Concepts in Sampling and Quantization, Representing Digital Images, Zooming and Shrinking Digital Images, Some Basic Relationships Between Pixels, Linear and Nonlinear Operations.	9
3	**Image Enhancement in the Spatial Domain:** Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods.	8
4	**Image Restoration:** A Model of the Image degradation/Restoration process, Noise Models, Restoration in the Presence of Noise Only–Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations , Estimating the Degradation Function, Inverse Filtering ,Minimum Mean Square Error (Wiener) Filtering.	8
5	**Image Segmentation and Object Recognition:** Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods, Structural Methods.	8

<u>Note 1:</u> Unit 1 and Unit 2 will have internal choice.

<u>Note 2:</u> Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Understand about Digital image processing uses, applications, image processing systems.
CO2: Understand about basic relation between the pixels, neighboring pixels, adjoining pixels.
CO3: Understand the concept of Gray level transformation, Histogram processing.
CO4: Understand the concept of image transformation and wavelets.
CO5: Understand the concepts of Edge linking boundaries, region based segmentation pattern classes and recognition.

Cos	Mapping with POs
CO1	PO1,PO3,PO5
CO2	PO2,PO3,PO4,PO5
CO3	PO1,PO2,PO3
CO4	PO1,PO2,PO3
CO5	PO2,PO3

TEXT BOOK:

1.Rafel C Gonzalez and Richard E. Woods: Digital Image Processing, PHI 2nd Edition 2005
2. Scott.E.Umbaugh: Computer Vision and Image Processing, Prentice Hall, 1997

REFERENCE BOOKS/WEBLINKS:

1. A. K. Jain: Fundamentals of Digital Image Processing, Pearson, 2004.
2. Z. Li and M.S. Drew: Fundamentals of Multimedia, Pearson, 2004.
3. S.Jayaraman, S.Esakkirajan, T.Veerakumar: Digital Image Procesing, TataMcGraw Hill, 2004.

<u>Faculty Name:</u> Prof. Vinod Kumar K

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : Software Testing		
Sub Code:CS743	**No. of Credits:3=3: 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:

1. Provide an understanding of the Software Testing concepts and testing types.
2. Identify the faults, test cases and solutions that are associated with problem.
3. Provide an understanding of the documentation methodologies in testing.

UNIT No	Syllabus Content	No of Hours
1	**A Perspective on Testing, Examples:** Basic definitions, Test cases, Insights from a Venn diagram, Identifying test cases, Error and fault taxonomies, Levels of testing. Examples: Generalized pseudocode, The triangle problem, The NextDate function, The commission problem, The SATM (Simple Automatic Teller Machine) problem. **Boundary Value Testing, Equivalence Class Testing, Decision Table-Based Testing:** Boundary value analysis, Robustness testing, Worst-case testing, Special value testing, Examples, Random testing, Equivalence classes, Equivalence test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations. Decision tables, Test cases for the triangle problem, NextDate function, and the commission problem, Guidelines and observations.	9
2	**Path Testing, Data Flow Testing:** DD paths, Test coverage metrics, Basis path testing, guidelines and observations. Definition-Use testing, Slice-based testing, Guidelines and observations. **Levels of Testing, Integration Testing:** Traditional view of testing levels, Alternative life-cycle models, The SATM system, Separating integration and system testing. A closer look at the SATM system, Decomposition-based, call graph-based, Path-based integrations.	8
3	**System Testing, Interaction Testing:** Threads, Basic concepts for requirements specification, Finding threads, Structural strategies and functional strategies for thread testing, SATM test threads, System testing guidelines, ASF (Atomic System Functions) testing example. Context of interaction, A taxonomy of interactions, Interaction, composition, and determinism, Client/Server Testing. **Process Framework:** Validation and verification, Degrees of freedom, Varieties of software. Basic principles: Sensitivity, redundancy, restriction, partition, visibility, Feedback.	9

4	**Fault-Based Testing, Test Execution:** Overview, Assumptions in fault-based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis. Test Execution: Overview, from test case specifications to test cases, Scaffolding, Generic versus specific scaffolding, Test oracles, Self-checks as oracles, Capture and replay.	8
5	**Planning and Monitoring the Process, Documenting Analysis and Test:** Quality and process, Test and analysis strategies and plans, Risk planning, Monitoring the process, Improving the process, The quality team, Organizing documents, Test strategy document, Analysis and test plan, Test design specifications documents, Test and analysis reports.	8

Note 1: Unit 2 and Unit 3 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
At the end of the course the students should be able to:
CO1: Demonstrate an understanding of the error, fault, test and test cases associated with the problem.
CO2: Understand the testing types and to identify the different types of test cases.
CO3: Understand the various levels of testing and identify the suitable solution.

COs	Mapping with POs
CO1	PO1,PO2,PO3,PO4,PO5,PO12
CO2	PO1,PO2,PO3,PO4,PO5,PO12
CO3	PO1,PO2,PO3,PO4,PO5,PO12

TEXT BOOK:

1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications,2008. ISBN - 9780849374753
   (Listed topics only from Chapters 1, 2, 5, 6, 7, 9, 10, 12, 13,14, 15)
2. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2008. ISBN - 978-0471455936
   (Listed topics only from Chapters 2, 3, 4, 16, 17, 20, 24)

REFERENCE BOOKS/WEBLINKS:
1. Aditya P Mathur**:** Foundations of Software Testing, Pearson, 2008.
   ISBN - 9788131707951
2. SrinivasanDesikan, Gopalaswamy Ramesh: Software testing Principles and Practices, 2nd Edition, Pearson, 2007. ISBN - 978-8177581218

FACULTY INCHARGE:

Prof. Ravikumar J

Sub Title : OBJECT TECHNOLOGY		
Sub Code:CS811	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:
The objective of the course is to:
1. Present students with the concept and terms used in Object Oriented Modeling using UML and to identify modeling as a design technique.
2. Develop an understanding of Class Models with advanced notations.
3. Develop an understanding of State and Interaction Models with diagrams.
4. Acquire the knowledge and understanding of the process of System Conception, Domain and Application Analysis.
5. Improve the creativity in developing a overall Class Design and fine tuning of classes and relationships.

Unit No	Syllabus Content	No. of Hours
1	**INTRODUCTION:** Object Orientation, OO development, OO themes; Evidence for usefulness of OO development; OO modeling history. **INTRODUCING THE UML:** An Overview of the UML, A Conceptual Model of the UML, Architecture, Software Development Life Cycle. **MODEL:** The Importance of Modeling, Principles of Modeling, Object-Oriented Modeling. **MODELING CONCEPTS:** Modeling as Design Technique; Modeling; abstraction; The three models. **DIAGRAMS:** Terms and Concepts, Common Modeling Techniques-Modeling different views of a system, Modeling different levels of abstraction, Modeling complex views.	08
2	**CLASS MODELING:** Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips. **ADVANCED CLASS MODELING :** Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips.	08
3	**STATE MODELING:** Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips. **ADVANCED STATE MODELING:** Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. **INTERACTION MODELING:** Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.	08
4	**PROCESS OVERVIEW:** Development stages; Development life cycle. **SYSTEM CONCEPTION:** Devising a system concept; Elaborating a	09

	concept; Preparing a problem statement. **DOMAIN ANALYSIS**: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis. **APPLICATION ANALYSIS**: Application interaction model; Application class model; Application state model; Adding operations.	
5	**CLASS DESIGN:** Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example. **IMPLEMENTATION MODELING:** Overview of Implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing.	09

Note 1: Unit 4 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

At the end of the course the student will be able to:

CO1:Understand the concepts of Object Oriented Analysis and Design ,UML Architecture, Notations and Diagrams and also demonstrate an understanding of modeling as a design technique.
CO2:Construct advanced Class models for a given case study.
CO3:Construct advanced State and Interaction models and know their importance in realistic situations.
CO4: Apply the process of System Conception for any given problem and understand the process of Domain and Application analysis with respect to its Class, State and Interaction model.
CO5: Create a Class model and enhance its design and associated relationships.

Cos	Mapping with POs
CO1	**PO1,PO3,PO4,PO6**
CO2	**PO1, PO2, PO3, PO4, PO6, PO7**
CO3	**PO1, PO2, PO3, PO4, PO6**
CO4	**PO1 PO2, PO4, PO6**
CO5	**PO1, PO2, PO3, PO4, PO5**

TEXT BOOKS:

1. **The Unified Modeling Language User Guide -** Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson , 2013, Thirteenth Impression .(**Chapters 1,2 & 7**)
   ISBN : 978-81-7758-372-4
2. **Object-Oriented Modeling and Design with UML** – Michael Blaha, James Rumbaugh, 2^{nd} Edition, Pearson , 2012, First Impression.(**Chapters 1,2,3,4,5,6,7,10,11,12,13,15&17**)
   ISBN : 978-81-317-6462-6

REFERENCE BOOKS:

1. **Object-Oriented Analysis and Design with Applications** – Grady Booch et al, 3^{rd} Edition, Pearson Education, 2007.
2. **Practical Object-Oriented Design with UML** – Mark Priestley, 2^{nd} Edition, Tata McGraw-Hill, 2003.
3. **Object-Oriented Design with UML and JAVA** – K. Barclay, J. Savage, Elsevier, 2008.

FACULTY NAME : SMITHA SHEKAR B

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Sub Title : Big Data Analytics		
Sub Code:CS812	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:

1. To Understand big data for business intelligence
2. To Learn business case studies for big data analytics
3. To Understand No sql big data management
4. To manage Big data without SQL
5. To understanding map-reduce analytics using Hadoop and related tools

UNIT No	Syllabus Content	No of Hours
1	**UNDERSTANDING BIG DATA:** What is big data – why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies – introduction to Hadoop – open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics	8
2	**NOSQL DATA MANAGEMENT**: Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models-relationships – graph databases – schemaless databases – materialized views – distribution models – sharding – master-slave replication – peer-peer replication – sharding and replication. Consistancyrelaxing consistency --version stamps—MapReduce – partitioning and combining -- Composing Map- Reduce Calculations.	9
3	**BASICS OF HADOOP**: Data format – analyzing data with Hadoop – scaling out – Hadoop streaming – Hadoop pipes. Design of Hadoop distributed file system (HDFS) – HDFS concepts – Java interface – data flow, Data Ingest with Flume and Sqoop. Hadoop I/O – data integrity – compression – serialization – Avro – file-based data Structures	8
4	**MAPREDUCE APPLICATIONS**: MapReduce workflows – unit tests with MRUnit – test data and local tests – anatomy of MapReduce job run – classic Map-reduce – YARN – failures in classic Map-reduce and YARN – job scheduling – shuffle and sort – task execution – MapReduce types – input formats – output formats	9
5	**HADOOP RELATED TOOL**: Introduction to Hbase: The Dawn of Big Data, the Problem with Relational Database Systems. Introduction to Cassandra: The Cassandra Elevator Pitch. Introduction to Pig, Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.	8

Note 1: **Unit 2 and Unit 4 will have internal choice.**

Note 2: **Three assignments are evaluated for 5 marks:**

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Describe big data and use cases from selected business domains
CO2: Explain NoSQL big data management
CO3: Install, configure, and run Hadoop and HDFS
CO4: Perform map-reduce analytics using Hadoop
CO5: Use Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data Analytics

Cos	Mapping with POs
CO1	PO1,PO2,PO5,PO6,PO10
CO2	PO1,PO2,PO5,PO8
CO3	PO1,PO4,PO5,PO6
CO4	PO1,PO2,PO3
CO5	PO2,PO5,PO6,PO9

TEXT BOOK:

1. Michael Minelli, Michelle Chambers, and AmbigaDhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Copyright © 2013 Pearson Education, Inc. 2012.
3. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012.
4. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012.

REFERENCE BOOKS/WEBLINKS:

1. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
2. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
3. Alan Gates, "Programming Pig", O'Reilley, 2011.

FACULTY NAME: Dr. Siddaraju

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

Sub Title : Artificial Intelligence & Machine Learning		
Sub Code:CS813	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:
The objective of the course is to:

1. To understand agent programming for different applications.
2. To learn different problem solving methods for artificial agents.
3. To learn knowledge representation using predicate logic and propositional logic.
4. To learn implementing planning in agents.
5. To learn different machine learning techniques.

UNIT No	Syllabus Content	No of Hours
1	Intelligent agents: Agents and environments, good behaviour, concept of rationality, nature of environments, structure of agents.	8
2	Problem-solving through Search: Problem solving agents, searching for solutions, uninformed search stratergies, A*, minimax.	8
3	Knowledge Representation and Reasoning: ontologies, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, syntax and semantics of first order logic, Propositional vs. Fist order inference, Forward chaining and backward chaining.	9
4	Planning: planning as search, partial order planning, construction and use of planning graphs.	8
5	Machine Learning and Knowledge Acquisition: forms of learning, inductive learning, learning decision trees, Learning nearest neighbor, Reinforcement learning, passive and active RL.	9

Note 1: Unit 3 and Unit 5 will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
At the end of the course the student will be able to:

CO1: Design and implement different types of agents for real time applications with proper understanding of basics of agent programming
CO2: Use problem solving techniques in real time applications by understanding of all the methods
CO3:Represent agent's behavior and environment using predicate logic and propositional logic

CO4: Design planning for agents using different planning methods
CO5: Design machine learning for agents working in different environment

Cos	Mapping with POs
CO1	PO2,PO3,PO4,PO5, PO6, PO8, PO12
CO2	PO2,PO3,PO5, PO6, PO12
CO3	PO1,PO2,PO3,PO4, PO5, PO12
CO4	PO1,PO2,PO3,PO4, , PO12
CO5	PO1,PO2,PO3,PO4,PO6,PO7, PO12

TEXT BOOK:

1. Artificial Intelligence: A Modern Approach, 3rd Edition, by Stuart Russell and Peter Norvig, 3rd Edition, Publisher: Prentice-hall International Phipe
   ISBN: 9780131038059

(2.1,2.2,2.3,2.4,3.1,3.3,3.4,4.1,6.2,8.1,8.2,9.1,9.3,9.4,10.1,10.2,10.3,10.4,11.2,11.3,11.4,18.1,18.2,18.3,19.3,20.4,21.1,21.2,21.3)

REFERENCE BOOKS/WEBLINKS:

1. Luger, G. F., & Stubblefield, W. A., Artificial Intelligence - Structures and Strategies for Complex Problem Solving. New York, NY: Addison Wesley, 5th edition (2005).
2. Nilsson, N. J. Artificial Intelligence - A Modern Synthesis. Palo Alto: Morgan Kaufmann. (1998).
3. Nilsson, N. J., Principles of Artificial Intelligence. Palo Alto, CA: Tioga (1981).
4. Rich, E., & Knight, K., Artificial Intelligence. New York: McGraw-Hill (1991).

<u>**Faculty : K R Shylaja**</u>

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

Sub Title : Cryptography & Network Security		
Sub Code:CS821	No. of Credits:4=4 : 0 : 0 (L-T-P)	No. of lecture hours/week : 4
Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours :52

Course objectives:

1. Recognize the different terminologies of cryptography
2. Understand the working of cryptographic algorithms.
3. Study the concept of Public key cryptosystem.
4. Understand IP Security concepts.
5. Understand We Security concepts.

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** OSI Security Architecture, Security Attacks, Security Services, Security Mechanism, Model for Network Security. **Classical Encryption Technique:** Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.	11
2	**Block Ciphers, Data Encryption Standard and Advanced Encryption Standard:** Simplified DES, Block Cipher Principles, DES, and Differential and Linear cryptanalysis, Modes of operation. **AES**. Evaluation Criteria for AES, AES Cipher-Encryption and Decryption, Data Structure, Encryption Round, Triple DES, Blowfish	11
3	**Public Key Cryptography and Key Management:** Principles of Public Key Cryptosystem, RSA algorithm, Key management, Diffie Hellman Key Exchange, Elliptic curve cryptography.	10
4	**IP Security:** IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.	10
5	**Web Security:** Web security Considerations; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET). **System security** Intruders, Viruses and related threats	10

Note 1: Unit 1 and Unit 2 will have internal choice.

Note 2: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

1. CO1:Analyze different terminology of cryptography.
2. CO2: Write algorithm for cryptographic algorithms.
3. CO3: Describe Public key cryptosystem.
4. CO4: Understand IP security architecture and key management techniques.
5. CO5: Summarize Web Security and System security concepts

COs	Mapping with POs
CO1	PO1,PO2,PO5,PO12
CO2	PO1,PO2,PO5,PO12
CO3	PO1,PO2,PO5,PO12
CO4	PO1,PO2,PO12
CO5	PO1,PO2,PO5,PO12

TEXT BOOK:

1. William Stallings, "Cryptography and Network Security – Principles and Practices", 6th Edition, Pearson Education 2014 ISBN13: 9780133354690

REFERENCE BOOKS/WEBLINKS:

1.Behrouz A. Forouzan and Debdeep Mukhopadhyay: "Cryptography and Network Security", 2nd Edition, Tata McGraw-Hill, 2010.

2.Atul Kahate, "Cryptography and Network Security" 2nd Edition TMH.

FACULTY INCHARGE:

1. Veena Potdar

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : Internet of Things		
Sub Code:CS822	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 52**

Course objectives:

1. To assess the vision and introduction of IoT.
2. To Understand IoT Market perspective.
3. To Implement Data and Knowledge Management and use of Devices in IoT Technology.
4. To Understand State of the Art - IoT Architecture.
5. To classify Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

UNIT No	Syllabus Content	No of Hours
1	**M2M to IoT**-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.	10
2	**M2M to IoT - A Market Perspective**- Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. **M2M to IoT-An Architectural Overview**-Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	10
3	**M2M and IoT Technology Fundamentals-** Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management	11
4	**IoT Architecture-State of the Art -** Introduction, State of the art.	10
5	**IoT Reference Architecture-** Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **Real-World Design Constraints-** Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. **Industrial Automation-** Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things	11

Note 1: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:

CO1: Interpret the vision of IoT from a global context.
CO2: Determine the Market perspective of IoT.
CO3: Compare and Contrast the use of Devices, Gateways and Data Management in IoT.
CO4: Implement state of the art architecture in IoT.
CO5: Illustrate the application of IoT in Industrial Automation and identify Real World Design

Constraints.

Cos	Mapping with POs
CO1	PO1, PO2, PO4,PO5,PO6
CO2	PO1, PO2, PO4,PO5,PO6
CO3	PO1, PO2, PO3,PO4,PO5,PO6
CO4	PO1, PO2, PO4,PO5,PO6
CO5	PO1, PO2, PO3,PO4,PO5,PO6

TEXT BOOK:

1) Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **"From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence",** 1st Edition, Academic Press, 2014. (**ISBN-13:** 978-0124076846)

REFERENCE BOOKS / WEBLINKS:

1) Vijay Madisetti and Arshdeep Bahga, **"Internet of Things (A Hands-on-Approach)",** 1st Edition, VPT, 2014. (**ISBN-13:** 978-8173719547)
2) Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013. (**ISBN-13:** 978-1430257400)

FACULTY INCHARGE:

1. GowriShankar

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : WIRELESS AND CELLULAR NETWORKS		
Sub Code:CS823	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:

1. To understand the fundamental concepts of Wireless Networks.
2. To understand the Advanced concept of modern wireless communication systems
3. To understand and analyze Cellular concepts with handoff.
4. To understand Multiple Access Techniques for Wireless Communications
5. To understand concepts of wireless networking and wireless mesh networks.

UNIT NO.	Syllabus Content	No of Hours
1	**Introduction to Wireless Communication Systems:** Evolution of Mobile Radio Communications ,Mobil Radio Systems around the world ,Examples of Wireless Communication Systems, Paging System, Cordless Telephone System, Cellular Telephone Systems, How a Cellular Telephone call is made ,Comparison of Common Wireless Communications Systems. **Modern Wireless Communications Systems:** Second generation (2G), Cellular Networks, evolution of 2.5G, TDMA Standards, Third Generation (3G) Wireless Networks.	11
2	**Modern Wireless Communications Systems:** Wireless Local Loop (WLL) and LMDS, Wireless Local Area Networks (WLANs), Bluetooth and Personal Area Networks (PANS).**The Cellular Concept:** System Design Fundamentals, Introduction, Frequency reuse, channel assignment strategies, handoff strategies – prioritizing handoffs, Practical Handoff considerations.	10
3	**The Cellular Concept** Interference and system capacity, co-channel interference and system capacity, channel planning for wireless systems, adjacent channel interference, power control for reducing interference. **Modulation Techniques for Mobile Radio:** Frequency modulation Vs amplitude modulation, Amplitude modulation, Angle modulation-single sideband AM, Pilot tone SSB, demodulation of AM signals, Digital Modulation,	11
4	**Multiple Access Techniques for Wireless Communications:** Introduction to Multiple access, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Spread Spectrum Multiple Access, Space Division Multiple Access (SDMA), Packet Radio. Protocols, Reservation Protocols – Reservation ALOHA, Packet Reservation Multiple Access (PRMA).	10
5	**Wireless Networking:** Introduction, Difference between Wireless and Fixed Telephone Networks, Development of Wireless Networks, First generation, second generation, third generation, Traffic routing in wireless networks-Circuit Switching, Packet Switching, X-25 Protocol. **Wireless Mesh Networks**: Introduction- Network Architecture, Characteristics, Application Scenarios.	10

<u>Note 1:</u> Unit 1 and Unit 3 will have internal choice.
<u>Note 2:</u> Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:
CO1: Understand the fundamental concepts of Wireless Networks.
CO2: Analyze Advanced concept of modern wireless communication systems
CO3: Describe Cellular concepts with handoff.
CO4: Classify Multiple Access Techniques for Wireless Communications
CO5: Use wireless networking and wireless mesh networks

COs	**Mapping with POs**
CO1	PO1,PO2, PO12
CO2	PO1,PO2,PO5,PO12
CO3	PO1,PO2,PO6,PO12
CO4	PO1,PO2,PO6,PO12
CO5	PO1,PO2,PO6,PO12

TEXT BOOK:

1. Theodore S Rappaport: Wireless Communications, Principles and Practice, 2nd Edition, Pearson Education Asia, 2013 ISBN-13: 978-8131731864.
2. Wireless Mesh Networks, first edition, Ian F Akyildiz and Xudong Wang, WILEY Publications, 2009 ISBN: 978-0-470-03256-5

REFERENCE BOOKS/WEBLINKS:

1. William C Y Lee: Mobile Communications Engineering Theory and Applications, 2nd Edition, McGraw Hill, 1998.
2. William Stallings: Wireless Communications and Networks, Pearson Education Asia, 2002.

<u>FACULTY INCHARGE:</u>

1. Mary Cherian

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

2018 Syllabus

Dr. Ambedkar Institute of technology, Bengaluru-56

Department of Computer Science & Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. Siddaraju

Department of Computer Science & Engineering

Professor & Head
Department of Computer Science & Engineerin
Dr. Ambedkar Institute of Technology
Bangalore-560 056.

Scheme for the Batch 2018 (175 CREDITS)

Semester	Credits
1st	20
2nd	20
3rd	24
4th	24
5th	25
6th	24
7th	23
8th	15
Total	**175**

Dr.Ambedkar Institute of Technology, Bengaluru-56

Scheme of Teaching and Examination from the Academic Year 2018 – 19

Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

I SEMESTER B.E (CHEMISTRY GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				Credits
						Theory Lecture	Tutorial	Dra Practi	Duration in hours	CIE Marks	SEE Marks	Total Marks	
						L	T	P					
1	BC	18MA11	Calculus and Linear Algebra	Mathematics	Science	3	2	--	3	50	50	100	4
2	BC	18CH12	Engineering Chemistry	Chemistry	Science	3	2	--	3	50	50	100	4
3	ES	18CS13	Programming for Problem Solving	Computer Science and Engineering	Computer Science and Engineering	2	2	--	3	50	50	100	3
4	ES	18EC14	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	2	--	3	50	50	100	3
5	ES	18ME15	Elements of Mechanical Engineering	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	2		3	50	50	100	3
6	BC	18CHL16	Engineering Chemistry Laboratory	Chemistry	Science	--	--	2	3	50	50	100	1
7	ES	18CSL17	Computer Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	3	50	50	100	1
8	HS	18HS11/ 18HS12	English/ Kannada	Humanities	Humanities	1	--	2	2	50	50	100	1
					TOTAL	**13**	**10**	**6**	**23**	**350**	**350**	**700**	**20**

First year scheme

Dr.Ambedkar Institute of Technology, Bengaluru-56													
Scheme of Teaching and Examination from the Academic Year 2018 – 19													
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)													
II SEMESTER B.E (PHYSICS GROUP)													
Sl. No	**Course and Course Code**		**Course Title**	**Teaching Department**	**Paper Setting Board**	**Teaching Hours /Week**		**Examination**					
						Theory	**Tutorial**	**Practical**	**Duration**	**CIE Marks**	**SEE Marks**	**Total Marks**	**Credits**
						L	**T**	**P**					
1	BC	18MA21	Advanced Calculus and Numerical Methods	Mathematics	Science	3	2	--	3	50	50	100	4
2	BC	18PH22	Engineering Physics	Physics	Science	3	2	--	3	50	50	100	4
3	ES	18EE23	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	2	--	3	50	50	100	3
4	ES	18CV24	Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	2	--	3	50	50	100	3
5	ES	18MEL25	Engineering Graphics and Design	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	--	2	3	50	50	100	3
6	BC	18PHL26	Engineering Physics Laboratory	Physics	Science	--	--	2	3	50	50	100	1
7	ES	18EEL27	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--		2	3	50	50	100	1
8	HS	18HS21/ 18HS22	English/ Kannada	Humanities	Humanities	1		2	2	50	50	100	1
					TOTAL	**13**	**8**	**8**	**23**	**400**	**400**	**800**	**20**

Note: BS: Science Course, ES: Engineering Science, Hu: Humanity and Social Science.

Definition of Credit:	
	1 hour Lecture (L) per week per semester = 1 Credit
	2 hour Tutorial (T) per week per semester =1 Credit
	2 hour Practical/Laboratory/Drawing (P) per week per semester=1 Credit.

Second year scheme

III SEMESTER												
Sl. No	**Course and Course Code**		**Course Title**	**Teaching Department**	**Teaching Hours /Week**			**Examination**				**Credits**
					Theory Lecture	**Tutorial**	**Practical/ Drawing**	**Duration in hours**	**CIE Marks**	**SEE Marks**	**Total Marks**	
					L	**T**	**P**					
1	BC	18MA31	Discrete Mathematical Structures	Mathematics	2	2	--	04	50	50	100	3
2	PC	18CS31	Digital Logic and Computer Design	CSE	4	0	--	04	50	50	100	4
3	PC	18CS32	Data Structures and Algorithms	CSE	4	0	--	04	50	50	100	4
4	PC	18CS33	Operating System	CSE	3	0	--	03	50	50	100	3
5	PC	18CS34	Python Programming	CSE	3	0	--	03	50	50	100	3
6	PC	18CS35	Web Technology	CSE	3	0	--	03	50	50	100	3
7	PC	18CSL36	Data Structures and Algorithms Laboratory	CSE	--	--	2	02	50	50	100	1
8	PC	18CSL37	Digital Logic and Computer Design Laboratory	CSE	--	---	2	03	50	50	100	1
9		18CSL39	Python Programming Laboratory	CSE	--	---	2	02	50	50	100	1
10	HS	18HS31/32	Constitution of India Professional Ethics and Human Rights/ / Env. Studies	Hu/Civ	1	--	--	02	50	50	100	1
11	MC	18HS33	Soft skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**24**	**02**	**06**	**33**	**450**	**450**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
11	MC	18MAD31	Advance Mathematics - I	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, MC: Mandatory Course.
18CSL38: Student must complete a certification under anyone online course as specified in the scheme

Second year scheme

IV SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BC	18MA41	Probability Statistics & Queuing Theory	Mathematics	2	2	--	04	50	50	100	3
2	PC	18CS41	Algorithms Design Techniques	CSE	3	0	--	03	50	50	100	3
3	PC	18CS42	OOP Principles and Practices using C++	CSE	3	0	--	03	50	50	100	3
4	PC	18CS43	Microcontroller and Embedded System	CSE	4	0	--	04	50	50	100	4
5	PC	18CS44	Theoretical Foundation of Computer Science	CSE	4	0	--	04	50	50	100	4
6	PC	18CS45	Computer Organisation and Architecture	CSE	3	0	--	03	50	50	100	3
7	PC	18CSL46	Microcontroller and Embedded System Laboratory	CSE	--	--	2	03	50	50	100	1
8	PC	18CSL47	Object Oriented Programming Laboratory	CSE	--	---	2	03	50	50	100	1
9	PC	18CSL48	Algorithm Design Techniques Laboratory	CSE	--	---	2	03	50	50	100	1
10	HS	18HS41/42	Constitution of India Professional Ethics and Human Rights/ Env. Studies	Hum/Civ	1	--	--	02	50	50	100	1
11	MC	18HS43	Employability skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**24**	**02**	**06**	**35**	**450**	**450**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
	MC	18MAD41	Advance Mathematics - II	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, NCMC: Non-Credit Mandatory Course.
ENV: Environmental Studies, CIP:Constitution of India Professional Ethics and Human Rights
18CSL48: Student must complete a certification under anyone online course as specified in the scheme

Third year scheme

V SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week: Theory Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	HS	18HS51/52	M&E / IPR (title as per BOS decision)	Hu	2	2	--	03	50	50	100	3
2	PC	18CS51	Software Engineering	CSE	3	-	--	03	50	50	100	3
3	PC	18CS52	Core Java	CSE	4	-	--	04	50	50	100	4
4	PC	18CS53	Database Management System	CSE	3	--	--	03	50	50	100	3
5	PC	18CS54	Computer Networks & Internet Protocols	CSE	4	--	--	04	50	50	100	4
6	PE	18CS55X	Elective -1 (PENDING)	CSE	3	--	--	03	50	50	100	3
7	OE	18XXE01	Open Elective -A	CSE	3	--	--	03	50	50	100	3
8	PC	18CSL56	Database Application Laboratory	CSE	--	--	2	02	50	50	100	1
9	PC	18CSL57	Network Programming lab using java & NS	CSE	--	--	2	02	50	50	100	1
				TOTAL	22	2	4	27	450	450	900	25

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

Electives

Course code	Professional Electives -2
18CS551	Web Technologies
18CS552	Advanced Algorithms
18CS553	Artificial Intelligence
18CS554	TCS-Elective

Open Elective -A

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
OOPS with C++	18CSE011	3
Python programming	18CS E012	3
Unix Shell Programming	18CS E013	3

Open Elective -A

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.

Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

Third year scheme

VI SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week: Theory Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	HS	18HS61/62	M&E/IPR	Hu	3	2	--	03	50	50	100	3
2	PC	18CS61	Internet of Things	CSE	4	--	--	04	50	50	100	4
3	PC	18CS62	Machine Learning	CSE	4	--	--	04	50	50	100	4
	PC	18CS63	Unix Programming	CSE	3	--	--	03	50	50	100	3
4	PE	18CS64X	Professional Elective -2	CSE	3	--	--	03	50	50	100	3
5	OE	**18XXE02**	**Open Elective -B**	CSE	3	--	--	03	50	50	100	3
6	PC	18CSL65	Internet of Things Lab	CSE	--	--	2	02	50	50	100	1
7	PC	18CSL66	Machine Learning Lab	CSE	--	--	2	02	50	50	100	1
8	MP	18CSP67	Mini-project	CSE				03	50	50	100	2
9	INT	18CSI68	Industry Internship	(To be carried out during the intervening vacations of VI and VII semesters)				--	--	--	--	--
				TOTAL	**20**	**2**	**4**	**24**	**400**	**400**	**800**	**24**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

Electives

Course code	Professional Electives -2
18CS641	Distributed Operating System
18CS642	Digital Image Processing
18CS643	Compiler Design
18CS644	Principles of Economics

Open Elective -B

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
Wireless Sensor Networks	18CSE021	3
Storage Area Network	18CS E022	3
Adhoc Wireless Networks	18CS E023	3

Open Elective -B

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.
Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

Fourth year scheme

VII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week: Theory Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	MC	18HS71/72	CMEP / OSHA	IM/CV	2	--	--	03	50	50	100	2
2	PC	18CS71	Android Programming	CSE	3	--	--	03	50	50	100	3
3	PC	18CS72	Cloud Computing	CSE	4	--	--	04	50	50	100	4
4	PC	18CS73	Introduction to Big Data Analytics	CSE	3	--	--	03	50	50	100	3
5	PE	18XX74X	Professional Elective -3	CSE	3	--	--	03	50	50	100	3
6	PE	18XX75X	Professional Elective -4	CSE	3	--	--	03	50	50	100	3
7	OE	18XXE03	Open Elective - C	CSE	3	--	--	03	50	50	100	3
8	PC	18CSL77	Android Programming Laboratory	CSE	--	--	2	02	50	50	100	1
9	PC	18CSL78	Cloud Computing Laboratory	CSE			2	02	50	50	100	1
10	Project	18CSP79	Project Work Phase - 1	CSE	--	--	-	-	-	-	-	-
11	INT	18CSI80	Internship	(If not completed after VI semester examinations, it has to be carried out during the intervening vacations of VII and VIII semesters)				--	--	--	--	--
				TOTAL	**21**	--	**4**	**26**	**350**	**350**	**900**	**23**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Internship: All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters. A SEE examination will be conducted during VIII semester and prescribed credits shall be added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent SEE examination after satisfy the internship requirements.

Electives

Course code	Professional Electives - 3	Course code	Professional Electives - 4
18CS741	Block Chain Technologies	18CS751	Computer Vision
18CS742	Cyber Forensics	18CS752	Introduction to Robotics
18CS743	Software Project Management	18CS753	Soft Computing

Open Elective -C
INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
Artificial Intelligence with Prolog programming	18CSE031	3
Machine Learning	18CS E032	3
Internet of Things	18CS E033	3

CMEP: Cost Management of Engg Projects, OSHA: Occupational Safety and Health Administration

VIII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	MC	18XX81	CMEP / OSHA	IM /CV	4	--	--	04	50	50	100	2
2	Project	18CSP84	Project Work Phase - 2	CSE	--	--	3	03	50	50	100	10
3	Seminar	18CSS85	Technical Seminar	CSE	--	--	3	03	50	50	100	1
4	INT	18CSI86	Internship	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semesters.)				03	50	50	100	2
				TOTAL	**4**	**--**	**6**	**13**	**200**	**200**	**400**	**15**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Internship: Those, who have not pursued /completed the internship will be declared as failed and have to complete during subsequent SEE examination after they satisfy the internship requirements.

CMEP: Cost Management of Engg. Projects, OSHA: Occupational Safety and Health Administration

Professor & Head
Department of Computer Science & [illegible]
Dr. Ambedkar Institute of Tech[illegible]
Bangalore-560 056.

DR. AMBEDKAR INSTITUTE OF TECHNOLOGY

SCHEME AND SYLLABUS

Outcome Based Education (CBCS)

(As per NEP 2020)

Scheme of Teaching and Examinations
(Common to all B.E. Programmes)
For I Year B.E. (I & II Semester)

Academic Year 2021-2022

Dr. Ambedkar Institute of Technology

Approved by AICTE, New Delhi, Aided by Government of Karnataka,
Accreditated by NAAC, Accreditated by NBA, New Delhi

(An Autonomous Institution, Affiliated to VTU, Belagavi)

Outer Ring Road, Near Jnanabharathi Campus

Mallathahalli, Bengaluru - 560 056

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)
Scheme of Teaching and Examination for I Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Physics Cycle : I Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101	Calculus and Differential Equations	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21PHT102	Engineering Physics	Physics	3	0	0	0	3	3	50	50	100	3
3	ES	21EET103	Basic Electrical Engineering	Electrical	2	2	0	0	4	3	50	50	100	3
4	ES	21CVT104	Civil Engineering & Mechanics	Civil	3	0	0	0	3	3	50	50	100	3
5	ES	21MEL105	Engineering Graphics	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21PHL106	Engineering Physics Lab	Physics	0	0	2	0	2	3	50	50	100	1
7	ES	21EEL107	Basic Electrical Engineering Laboratory	Electrical	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108	Communicative English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21HST109	Health and Wellness	Humanities	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN110	Career Development skill-I	Humanities	1	0	1*	0	2	--	50	-	PP/NP	0
								Total	29		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)
Scheme of Teaching and Examination for I Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Chemistry Cycle: I Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101	Calculus and Differential Equations	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21CHT102	Engineering Chemistry	Chemistry	3	0	0	0	3	3	50	50	100	3
3	ES	21CST103	Problem solving through Programming	Computer Science	2	2	0	0	4	3	50	50	100	3
4	ES	21ECT104	Basic Electronics and Communication Engineering	Electronics	2	2	0	0	4	3	50	50	100	3
5	ES	21MET105	Elements of Mechanical Engineering	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21CHL106	Engineering Chemistry Laboratory	Chemistry	0	0	2	0	2	3	50	50	100	1
7	ES	21CSL107	Computer Programming Laboratory	Computer Science	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108	Communicative English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21CVT109	Rural Development Engineering	Civil	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN110	Career Development skill-I	Humanities	1	0	1*	0	2	----	50	--	PP/NP	0
								Total	30		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)

Scheme of Teaching and Examination for II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Physics Cycle: II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT201	Advanced Calculus and Numerical Methods	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21CHT202	Engineering Chemistry	Chemistry	3	0	0	0	3	3	50	50	100	3
3	ES	21CST203	Problem solving through Programming	Computer Science	2	2	0	0	4	3	50	50	100	3
4	ES	21ECT204	Basic Electronics and Communication Engineering	Electronics	2	2	0	0	4	3	50	50	100	3
5	ES	21MET205	Elements of Mechanical Engineering	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21CHL206	Engineering Chemistry Laboratory	Chemistry	0	0	2	0	2	3	50	50	100	1
7	ES	21CSL207	Computer Programming Laboratory	Computer Science	0	0	2	0	2	3	50	50	100	1
8	HS	21HST208	Professional writing skills in English		1	0	1*	0	2	2	50	50	100	1
9	AE	21CVT209	Rural Development Engineering	Civil	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN210	Career Development skill-II	Humanities	1	0	1*	0	2	----	50	--	PP/NP	0
								Total	30		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,

AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,

L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056

Outcome Based Education(OBE) and Choice Based Credit System (CBCS) (As per NEP2020)

Scheme of Teaching and Examination for II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Chemistry Cycle : II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT201	Advanced Calculus and Numerical Methods	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21PHT202	Engineering Physics	Physics	3	0	0	0	3	3	50	50	100	3
3	ES	21EET203	Basic Electrical Engineering	Electrical	2	2	0	0	4	3	50	50	100	3
4	ES	21CVT204	Civil Engineering & Mechanics	Civil	3	0	0	0	3	3	50	50	100	3
5	ES	21MEL205	Engineering Graphics	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21PHL206	Engineering Physics Laboratory	Physics	0	0	2	0	2	3	50	50	100	1
7	ES	21EEL207	Basic Electrical Laboratory	Electrical	0	0	2	0	2	3	50	50	100	1
8	HS	21HST208	Professional writing skills in English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21HST209	Health and Wellness	Humanities	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN210	Career Development skill-II	Humanities	1	0	1*	0	2	--	50	-	PP/NP	0
								Total	29		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">CALCULUS & DIFFERENTIAL EQUATIONS</td></tr>
<tr><td>Course Code</td><td colspan="7">21MAT101</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>03</td><td>02</td><td>00</td><td>00</td><td>05</td><td>65</td><td>04</td></tr>
<tr><td>CIE Marks: 50</td><td>SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="4">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: This course is intended to impart to the students the skills of employing the basic tools of differential and for solving basic and difficult engineering problems.

UNIT I **8+5 hours**

Differential Calculus-1: Recapitulation of differentiation, Taylor's and Maclaurin's series for single variable (no proof). Introduction to polar curves, expression for angle between radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature-Cartesian, parametric, polar and pedal forms.

Self-study: Indeterminate forms, center and circle of curvature.

UNIT II **8+5 hours**

Differential Calculus-2: Partial derivative of first and second order, total derivative, derivative of composite function. Euler's theorem for function of two variables. Jacobians and property $JJ' = 1$.Taylor's series for functions of two variables (no proof). Maxima and minima for function of two variables.

Self-Study: Errors and approximations, Extended Euler's theorem, Lagrange's undetermined multiplier method.

UNIT III **8+5 hours**

Ordinary differential equations (ODE's) of first order: Linear differential equations. Reducible to linear differential equation, Bernoulli's equations. Exact and reducible to exact differential equations. Orthogonal trajectories in Cartesian and polar form. Introduction to general and singular solutions; solvable for p only and Clairaut's equations.

Self-study: Reducible to Clairaut's equations. Application to Newton's law of cooling.

UNIT IV	**8+5 hours**
Ordinary differential equations (ODE's) of higher order: Higher order linear ODE's with constant coefficients, Inverse differential operator method (no product of functions). Method of variation of parameter. Cauchy's and Legendre's homogenous linear differential equations. Applications: L-C-R circuits. ***Self-study: Method of Undetermined co-efficients.***	
UNIT V	**8+5 hours**
Linear Algebra: Elementary row and column operations of a matrix**,** echelon form, Rank of matrix. Consistency of homogeneous and non-homogeneous equations. Gauss elimination, Gauss Jordan and Gauss-Seidel methods. ***Self-study: Solution of system of linear equations by Jacobi method, eigenvalues and eigenvectors.***	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Determine the rate of changes, extreme values, Taylor's series for the function of two variables and rank of a matrix.

CO2: Solve ordinary differential equations and system of linear equations.

CO3: Test for angle of polar curves, consistency of linear equations, the independency of two functions of two identical independent variables and orthogonally of two polar curves.

CO4: Describe Mathematical procedures to find integrating factors, orthogonal trajectories, complementary functions, particular integrals and consistency of system of equations.

CO5: Apply the terminologies of calculus and linear algebra for approximations.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint)2016.

REFERENCE BOOKS

1. V. Ramana : Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I& II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/ Cole, 2005.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3										
CO3	3	3										
CO4	3	3										
CO5	3	3	3									
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**ENGINEERING PHYSICS**						
Course Code	**21PHT102/202**						
Category	Basic Science Course (BS)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE: To introduce the Engineering students to the basics of elasticity, vibrations, quantum mechanics, electrical and dielectric properties of materials,laser and fiber optics, crystal structure and nanomaterials with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I **8 hours**

Elasticity: Torsion: Expression for couple per unit twist of a solid cylinder (derivation). Torsional Pendulum: Expression for period of oscillation and Rigidity modulus (derivation). Bending of Beams: Definition of beam, neutral surface and neutral axis. Expression for bending moment of a beam (derivation). Expression for Young's modulus of the material of a single cantilever (derivation). Numerical problems.

Vibrations: Theory of free vibrations, theory of damped vibrations and discussion of three cases of damping. Theory of Forced vibrations. Resonance: Condition for resonance, sharpness of resonance. Numerical problems.

Self-study component: Types of beams and its engineering applications, application of damping in automobiles, LCR resonance.

UNIT II	**8 hours**

Modern Physics: de- Broglie hypothesis: de Broglie wavelength for free and accelerated electron. Concept of wave packet. Phase velocity, group velocity (no derivation), relation between phase velocity and group velocity, relation between group velocity and particle velocity, relation between phase velocity, group velocity and velocity of light. Numerical problems.

Quantum Mechanics: Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle: Non-confinement of electron in the nucleus. Wave function. Properties and Physical significance of a wave function. Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrödinger's wave equation. Eigen values and Eigen functions. Application of Schrödinger wave equation to a particle in a box: Expression for energy Eigen values and Eigen functions for a particle in one-dimensional potential well of infinite height and finite width, discussion of wave functions and probability density for a particle in a box for ground and first excited state. Numerical problems.

Self-study component: Davisson and Germer experiment, Matter waves and their properties. Discussion of wave functions and probability density for a particle in a box for n=3, Quantum tunneling.

UNITIII	**8 hours**

Electrical properties: Assumptions of quantum free electron theory, Fermi level, Fermi energy, Fermi velocity and Fermi temperature. Fermi factor f(E) and its dependence on temperature. Expression for density of states (qualitative), expression for Fermi energy at absolute temperature (derivation). Electrical conductivity using effective mass and Fermi velocity (derivation). Merits of quantum free electron theory. Numerical problems.

Dielectric properties: Introduction to dielectrics: types of dielectrics, polarization, polarizability, dielectric constant, relation between dielectric constant and polarizability. Polarization mechanism and types of polarization. Derivation of equation for internal field in liquids and solids (1-Dimensional). Expression for Classius-Mossotti equation (Derivation). Numerical problems.

Self-study component:Distinguish between CFET and QFET, applications of dielectric materials in engineering (Mica, glass, rubber, and porcelain), Piezo-electricity.

UNIT IV **8 hours**

Lasers: Interaction of radiation with matter: Induced absorption, spontaneous emission and stimulated emission of radiation. Expression for energy density in terms of Einstein's coefficients (derivation). Requisites of a laser system. Condition for laser action. Principle, construction and working of He-Ne laser. Application of laser: Holography, principle, recording (wave front division technique) and reconstruction of 3-D images. Mention of applications of holography. Numerical problems.

Optical fibers: Propagation mechanism in optical fibers. Expression for angle of acceptance and numerical aperture (derivation). Fractional index change, V- number and modes of propagation (N). Types of optical fibers. Attenuation: expression for attenuation coefficient (derivation). Application of optical fibers: Point to point communication with block diagram. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems.

Self-study component: Applications of laser in medical and industry. Discuss the causes for attenuation in optical fibers.

UNIT V **8 hours**

Crystal Structure: Seven crystal systems, Miller indices, Interplanar spacing in terms of miller indices. X-ray diffraction, Bragg's law (derivation), Bragg's X-ray spectrometer (construction and working) and determination of crystal structure by Bragg's X-ray spectrometer, Numerical Problems.

Nanomaterials: Nano Scale, Surface to Volume Ratio, Quantum Confinement, types of nanomaterials, Synthesis of nanomaterials: Top-down approach: High energy Ball-milling method and Bottom-Up approach: Sol-Gel method. Characterization Technique: Scanning Electron Microscope (SEM), Properties of nanomaterials: Mechanical, electrical, magnetic and optical.

Self-study component: Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.

TEACHING and LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:Apply the knowledge of elasticity and vibrations to engineering.

CO2:Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system.

CO3:Summarize the importance of free electrons in determining the properties of metals; understand the concept of Fermi energy. Gain the knowledge of the electrical and dielectric properties of a materials.

CO4:Describe the basics of laser Physics, working of lasers, holography and principle of propagation of light in optical fibers.

CO5:Recognize various planes in a crystal and describe the structure determination using X-rays.

TEXT BOOKS

1. P. S. Aithal, H. J. Ravindra, Textbook of Engineering Physics, Acme Learning Pvt. Limited, New Delhi, 1^{st} edition, (2017).
2. Dr. Amit Sarin, Anil Rewal, Engineering Physics Books, Wiley India Private Ltd., New Delhi 9^{th} Edition (2014).
3. Avadhanulu M. N. and P.G. Kshirsagar, A text Book of Engineering Physics, 10th Edition (2014).
4. Engineering Physics by Gaur and Gupta, DhanpatRai Publications (P) Ltd.
5. Dr. K. Vijayakumar, Dr. S. Chandralingum, Modern Engineering Physics, S. Chand and Company Limited, 1^{st} edition 2010
6. K. K. Chattopadhyay, Introduction to Nanoscience and Nanotechnology, PHI India, (2009).
7. Sulabha Kulkarni, Introduction to Nanoscience and Nanotechnology 2nd Edition (2012)

REFERENCE BOOKS

1. S. O. Pillai, Solid State Physics, New Age International. Sixth Edition.
2. A Marikani, Engineering Physics, PHI Learning Private Limited, Delhi - 2013
3. Prof. S. P. Basavaraju, Engineering Physics, Subhas Stores, Bangalore.
4. V. Rajendran , Engineering Physics, Tata McGraw Hill Company Ltd., New Delhi -2012
5. S. Mani Naidu, Engineering Physics, Pearson India Limited – 2014
6. AjoyGhatak, Optics, Tata McGraw Hill, 2005.
7. Arthur Beiser, Concepts of Modern Physics, McGraw Hill,7^{th} edition 2017.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://physicsworld.com/

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
CO5	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Chemistry

Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**ENGINEERING CHEMISTRY**						
Course Code	**21CHT102/202**						
Category	Basic Science Course (BS)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE: To expose first year engineering students to various physicochemical aspects of engineering materials such as metals, alloys, plastics, conducting polymers etc. with a view to highlight their significance and importance in application oriented systems.

UNIT I **8 hours**

Electrochemical energy sources:

Electrochemical cells

Introduction to electro chemical cells, origin of single electrode potential, sign convention and cell notation, standard electrode potential, derivation of Nernst equation for single electrode potential, numerical problems.

Types of electrodes- Classification of reference electrodes, calomel electrode – construction, working and applications, Measurement of single electrode potential using calomel electrode, Electrochemical series,Concentration cells-Derivation of Emf of a concentration cell - numerical Problems. Ion selective electrodes – Glass electrode – construction and working, Determination of pH of a solution using glass electrode.

Batteries and fuel cells

Basic concepts – principal components of a battery, operation of a battery during charging and discharging, Battery characteristics – voltage, capacity, energy efficiency, cycle life and shelf life. Classifications of batteries, Construction, working and applications of Lead acid, Ni-metal hydride and Li-ion battery, significance of Lithium.

Fuel cells – Construction, working and applications of CH3OH-O_2 fuel cell using H2SO4 electrolyte.

Self-study : Introduction to Refrence electrode, Ag-AgCl electrode, Introduction to fuel cells & battery, H2-O2 Fuel cell.

UNIT II **8 hours**

Corrosion and Metal finishing

Corrosion science

Corrosion – Introduction, electrochemical theory of corrosion, galvanic series: Types of corrosion – Differential metal corrosion –Differential aeration corrosion, Stress corrosion. Factors– Related to nature of metal: electrode potential, relative sizes of anode and cathode, nature of the corrosion product. Related to environment: pH of the medium, temperature, humidity and presence of impurities in the atmosphere.

Corrosion control: Inorganic coatings; Anodizing – anodized coating of aluminium. Phosphating. Metallic coatings – Anodic metallic coating ex : Galvanizing, Cathodic metallic coating ex : Tinning .Organic coatings – examples, Corrosion inhibitors – definition, anodic and cathodic inhibitors, Cathodic protection – definition, sacrificialanode method.

Metal finishing

Technological importance, Electroplating – pre-treatment, process.

Significance of Polarization, Decomposition potential and Overvoltage in electroplating and their applications. Effect of plating variables on the nature of electrodeposit – metal ion concentration, organic additives (Complexing agents, brighteners, levelers, structure modifiers and wetting agents), current density, pH, temperature and throwing power of the plating bath, Electroplating of chromium.

Electroless plating: difference between electroplating and electroless plating. Pre-treatment and activation of the surface, electroless plating of copper in the manufacture of PCBs.

Self-study : Metallic coating : Anodic metallic coating- Galvanization, Cathodic metallic coating- Tinning, Organic coating

UNIT III **8 hours**

Energy: Sources & Conversion

Chemical fuels: Hydrocarbon fuels, classification. Calorific value –GCV and NCV. Bomb calorimeter, numerical problems.

Petroleum cracking – Fluidized catalytic cracking process, Knocking – mechanism and harmful effects, Octane and Cetane numbers, Reforming of petrol. Unleaded petrol, power alcohol, Biodiesel, Catalytic converters – construction and working.

Solar energy: Photovoltaic cells – Introduction, definition, production of solar grade silicon, purification of silicon by zone refining process,construction and working of silicon-photovoltaic cell, advantages and disadvantages.

Self-study :Determination of GCV & NCV of gaseous fuel by Buoys calorimeter and numerical problems.

UNIT IV	**8 hours**

Polymer science and Environmental Pollution

Polymer science

Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of epoxy resins. Conducting polymers: mechanism of conduction in polyacetylene and its applications.

Environmental Pollution: Introduction, Air pollutants: Sources and effects of primary& Secondary air Pollutants, Ozone depletion, greenhouse effect - global warming. Sources of water pollution, Determination of BOD and COD

Self-study :Characterization of nanomaterials- FT-IR, XRD, SEM, TGA, BET-surface area analysis.

UNIT V	**8 hours**

Instrumental methods of chemical analysis: theory, instrumentation and applications- Colorimetric estimation of Cu, Potentiometric estimation of FAS, Conductometric estimation of acid mixture.

Water technology

Impurities in water –water analysis: Hardness – types, determination by EDTA method, dissolved oxygen by Winkler's method.

Potable water- desalination of water by electrodialysis method.

Green chemistry: Introduction, Principles, green synthesis – Aspirin and ibuprofen

Green catalyst – Zeolite and Silica. Microwave assisted reaction in water – Methyl benzoate to Benzoic acid, oxidation of toluene, Ultrasound assisted reaction – Sonochemicalsimmons-smith reaction

Self –study: Importance of green chemistry in industry, environment related issues.

TEACHING AND LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

Course Outcomes:

1. CO1: At the end of the first unit the student will be able to understand the basic concepts electrochemistry and its applications, in the construction of electrochemical energy sources.
2. CO2: At the end of the second unit the student will be able to understand concepts of corrosion and its control in the fabrication and design of structural materials and importance of metal finishing in

enhancing physicochemical properties.

3. CO3: At the end of the third unit the student will be able to understand concepts of renewable and non-renewable energy sources.
4. CO4: At the end of the fourth unit the student will be able to understand the application of polymeric materials for different applications.
5. CO5: At the end of the fifth unit the student will be able to understand the instrumental techniques and water quality parameters.

REFERENCE:

1. Principles of Physical Chemistry B.R.Puri, L.R.Sharma&M.S.Pathania, S.Nagin Chand &Co.
2. Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
3. Corrosion Engineering – by M.G.Fontana, Mc Graw Hill Publications.
4. Environmental Chemistry by Stanley E. Manahan, 7th Edition, lewis Publishers, 2000
5. Engineering Chemistry by DrRenubapna, Macmilan publisher India limited
6. Engineering Chemistry by Jayaprakash and VenugopalSubhash Publications.
7. Nano Metal Oxides For Environmental Remediation. United Publications Dr. Jahagirdar A.A and Dr. Nagaswarupa H P

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
CO5	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Scheme and Syllabus - CBCS –2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">BASIC ELECTRICAL ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21EET103/21EET203</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>02</td><td>00</td><td>00</td><td>04</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE:

1. Understand the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Analyze the series and parallel electrical circuits for voltage, current, power, and energy.
4. Describe the construction and working principles of electrical machines.
5. Explain electric power generation, transmission and distribution, wiring schemes and equipment and personal safety measures.

UNIT I **6+6 hours**

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel, and series-parallel circuitsexcited by independent voltage sources. Power and energy, maximum power transfer theorem appliedto the series circuit and its applications.

Electromagnetism and AC Fundamentals: Faraday's laws, Lenz's law. Fleming's rules & dynamically induced e.m.f. Statically induced e.m.f.s., the concept of self and mutual inductance & coefficient of coupling, force on the current-carrying conductor. Generation of sinusoidal voltage, average and RMS value, form factor, and peak factor.

Self-Study: Basics of lead acid batteries, nickel - iron batteries, lithium – ion batteries, advantages and disadvantages of batteries, rating of batteries in ampere - hour.

UNIT II	**5+5 hours**
Single-phase circuits: Voltage, current, and power waveforms with phasor diagram, in R, L, and C circuits. Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real, reactive and apparent powers, power triangle, and Power factor. **Three-phase circuits:** advantages of three-phase systems, generation of three-phase power, representation of the balanced star (3 wire and 4 wire system) and delta connected loads, phase and line relations of voltages and currents from phasor diagrams. Measurement of three-phase power by the two-wattmeter method. **Self-Study:** Electric Wiring : Casing and cap wiring, Open conduit and closed conduit systems. Advantages and disadvantages. Types of wires used for lighting and heating (power) circuits.	
UNIT III	**5+5 hours**
DC Machines: (**a)** Principle of operation, constructional details, induced emf equation, types of generators, and the relation between induced emf and terminal voltage. (**b**) Principle of operation, back emf and torque equations, types of motors, characteristics (shunt and series only), and applications. **Transformers**: Necessity of transformer, the principle of operation, Types, and construction of single-phase transformers, emf equation, losses, efficiency, and condition for maximum efficiency. **Self-Study:** DC compound generators, compound motors, three phase transformers **–** types and constructions.	
UNIT IV	**5+5 hours**
Three-phase induction Motors: Concept of rotating magnetic field, the principle of operation, constructional features of motor, types – squirrel cage and wound rotor and their applications., slip, the significance of slip, and problems on slip calculations. **Three-phase synchronous generators:** Principle of operation, constructional features of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation, with the concept of winding factor (excluding the derivation and calculation of winding factors) **Self-Study:** Single phase induction motors: Double field revolving theory. Types, Working principle and constructions.	

UNIT V **5+5 hours**

Power transmission and distribution- Concept of electric power transmission and distribution. Low voltage distribution system (400 V and 230 V) for domestic, commercial, and small scale industry through block diagram/single line diagrams only

Electricity bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two- part electricity tariff, calculation of electricity bill.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB)merits and demerits.

Personal safety measures: Electric Shock, Safety Precautions, Earthing, and its types.

Self-Study: Electrical Power Generation: Sources of energy – renewable and non-renewable, working principle of hydel, thermal, nuclear, wind and solar power plants through block diagrams, environmental effects and advantages and disadvantages.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the basic concepts in electrical engineering.

CO2: Analyze-dc circuits, single-phase, and three-phase ac circuits.

CO3: Explain the construction and operation principle of electrical machines.

CO4: Solve basic problems on electrical machines.

CO5: Explain the concept of electric power transmission, distribution, electricity billing, equipment, and personal safety measures.

TEXT BOOKS

1. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw-Hill Education, Revised first edition, 2019
2. Electrical and Electronic Technology, Edward Hughes, Pearson, 12th edition, 2016
3. Lecture Notes (for module 5), Dr. AIT.

REFERENCE BOOKS

1. Basic Electrical Engineering, D.P. Kothari I.J.Nagrath, McGraw-Hill Education, 4th Edition,2019.
2. Fundamentals of Electrical Engineering and Electronics, B.L. Theraja, S Chand and Company, Reprint Edition 2013.
3. Principles Electrical Engineering and Electronics, V.K Mehata, Rohit Mehta, S Chand and Company, 2nd edition, 2015.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://www.youtube.com/watch?v=IZA_bJiGiJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1
3. https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijj2Eub-UHs_y

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO2	PSO3
CO1	3	3						1		1		1	3	1	1
CO2	3	3						1		1		1	3	1	1
CO3	3	3						1		1		1	3	1	1
CO4	3	3						1		1		1	2	1	1
CO5	3	3				3	1	1		1		1	3	1	1
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department ofComputer Science & Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">PROBLEM SOLVING THROUGH PROGRAMMING</td></tr>
<tr><td>Course Code</td><td colspan="7">21CST103/203</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course(ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>02</td><td>00</td><td>00</td><td>03</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td>Total Max. Marks=100</td><td colspan="4">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVES:

1. Elucidate the basic architecture and functionalities of a Computer.
2. Apply programming constructs of C language to solve the real-world problems.
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures.

UNIT I **8+3 hours**

Fundamentals of Problem Solving:
Art of programming through Algorithm and Flowchart, Designing solutions to various problems.
Overview of C: Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions
Self Study Component:Introduction to Computer: Computer generations, computer types, CPU, Primary memory, Secondary memory, input devices, output devices.

UNIT II **8+3 hours**

Managing Input and output operations:Conditional Branching and Loops: Example programs, finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascal's triangle.
Self Study Component: Hardware and Software: Computers in a network, Network hardware, Software basics, software types.

UNIT III **8+2 hours**

Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching and Sorting Algorithms(Linear search, Binary search, Bubble sort and Selection sort).
Self Study Component:Programming Examples

UNIT IV **8+2 hours**

User Defined Functions and Recursion.

Example programs: Finding Factorial of a positive integer, GCD of two numbers and Fibonacci sequence.

Self Study Component: Storage classes: auto, extern, static, register.

UNIT V **8+2 hours**

Structures, Unions and Pointers, Programs like Addition of two complex numbers using structures, compute the sum, mean and standard deviation of all elements stored in an array of N real numbers using pointers.

Self Study Component: Case Study related to Functions and Structures :

***Example:* Implement structures to read, write and compute average marks and the students scoring above and below average marks for a class of 'N' students with the structure definition as**

```
struct student
{
        char name[20];
        introllno;
        int m1, m2, m3;
        intavg;
}
```

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to: At the end of the course the student will be able to:

CO1:Elucidate the basic architecture and functionalities of a computer and also recognize the hardwareparts.

CO2:Apply programming constructs of C language to solve the real worldproblem

CO3:Explore user-defined data structures like arrays in implementing solutions to problems like searching andsorting

CO4:Explore user-defined data structures like structures, unions and pointers in implementingsolutions

CO5: Design and Develop Solutions to problems using modular programmingconstruct Using functions

TEXT BOOKS

1. E. Balaguruswamy, "Programming in ANSI C", 7th Edition, TataMcGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Prentice Hall ofIndia.

REFERENCE BOOKS

1. "Programming in C"by ReemaThereja, , Cengage publication.
2. "C- Programming Techniques" by A.M. Padma Reddy, Sri Nandi Publications

ONLINE RESOURCES

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/

MOOC courses can be adopted for more clarity in understanding the topics and varieties ofproblem solving methods.

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2		2	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Civil Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">Civil Engineering and Mechanics</td></tr>
<tr><td>Course Code</td><td colspan="7">21CVT104 / 204</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ESC)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Teaching Hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>0</td><td>3</td><td>40</td><td>3</td></tr>
<tr><td>CIE Marks:50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course Objectives: Students will be revealed to

1. Apply the various lawsand principles of mechanics in various fields of engineering curricula and develop analytical ability and powers of reasoning.
2. Become conversant with basics of force systems to analyze various conditions developed in supports, static, relative motions and surfaces of the bodies in various planes.
3. To understand the significance of the area concentrated at one point in the planes and bodies, determine itscoordinate'sfor simple and composite sections and its higher properties like Moment of Inertia.
4. To familiarize with laws of rectilinear motion, kinematics of motion and their inter relationships.

UNIT I: **7 Hours**

Basics of Civil Engineering: Introduction to Civil engineering: Scope of different fields of civil engineering – Surveying, Building materials, Construction technology, Geotechnical engineering, Structural engineering, Hydraulics, Water resource engineering and Irrigation engineering, Transportation engineering, Environmental engineering.

Infrastructure: Types of infrastructure, role of civil engineer in the infrastructure development, Effect of the infrastructure facilities on socio-economic development of a country.

Self-study: -Roads, Bridgesand Dams; Types of roads, bridges and Dams, components and their function with simple sketches.

UNIT II:	**10 Hours**
Fundamental principles of mechanics: Introduction**,** basic principles and concepts of mechanics, Laws of mechanics, Idealization of mechanics. **Basic principles of statics:**Introduction to Force and its characteristics, equivalent system of forces, principles of transmissibility of a force, systems of forces, resultant of coplanar concurrent forces, component of a force, moment of a force with respect to a point, principles of moments (Varignon's theorem), Couples, effects of a force at another point, equations of static equilibrium, free body diagram. **Co-planar forces (forces in a plane):**Resultant of co-planar concurrent forces, equilibrium of co-planar concurrent forces and Numerical problems. **Co-planar non concurrent force system:**Resultant of co-planar non-concurrent forces, equilibrium of coplanar non concurrent forces and Numerical problems.	
UNIT III:	**8 Hours**
Support Reactions: Introduction, Beam, Classification of beams, types of loads and supports, support reactions in statically determinate beams - Numerical problems. **Friction:**Introduction, laws of dry friction, limiting friction, co-efficient of friction, angle of friction, angle of repose and cone of friction. Numerical problems on Blocks (horizontal and inclined plane), Ladder friction and Wedge friction.	
UNIT IV:	**8 Hours**
Centroid: Introduction, centroid and center of gravity. Derivations of simple geometrical sections – rectangle, triangle, semicircle and quarter circle. Numerical problems on composite sections. **Moment of Inertia:**Introduction, Moment of Inertia of an area, Parallel axis theorem, Perpendicular axis theorem, Radius of gyration, Polar moments of inertia. Derivations of simple geometrical sections – Rectangle, Triangle, Circle, Semicircle and Quarter circle. Numerical problems on composite sections.	
UNIT V:	**7 Hours**
Basic Principles of Dynamics: Introduction, kinematics and kinetics, Definitions of Displacement, Speed, Velocity and Acceleration. D'Alembert's principlewith numerical problems.Newton's Laws of motion,Concept of Rectilinear motion: withsimple-numerical problems.Differential relationship between displacement, velocity and accelerations. Principles of projectile with numerical problems.	

COURSE OUTCOMES: The students will be able to

CO1: Discuss the basics of Civil Engineering, Concept of Engineering Mechanics, Forces and ForceSystems to determine the resultant

CO2: Define the effect of forces on the bodies in respect of its contact surfaces and the reactions developed in the system

CO3: Identify the geometrical properties like, centroid and Moment of Inertia of regular, composite and built-up sections.

CO4: Illustrate the concept of rectilinear motion,kinetics and kinematics of bodies with numerical approach.

TEXT BOOKS:

1. Irving H Shames, Engineering Mechanics, Prentice Hall.
2. F P Beer and E R Johnson, Vector Mechanics for Engineers, Vol-II-Dynamics, Tata McGraw Hill.
3. Engineering Mechanics by Timoshenko-Young and J V Rao, Mc Graw-Hills Book Company, New, Delhi
4. Elements of Civil Engineering (IV Edition) by S S Bhavikatti, Vikas Publishing House Pvt. Ltd. New, Delhi.
5. Elements of Civil Engineering and Engineering Mechanics, by M N Shesha Prakash and G VMogaveer, PHI Learning 2009.

1 R C Hibler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
2 Endy Ruina and Rudraprathap, Introduction to Statics and Dynamics, Oxford University Press.
3 Shanes and Rao, Engineering Mechanics, Pearson Education.
4 Bansal R J, Text Book of Engineering Mechanics, Likshmi Publications.
5 Engineering Mechanics by M V S Rao and D R Durgaiah, University Press 2005.

REFERENCE BOOKS:

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATION

QUESTION PAPER PATTERN FOR SEE										
Q. No.	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**	**Q10**
UNIT	**01**		**02**		**03**		**04**		**05**	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING OF Cos WITH POs

CO & PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓										✓
CO3	✓	✓										✓
CO4	✓	✓		✓								✓

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electronics and Communication Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">BASIC ELECTRONICS AND COMMUNICATION ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21ECT104/204</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>02</td><td>00</td><td>00</td><td>03</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVES:

1. Preparation:To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. Core Competence: To equip students with a basic foundation in electronic engineering fundamentals required for comprehending the operation and application of electronic circuits, logic design, embedded systems and communication systems.
3. Professionalism & Learning Environment: To inculcate in first year engineering students an ethical and a professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context and life- long learning needed for a successful professional career.

UNITI	**8+3 hours**
Electronic Circuits: Rectifiers, Reservoir and smoothing circuits, Full-wave rectifiers, Bi-phase rectifier circuits, Bridge rectifier circuits, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers, Power Supplies–Block diagram, (No Derivations, Numericals on Rectifiers included). **Amplifiers:** Types of amplifiers, Class of operation, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback. **Operational amplifiers:** Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits, Multi-stage amplifiers. **Oscillators:** Positive feedback, Conditions for oscillation, Ladder network oscillator, Wein bridge oscillator. (No Derivations, Numericals on Op-amp included). **Text 1** ***Self-study component: BJT types, comparison of BJT, FET &FinFET.***	
UNITII	**8+3 hours**
Logic Circuits: Boolean Algebra, Logic gates, Realization of Boolean Expressions using basic gates and their truth table. Half Adder and Full Adder, Multiplexer and decoder. Shift registers and its types – operation and truth table, Counters and asynchronous counters. Bistables, R-S Bistables, D-type Bistables, J-K Bistables. **Text 4** Data representation, Data types, Data storage, A microcontroller system. **Sensors and Interfacing**: Instrumentation and control systems, Transducers, Sensors. **Text 1** Actuators, LED, 7-Segment LED Display, Optocoupler, Stepper Motor, Relay, Piezo Buzzer, PushButton Switch, Keyboard. **Text 2** ***Self-study component: Actuator types, LCD, Touch screen displays***	
UNITIII	**8+2 hours**
Embedded Systems: Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvardvs Von-Neumann, Big-EndianvsLittle-Endian,Memory,Program storage memory (ROM),RAM, Embedded firm ware, other system components. **Text 2** **Communication Interface:** UART, Parallel Interface, USB, Bluetooth, Wi-Fi, GPRS. **Text 2** ***Self-study component: Block diagrams of the architectures of RISC, CISC, Harvard and Von-Neumann.***	

UNITIV	8+2 hours
Analog and Digital Communication: Modern communication system scheme, Information source and input transducer, Transmitter, Channel – Hardware and Software, Noise, Receiver, Multiplexing, Types of communication systems. **Text 3** Types of modulation (only concepts)– AM,FM,PhaseModulation,PulseModulation,PAM,PWM,PPM,PCM. Concept of Radio wave propagation. Concepts of Sampling theorem, Nyquist rate, Digital Modulation Schemes– ASK, FSK,PSK ***Self-study component: Evolution of Wireless Network Communication Technologies (1G, 2G, 3G and4G, 5G).***	
UNITV	**8+2 hours**
Data Transmission: Asynchronous Transmission, Synchronous Communication, Data Compression, Encryption. Radio Waves, Antennas, Satellite Communication, Microwave Communication, Optical Fiber Communication (OFC): Block diagram of OFC, Advantages of OFC, Applications of OFC. **Text 4** **Cellular Wireless Networks** - Introduction, cellular telephone system, cellular concept and frequency reuse. **Text 3** ***Self-study component:*** **Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.**	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the concepts of electronic circuits encompassing power supplies, amplifiers and oscillators.

CO2: Explain the concepts of digital logic circuits, sensors, actuators and I/O subsystems.

CO3: Discuss the characteristics of embedded systems and types of communication interface.

CO4: Describe the fundamental concepts of analog communication, digital communication and radio wave propagation.

CO5: discuss the techniques of data transmission, different modes of communication, wired and wireless communication systems.

TEXT BOOKS

1. MikeTooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015. DO Ihttps://doi.org/10.4324/9781315737980. eBook ISBN9781315737980
2. KVShibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016.
3. SLKakaniand Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017. https://elib4u.ipublishcentral.com/pdfreader/communication-systems
4. DPKothari, IJNagrath, 'BasicElectronics', 2ndedition, McGraw Hill Education (India), Private Limited, 2018.

REFERENCE BOOK

1. Mitchel E. Schultz, 'Grob's Basic Electronics', 11th Edition, McGraw-Hill, 2011.

ONLINE RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ee55/preview

MODERN TOOLS:

1. PSPICE

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		1			2	1	1		3
CO2	3	2	1					2	1	1		3
CO3	3							2	1	1		3
CO4	3							2	1	1		3
CO5	3							2	1	1		3
Strength ofcorrelation: Low-1, Medium-2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ELEMENTS OF MECHANICAL ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21MET105/205</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (EC)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>00</td><td>02</td><td>00</td><td>04</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE:

1. Acquire a basic understanding role of Mechanical Engineering in the industry and society, formation of steam and its industrial application, renewable energy resources and basic concepts of Hydraulic turbines.
2. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning.
3. Acquire knowledge of various engineering materials, and metal joining techniques.
4. Acquire essential experience on basic Power transmission systems and Robotics.
5. Acquire knowledge of basic concepts on manufacturing principles and machine tools and their advancement.

UNIT 1 **8+3 hours** **Introduction to Mechanical Engineering (Overview only):** Role of Mechanical Engineering in Industries and Society **Sources of energy:** Classification, renewable and non- renewable sources of energy and comparison. **Steam:** Steam formation at a constant pressure: properties of steam, simple numerical problems to understand the use of steam tables. Applications of steam in industries. **Power generating systems:** Introduction, construction and working of: Steam turbines – Impulse and reaction turbine, Gas turbines – Open and closed cycle, Hydraulic turbines – Pelton wheel, Francis and Kaplan turbine. **Power absorbing systems:** Introduction, classification of pumps and compressors. ***<u>Self-study:</u>*** ***Harnessing of renewable energy sources: Wind energy, Solar energy, Bio-mass and their applications*** ***Boilers- Introduction, classification of boilers, difference between fire tube and water tube boilers.*** ***Laboratory Components:*** *1. Study/Visit any one Conventional or Renewable Energy Power Plant and prepare a comprehensive report.* ***2.*** *Demonstration of Components of any one Turbo-machine.* ***3.*** *Study/Visit to an Industry using steam for their process and prepare a comprehensive report.*
UNIT 2 **8+3 hours** **Internal combustion engines:** Introduction, classification, parts and terminology of I C engines, working of 4-stroke petrol & diesel engines, simple numerical problems on four stroke engines. Applications of IC engines. **Hybrid and Electrical vehicles:** Introduction, basic working principle ofelectrical and hybrid vehicles. **Refrigeration and Air conditioning-** Introduction, definition and unit of refrigeration. Refrigerants and their properties. Types of refrigeration systems- Vapour absorption and Vapour compression refrigeration systems and their comparison. Principle & working of room air conditioner. Applications of Refrigerators and Air conditioning system. ***<u>Self-study:</u>*** ***Engines: Two stroke petrol and diesel engines, emission norms.*** ***Laboratory Components:*** *1. Study of Engine Components through Cut Sections* 2. *Demonstrate Components and Working principles of Domestic Refrigerator and prepare a comprehensive report* ***OR*** *Study/visit any commercial centralized Air-Conditioning unit, understand various components and operations, and prepare a comprehensive report.*

UNITIII **8+2 hours** **Engineering Materials:** Types and applications of ferrous, nonferrous metals and alloys. Composite Materials: Introduction, classification and applications. **Heat treatment:** Introduction to heat treatment, Types of Heat Treatment: Annealing, quenching, carburizing, and hardening. **Metal Joining Processes:** **Soldering and brazing:** Definition, types, advantages, limitations and applications of soldering and brazing. Working principle of soldering iron and torch brazing methods. **Welding:** Introduction, classification and applications of welding. Working principle of electric arc welding and oxy-acetylene gas welding. Introduction to TIG and MIG welding. ***Self-study:*** ***Engineering materials: Polymers, Ceramics, Bio materials, Smart materials and its engineering applications.*** ***Laboratory Components*** *1. One exercise each involving Welding, Soldering, and Brazing.* 2. *Study oxy-acetylene gas flame structure and its application to gas welding* *3. Demonstration of* ***anyone*** *Heat transfer application device and prepare a comprehensive report*
UNIT IV **8+2 hours** **Power transmission:** **Belt drives** – Introduction, types of belts and belt drive. Terminology - velocity ratio, creep and slip. **Gear drives** - Introduction, classification; Gear trains – types of gear train. Simple numerical problems on gear drives. **Robotics**: Robot anatomy, Joints & links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly, and Inspection. ***Self-study:*** ***Power transmission: Rope drives, Chain drives and Pulleys.*** ***Laboratory Components:*** *1. Demonstration of the machine consists of Gear Trains* *2. Demonstration of various elementary mechanisms and their motion.* *3. Demonstration of any one model of Robot*

UNIT V **8+2 hours**

Manufacturing process: Introduction and classification of manufacturing process.

Machine tools: Lathe -Working principle and specification of center lathe.Sketch and description of operations performed – turning, facing, knurling, thread cutting, drilling, taper turning. Construction and Working of Milling Machines and applications.

Introduction to Mechatronics: Concept of open-loop and closed-loop systems, Examples of Mechatronic systems and their working principle.

Rapid prototyping (3D printing) - Definition, Classifications, Advantages, Disadvantages, Applications, Brief introduction of 3D Printers-SLA, SLS, FDM.

Self-study:

Introduction to Modern Manufacturing Tools and Techniques:

CNC: Introduction, components of CNC, advantages and applications of CNC, CNC Machining centres and Turning Centers.

Laboratory Components:

1. Demonstration of developing one model involving Lathe, Milling and Drilling

2. Study/Visit an Industry using CNC/ modern techniques and submit a report

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:**Demonstrate** the working of various power generation devices such as steam, gas, hydraulic turbines and power absorbing devices like air compressors.

CO2: **Analyze** about the various IC engines, and power absorbing devices such as refrigerators and air conditioning.

CO3:**Describe** the engineering materials, heat treatment, joining processes for various applications.

CO4:**Describe** power transmission methods for various applications.

CO5:Demonstrate the principle, application of various basic and advanced manufacturing processes.

TEXT BOOKS

1. Elements of Mechanical Engineering - K.R. Gopalkrishna, Subhash publishers, Bangalore.
2. A Text Book of Elements of Mechanical Engineering – S. Trymbaka Murthy I. K. International Pvt Ltd, 2010 - Mechanical engineering
3. Elements of Mechanical Engineering – Dr. A.S. Ravindra, Best Publications, 7th edition, 2009.
4. Robotics, AppuKuttan KK K. International Pvt Ltd, volume 1.
5. Material Science, by Raghavan, Fifth Edition,PHI(P)LTD.

REFERENCE BOOKS

1. Elements of Workshop Technology. Vol 1 & 2, S.K.H. Chowdhary, A.K.H. Chowdhary and Nirjhar Roy, 11th edition 2001, Media Promoters and Publishers, Mumbai.
2. Hand books of Mechanical Engineering.
3. Material science, by Callister, Reprint 2008,Wiley India(P) LTD

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://mechanicalengineeringworld.com/

Assessment Details both (CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) and Semester End Exam (SEE) is 50% each. The students have to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Student has to score a minimum of 40% marks individual in thoery and laboratory test components to quality to take up SEE. Student has to score a minimum of 40% marks in SEE to pass.

<table>
<tr><th colspan="2">CONTINUOUS INTERNAL EVALUATION (CIE)</th><th colspan="2">Max Marks</th><th>Minimum Marks to be scored in CIE, to qualify to take SEE (40% individually)</th></tr>
<tr><td>Theory</td><td>Weightage of Tests (Test1, Test2)</td><td colspan="2">30</td><td>12</td></tr>
<tr><td rowspan="2">Laboratory components</td><td>Lab demonstration components: Rubrics for each lab component are added, then taken average (more emphasized on demonstrationtopics)</td><td>10</td><td rowspan="2">20</td><td rowspan="2">08</td></tr>
<tr><td>Lab Test</td><td>10</td></tr>
<tr><td colspan="2">TOTAL</td><td colspan="2">50</td><td>20</td></tr>
</table>

Note: Questions from Self-study component will not be asked for CIE and SEE.

<table>
<tr><th colspan="11">QUESTION PAPER PATTERN (SEE)</th></tr>
<tr><td>Q. No.</td><td>Q1</td><td>Q2</td><td>Q3</td><td>Q4</td><td>Q5</td><td>Q6</td><td>Q7</td><td>Q8</td><td>Q9</td><td>Q10</td></tr>
<tr><td>UNIT</td><td colspan="2">1</td><td colspan="2">2</td><td colspan="2">3</td><td colspan="2">4</td><td colspan="2">5</td></tr>
<tr><td colspan="11">1. Two full questions (each of 20 Marks) are to be set from each unit.</td></tr>
<tr><td colspan="11">2. Student shall answer five full questions selecting one full question from each unit.</td></tr>
</table>

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	2	2	1	1	1	1	3
CO2	3	2	2	1	1	2	2	1	1	1	1	3
CO3	2	1	1	1	2	2	2	1	1	1	1	3
CO4	3	1	2	1	2	2	2	1	1	1	1	3
CO5	3	1	1	1	1	2	2	1	1	1	1	3
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**ENGINEERING GRAPHICS**						
Course Code	**21MEL105/205**						
Category	Engineering Science Course (EC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	04	52	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**	**Duration of SEE: 03 Hours**			

Course Objectives:

1. To understand the basic principles and conventions of engineering drawing
2. To use drawing as a communication mode
3. To generate pictorial views using CAD software
4. To understand the development of surfaces
5. To visualise engineering components

Teaching-Learning (General Instructions):

- Students should be made to aware of powerful communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point Presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

UNIT I **12 hours**

Introduction: ***(Not for SEE)***

Significance of Engineering drawing, Lettering, BIS Conventions of Engineering Drawing, Freehand sketching of engineering drawing, Introduction to Scales and its types.

Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet andcurves.

Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections, Orthographic projections of points in all the quadrants. Orthographic projections of lines placed in first quadrant only; Inclined to HP,toVP and to both the planes.

Orthographic projections of planes placed in first quadrant only; resting on HP and on VP, inclined to HP,to VP and toboth the planes viz. triangle, square, rectangle, pentagon, hexagon and circular laminae.

Application on projections of Lines & Planes (Not for SEE)

UNIT II **12 hours**

Orthographic Projection of Solids:

Orthographic projection of right regular solids resting on HP, inclined to HP and to VP only.

Prisms and Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, Tetrahedron. Applications problems on projections of Solids (Not for SEE)

Projections of Frustum of cone, pyramid & truncated sphere (Not for SEE)

UNIT III **10 hours**

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simplesolids.

Conversion of simple isometric drawings into orthographic views.

Problems on applications of Isometric projections of simple objects / engineering components***(Not for SEE)***

Introduction to drawing views using 3D environment (Not for SEE)

UNIT IV **10 hours** **Development of Lateral Surfaces of Solids:** Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with baseonHPonly. Development of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels, trays ***(Not for SEE)*** ***Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and* rectangular duct *(Not for SEE)***	
UNIT V **08 hours** **Multidisciplinary Applications & Practice *(Not for SEE):*** **Free hand Sketching;** True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc. **Drawing Simple Mechanisms;** Gear trains, Ratchets, two wheeler cart & Four wheeler carts to dimensions etc. **Electric Wiring and lighting diagrams;** Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software **Basic Building Drawing;** Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software, **Electronics Engineering Drawings**- Like, Simple Electronics Circuit Drawings. **Graphs & Charts**: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.	

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1. Understand and visualize the objects with definite shape and dimensions

CO2. Analyse the shape and size of objects through different views

CO3.Develop the lateral surfaces of the object

CO4.Create a 3D view using CAD software

CO5. Identify the interdisciplinary engineering components or systems through its graphical representation

TEXT BOOKS:

1. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited,2019.
2. K.R Gopalakrishna & Sudhir GopalakrishnaTextbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017.
3. S. N. Lal: Engineering Drawing with an Introduction to Auto CAD: First-angle Projection 1st Edition, Cengage, Publication, 2018.
4. S.N. Lal, & T Madhusudhan:, Engineering Visulisation, 1st Edition, Cengage, Publication.
5. LuzadderWarrenJ.,DuffJohnM., Fundamentals of Engineering Drawing: with an Introduction to Interactive Computer Graphics for Design and Production, Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition,2005.

REFERENCE BOOKS:

1. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press,2015.
2. Dhawan R. K., A Textbook of Engineering Drawing, 3/e, S. Chand Publishing,2019.
3. Venugopal K., Engineering Drawing and Graphics, New Age International publishers,2014.
4. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint2005.
5. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes,1997.
6. K S Sai Ram Design of steel structures, Third Edition by Pearson.
7. Nainan p kurianDesign of foundation systems, Narosa publications.
8. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgraw hill.

SCHEME FOR CIE		
	DETAILS	**MAX. MARKS**
Manual Sketching (25)	Classwork	**15**
	Assignment	**10**
Computer Printout (15)	Classwork	**15**
	Test Marks*	**10**
	TOTAL CIE MARKS	**50**

* Test marks is based on the average of two tests conducted in the mid-semester and end-semester.	

QUESTION PAPER PATTERN FOR SEMESTER END EXAMINAITON (SEE)								
UNIT	1		2		3		4	
Max. Marks	15		15		10		10	
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

NOTE:
1. Two Full Questions to be set from each Unit with internal choice.
2. Each Full question shall cover all the topics of the Unit.
3. Model question paper may be referred for distribution of topics in each Full Question.

SCHEME OF EVALUATION FOR SEE			
Unit	**Maximum Marks**	**Manual Sketching**	**Computer display and print out**
1	15	08	07
2	15	07	08
3	10	05	05
4	10	05	05
Total	**50**	**25**	**25**

NOTE: Evaluation shall be carried out jointly by both the examiners.

MAPPING OF COs WITH POs												
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	1	2	0	1	1	2	2	0	2
CO2	3	2	2	1	2	0	1	1	2	2	0	2
CO3	3	2	2	1	2	0	1	1	2	2	0	2
CO4	3	2	2	1	2	0	1	1	2	2	0	2
CO5	3	2	2	1	2	0	1	1	2	2	0	2

Strength of correlation: Strongly related-3, Moderately related-2, Weakly related-1, Not related-0

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING PHYSICS LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21PHL106/206</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course objective: To make Engineering students to understand basic concepts and principles of Physics. Gain the practical knowledge of elasticity, vibrations, Laser and optical fibers.

Sl. No.	Title of the Experiment	Compatibility with the theory course
1.	Determination of Young's Modulus of a material by single cantilever.	Unit I
2.	Determination of Rigidity modulus of a material by torsional pendulum.	Unit I
3.	Determination of acceleration due to gravity by using bar pendulum.	Unit I
4.	Determination of resonant frequency & quality factor in Series & Parallel LCR Circuits	Unit I
5.	Determination of Planck's constant using LED's	Unit II
6.	Determination of knee voltage and resistance from I-V characteristics of Zener Diode.	Unit III
7.	Measurement of dielectric constant.	Unit III
8.	Determination of Fermi energy of copper.	Unit III
9.	Determination of wavelength of Semiconductor Laser by diffraction method.	Unit IV
10.	Determination of Acceptance angle and numerical aperture of an optical fiber.	Unit IV
11.	Radius of curvature of Plano convex lens using Newton's rings	Unit IV
12.	Energy gap of a given semiconductor	Unit III

COURSE OUTCOMES: At the end of the course the students will be able to:

CO1: Apply the Physics concepts relevantly and appropriately where ever required.

CO2: The mechanical properties of solids will be understood by carrying out experiments of Young's Modulus, rigidity modulus and bar pendulum.

CO3: The optics experiments such as wavelength of laser by diffraction and numerical aperture of an Opticalfiber will help the students to understand the significance of Physics in various fields of Science and Technology.

CO4: Understand the importance of Physics in electronics.

REFERENCE BOOKS:

1. Laboratory Manual in Applied Physics -- H. Sathyaseelan. – New Age International.
2. An Advanced Course in Practical Physics -- D. Chattopadhyay and P.C. Rakshit, New Central Book Agency (p) Ltd, Kolkata .

Web link for Physics virtual lab: https://www.vlab.co.in/broad-area-physical-sciences

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Humanities & Social Sciences

Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING CHEMISTRY LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21CHL106/206</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>12</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: To expose first year engineering students to various experimental technique related to potentiometric, conductometric, colourimetric and PKa with a view to highlight their significance and importance in application oriented systems. Students will be able to analyze hardness of water, COD of waste water.

Sl. No.	**Syllabus content**
	PART-A
1	Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2	Colorimetric determination of Copper.
3	Conductometric estimation of acid mixture using standard NaOH solution.
4	Determination of pKa of a weak acid using pH meter.
5	Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6	Flame photometric estimation of Sodium and Potassium in the given sample of water. (Demonstration)
	PART-B
7	Determination of Total Hardness of water using disodium salt of EDTA.
8	Determination of Calcium Oxide in the given cement by Rapid EDTA method.
9	Determination of percentage of Copper in the given brass solution using standard Sodium thiosulphate solution.
10	Determination of Iron in Hematite ore solution using Potassium dichromate crystals by external indicator method.

11	Determination of Chemical Oxygen Demand of the given industrial waste water sample.
12	Determination of Total Alkalinity of given water sample using standard Hydrochloric acid.(Demonstration)

Course Outcomes:

1. Students will be able to apply the basic concepts electrochemistry in experiments such as potentiometry and determination of PKa of weak acid, conductometry experimentsetc
2. Students will be able to understand concepts of electromagnetic radiation and perform coulorimetric experiments.
3. Students will be able to analyze the total hardness of water sample and COD of the wastewater
4. Students will be able to analyze the hematite ore in the given sample.

References Books:

1. Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J.Bassett, J.Mendham and R.C Denney.

VIRTUAL LAB LINK DETAILS:

- https://www.labster.com/chemistry-virtual-labs/
- https://youtu.be/OwZbw6Mhrqc
- https://youtu.be/UOLOsKZxi6Y

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**BASIC ELECTRICAL ENGINEERING LABORATORY**						
Course Code	**21EEL107/207**						
Category	Engineering Science (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. To understand and measure electrical quantities and parameters.
2. To verify the relation between line and phase quantities, measure power and power factor in three-phase circuits.
3. To demonstrate fundamental laws of electrical engineering.
4. To determine the efficiency of single-phase transformers
5. To understand the significance of power, power factor, and control electrical Lamps from different places.

Expt No	Syllabus Contents	No.of Hours	Blooms Taxonomy level.
1	Measurement of Resistance using Voltmeter-Ammeter method and verification using Wheatstone bridge.	2	L1
2	Measurement of Inductance in single-phase circuit by the three-voltmeter method.	2	L2
3	Measurement of voltage, current, power, and power factor and verify line and phase relationship in the three-phase star-connected circuit.	2	L3
4	Verification of Kirchhoff's Laws in DC circuits	2	L2
5	Verification of maximum power theorem in DC circuits.	2	L2
6	Comparison of domestic lamps against their power consumption.	2	L3
7	Improvement of power factor in inductive circuits.	2	L3
8	Control of electrical Lamp from one, two and three points.	2	L2
9	Load test on a single-phase transformer.	2	L3

10	Demonstration of FUSE and MCB by creating overload and fault.	2	L1
	EXPERIMENTS BEYOND SYLLABUS		
1	Speed load characteristics of a three-phase induction motor.	2	L2
2	Voltage regulators to control electrical output.	2	L3

Course Outcomes:

CO1: Verify basic laws and theorem of electrical circuits.

CO2: Understand the power consumption of different types of lamps and control of lamps

from different points.

CO3: Determine the impedance of an electrical circuit and power consumption by a 3-phase

load.

CO4: Evaluate the performance of single-phase transformers.

CO5: Demonstrate the effects of fault and protection of electrical circuits.

References.

1. Dr. Eranna Dr. S. Vasudevamurthy, “Department manual.

Web Links.

1. http://vlab.amrita.edu/?sub=1&brch=75&sim=217&cnt=1/
2. http://vlab.amrita.edu/?sub=1&brch=75&sim=322&cnt=1

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				1		1	1	1		1	3		1
CO2	3	3				1		1	1	1		1	3		1
CO3	3	3				1		1	1	1		1	3		1
CO4	3	3				1		1	1	1		1	3		1
CO5	3	3				1		1	1	1		1	3		1
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science and Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

	COMPUTER PROGRAMMING LABORATORY						
Course Code	**21CSL107/207**						
Category	Engineering Science Course (ES)						
Scheme and Credits	No. of Hours/Week					Total Hrs./ semester	Credits
	L	T	P	SS	Total		
	0	0	2	0	2	26	1
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course objectives to:

- Explain problem statements and identify appropriate solutions
- Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
- Development of algorithms and programs using constructs of C programming language
- Reporting the observations

Practice Programs	
1.	To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) (SI = P*T*R/100).
2.	To print the ASCII value of the given input.
3.	To findlargest of three numbers.
4.	To perform simple calculator using switch case statement.
5.	To find factorial of a number.
6.	To print even and odd numbers using looping Construct.
7.	To find sum of N natural Numbers
8.	Write a C Program to search for the given key element with the help of Linear search technique.
9.	Develop a c program to implement selection sort technique.
10.	Develop a C program to swap two numbers using pointers (Call by Reference).

Lab Programs		
1	a	Write a C program to find the roots of a quadratic equation.
	b	Write a C program to print the numbers in triangular form 1 1 2 1 2 3 1 2 3 4
2	a	Write a C program to check whether the given four digit number is palindrome or not.
	b	Write a C program using function to sort the given array elements using bubble sort technique.
3	a	Develop a C program to Store age of n students and perform the following operations i. Find minimum age of student in the list ii. Find maximum age of a student in the list
	b	Develop a C Program to compute Sin(x) using Taylor series approximation.Compare your resultWith the built- in Library function. Print both the results with appropriate messages.
4	a	If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss and determine how much profit or loss incurred in percentage.
	b.	Write a C program to implement Recursive functions for Binary to Decimal Conversion.
5	a	Write a C program to generate N Fibonacci series.
	b	Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
6	a	Write a C program to check whether the given number is prime or not.
	b	Write a C program to i. read N Bank Employees name ii. Search for an employee in the list using Binary Search Technique. Note: Use 2-D character array to store Bank employees names

<table>
<tr><td>7</td><td>a</td><td>Develop a C program to calculate tax based on given yearly salary and tax percentages. Read monthly salary of an employee as an input from the user.
Conditions to calculate tax, if yearly salary is:
<table>
<tr><th>Income Range</th><th>Tax Charges</th></tr>
<tr><td><=1,50,000</td><td>No tax</td></tr>
<tr><td>1,50,001 to 3,00,000</td><td>10%</td></tr>
<tr><td>3,00,001 to 5,00,000</td><td>20%</td></tr>
<tr><td>5,00,001 and above</td><td>30%</td></tr>
</table>
</td></tr>
<tr><td></td><td>b</td><td>Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.</td></tr>
<tr><td>8</td><td></td><td>Write C functions to implement string operations such as Compare, Concatenate and String length. Convince the parameter passing techniques.</td></tr>
<tr><td>9</td><td></td><td>Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. Which shop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:
Demanded quantity of foodstuff:
<table>
<tr><th></th><th>roll</th><th>bun</th><th>cake</th><th>bread</th></tr>
<tr><td>P_1</td><td>6</td><td>5</td><td>3</td><td>1</td></tr>
<tr><td>P_2</td><td>3</td><td>6</td><td>2</td><td>2</td></tr>
<tr><td>P_3</td><td>3</td><td>4</td><td>3</td><td>1</td></tr>
</table>
Prices in shops S_1 and S_2:
<table>
<tr><th></th><th>S_1</th><th>S_2</th></tr>
<tr><td>roll</td><td>1.50</td><td>1.00</td></tr>
<tr><td>bun</td><td>2.00</td><td>2.50</td></tr>
<tr><td>cake</td><td>5.00</td><td>4.50</td></tr>
<tr><td>bread</td><td>16.00</td><td>17.00</td></tr>
</table>
MATRIX MULTIPLICATION
Write a C program by considering 2 matrices A (M x N) and B (P x Q) that uses functions to perform the following: i. Reading data to p1, p2, p3 (Matrix A) ii. Reading data to s1, s2 (Matrix B) iii. Multiplication of Two Matrices(C=AXB)</td></tr>
<tr><td>10</td><td></td><td>Write a C Program To maintain a record of bank customer's with four fields (Customer ID, Customer Name, Address and ACC-Num). Read and display the bank customer details.
Note: Using array of structures.</td></tr>
</table>

<u>Note:</u> In the practical examination the student need to select one question and both a, b (if present) should beexecuted. All the questions listed in the syllabus have to be included in the lots. The change ofquestion has to be considered by deducting marks(20% of execution), provided the request is made for the same,within half an hour from the start of the examination.

Course Outcomes:

At the end of the course the student will be able to:

CO1: Define the problem statement and identify the need for computer programming

CO2: Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming

CO3: Develop algorithm, flowchart and write programs to solve the given problem

CO4: Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.

Suggested Learning Resources:

1. Yashavanth Kanetkar, Let us C, Authentic Guide to C Programming Langauge, bpb publisher, 17th Edition, 2020.

2. Herbert Schildt, C: The complete reference, Mc Graw Hill, 4th Edition, 2017 Programming in C, Reema Theraja, Cengage publication.

Weblinks and Video Lectures (e-Resources):

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2		3	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-
CO	3	3	3	2	3	-	-	-	-	-	-	-

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Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">COMMUNICATIVE ENGLISH</td></tr>
<tr><td>Course Code</td><td colspan="7">21HST108</td></tr>
<tr><td>Category</td><td colspan="7">Humanities & Social Sciences (HS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./ semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>1</td><td>0</td><td>1*</td><td>-</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 02 Hours</td></tr>
</table>

COURSE OBJECTIVE: To enable the students to assimilate the correct patterns of the language, & to develop students insight into the structure of English language. To enrich vocabulary bank, to communicate more effectively in English, to express opinions including facts & ideas & maintain conversation in everyday situations. To use digital literacy tools their LSRW skills can be enhanced and to master good speaking skills with different strategies.

UNIT I	**4 hours**
Introduction to Communicative English, Fundamentals of Communicative English, Barriers to Effective Communicative English, Different styles in Communicative English, Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills. Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Articles, Conjunctions.	
UNIT II	**6 hours**
Grammar: Preposition, kinds of Preposition and Prepositions often confused / used in different situations. Word Accent – Rules for Word Accent, Stress Shift, Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags and Exercises, Vocabulary: One Word Substitutes and Exercises, Synonyms and Antonyms, Exercises on it. Idioms & Phrases, Words often confused, Homophones, homonyms	

UNIT III	**6 hours**
Grammar: Articles – Definite & Indefinite articles, Spelling Rules and Words often Misspelt, Word Pairs (Minimal Pairs), Sequence of Tenses (Rules in use of Tenses), Situational dialogues: Self-introduction, greeting, thanking, accepting thanks, apologizing, invitations, making complaints, Wh-questions/ yes-no questions, Vocabulary: Contractions/Abbreviations, strong and Weak forms of verbs, Words Formation-Prefixes and Suffixes.	
UNIT IV	**5 hours**
Communication Skills: LSRW Skills	
UNIT V	**5 hours**
Speaking Skills**:** Extempore / Public Speaking, Difference between Extempore / Public Speaking, and Guidelines for Practice. Listening Comprehension. Oral Presentation, Role Plays Just a minute (JAM), Group Discussion, Persuasion Speech, Description.	
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Learn basic grammar rules, developed the mastery of language.

CO2: Enhance vocabulary and fluency will be increased.

CO3: Gain the ability to communicate confidently in various situations.

CO4: improve listening, speaking, reading and writing skills.

CO5: Overcome their stage freight and express their views freely without hesitation.

TEXT BOOKS

1. Workbook
2. English Grammar and composition by WREN AND MARTIN
3. Contemporary English Grammar by JAYANTHI DAKSHINAMURTHY
4. English for Technical Communication by LAKSHMINARAYANA K.R
5. Effective English for Technical Communication by FARATULLAH T.M

REFERENCE BOOKS

1. Objective English (Multiple choice questions with answers for competitive examinations) by Dr.B.James
2. The English Errors of Indian Students by T.L.H Smith Pearse.

3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018.
4. A Textbook of English Language Communication Skills, Infinite Learning Solutions – (Revised Edition) 2020.
5. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press 2018.
6. Technical Communication by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
7. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – 2019.
8. Practical English Usage by Michael Swan, Oxford University Press – 2016.
9. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
10. Effective Technical Communication – Second Edition by M. Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

Ss	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2										3		
CO3										3		
CO4										3		
CO5										3		
Strength of correlation: Low-1, Medium- 2, High-3												

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Course Title	**HEALTH & WELLNESS**						
Course Code	**21HST109**						
Category	**Ability Enhancement Course (AE)**						
Scheme and Credits	No. of Hours/Week					Total Hrs./ semester	Credits
	L	T	P	SS	Total		
	1	0	1*	0	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

Course objective:
The definition of Health and quality of life will teach the learner the necessity for a balanced strength and well-being. The Determinants of Health and Wellness topics like Diet, Food & Nutrition, life style, bring the points of understanding. Physical health, mental health, Social Health, Spiritual health, etc is a point to learn. The adolescent chooses the food as per the taste rather than the usefulness. Warming up exercises, physical exercises, yogasanas, pranayama and certain aspects of personality development may help in going a long way to improve the health and personality of the youth.

UNIT I	**5 hours**
Fundamentals of Balanced Health: Health and quality of life, Definition of Health (WHO), Five Pillars of Balanced Health, Body and Mind concepts, Disease and Healing, Genetics & Environment.	
UNIT II	**4 hours**
Determinants of Health and Wellness: Lifestyle and Health, Sleep and health, Relaxation and Meditation, Physical Fitness and Stamina, Reproductive health and hygiene.	
UNIT III	**7 hours**
Seven dimensions of Health & Wellness: Physical health, Mental health, Social Health, Spiritual health, Cultural health, Moral health, Economical health.	
UNIT IV	**5 hours**
Healthy Eating- Diet and Nutrition: Food and Diet – Difference, Concept of DIET, Nutrition.	

UNIT V	5 hours
Physical activity and personality Development: Warming up exercise, Physical exercise, Yogasanas, Pranayama etc. Special training for the challenged students A few words on personality development (personal quality).	
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Understand the necessity for a balanced health and well-being.

CO2: Know one's life style, physical fitness and stamina.

CO3: Differentiate types of health.

CO4: understand 'Food is medicine' or 'Medicine is food' concept.

CO5: Have the knowledge of yogasanas & pranayama for an overall personality.

TEXT BOOKS

1. Dixit Suresh (2006) Swasthya Shiksha Sports Publications, Delhi.
2. Pinto John and Ramachandra K (2021) Kannada version " Daihika Shikshanada Parichaya", Louis Publications, Mangalore.

REFERENCE BOOKS

1. Simplified Physical Exercises, Thathvagnani, The World Community Service Center, Vethathiri Maharshi, Vethathiri Publications, Erode, SKY Yoga.
2. Puri K. & Chandra S.S (2005) "Health & Physical Education', Surjeet Publication, New Delhi.
3. Shanti K.Y (1987) "The Science of Yogic Breathier" Pranayama D B Bombay.S.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3						
CO3						3						
CO4						3						
CO5						3						
Strength of correlation: Low-1, Medium- 2, High-3												

<table>
<tr><td>Course Title</td><td colspan="7">RURAL DEVELOPMENT ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21CVT109/209</td></tr>
<tr><td>Category</td><td colspan="7">Ability Enhancement Course (AE)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Teaching Hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>1</td><td>0</td><td>1*</td><td>0</td><td>2</td><td>26</td><td>1</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 02 Hours</td></tr>
</table>

Course Objectives:

1. Describe the scope of Rural Development Planning and Concept of Appropriate Technology and implementation of various national policies.
2. Understand the need and concept of low-cost construction materials for individual and group housing;
3. Illustrate the concept of Water Supply and Rural Sanitation.
4. Interpret the concept of rural transport system and issues related to it.
5. Summarize the need of effective Watershed and catchments area development methods and problems relating to watershed management, watershed structures.

UNIT I	**3 Hours**
Rural Development Planning and Concept of Appropriate Technology: Scope; development plans; various approaches to rural development planning; concept of appropriate technology. Rural development program / projects.	
UNIT II	**3 Hours**
Rural Housing: Low-cost construction materials for housing; Composite material - ferro-cement & fly ash, soil-stabilized un-burnt brick; Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry; rat-trap bond for walls; Panels for roof, ferro-cement flooring / roofing units.	

UNIT III	3 Hours
Rural Water Supply and Sanitation: Sources of water. BIS & WHO water standards. Quality, Storage and distribution for rural water supply works; low-cost water treatment technologies; conservation of water; rainwater harvesting; drainage in rural areas, septic tank; low-cost community & individual Garbage disposal systems	
UNIT IV	**3 Hours**
Rural Transportation System: Categories of Pavement Layers, Types of roads, Surface Treatments for roads in rural areas. Soil Stabilization, Lime, Lime Fly ash and Cement Treated Course.	
UNIT V	**3 Hours**
Irrigation Techniques: Consideration of low-cost irrigation techniques, drip & sprinkler irrigation systems. Watershed and catchments area development - problems and features of watershed management, watershed structures	

COURSE OUTCOMES: The students will be able to,

CO1: Understand the concepts and relative Technology for implementation of various National Policies relating to Rural Development in the Country

CO2: Apply the knowledge for Designing and selection of the Construction Materials for Rural Housing

CO3: Analyze and Conceptualize Rural Water Supply and Rural Sanitation.

CO4: Evaluate and interpret the aspects of Rural Transport System

CO5: Appraise and Evaluate the effectiveness of Watershed and Catchment Management for Modern Irrigation System

TEXT BOOKS:

1. Rural Development by Katar Singh, SAGE Publication
2. A.G.Madhov Rao, D.S.Ramachandra Murthy, Appropriate Technologies for low cost Housing Oxfordand IBH Publishing Co. Pvt .Ltd.

REFERENCE BOOK(S):

1 Rural Infrastructure by P.Nair, SBS Publication
2 Rural Infrastructure by Samalia Bihari Verma, Gyaneshwar Prasad & Sahib Kumari Singh, Sarup & Sons.

3 C. Satyanarayana Murthy, Design of Minor Irrigation and Canal Structures. Wiley Eastern Ltd.,

4 Document on Rural Road Development in India Volume1& 2; Central Road Research Institute, New Delhi.

ONLINE RESOURCE:

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√				√	√					
CO2							√					
CO3			√				√					√
CO4							√					
CO5					√		√					√

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<table>
<tr><td>Course Title</td><td colspan="7">Career Development Skills - I</td></tr>
<tr><td>Course Code</td><td colspan="7">21HSN110</td></tr>
<tr><td>Category</td><td colspan="7">HSS (Humanities)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>01</td><td>00</td><td>01*</td><td>00</td><td>02</td><td>26</td><td>00</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: -</td><td colspan="2">Total Max. Marks=50</td><td colspan="3">Duration of SEE: NIL</td></tr>
</table>

COURSE OBJECTIVE:

1. The lessons under this unit are designed to enable the students to plan their career on correct measures and motivate them to set their goals on prior basis.
2. This unit aims to develop the personality skills of the students and teach them to lead a corporate discipline nurture. It also helps them to get groomed with professional ethics.
3. This unit is designed to give the awareness to the students about the job market to prepare themselves at their own pace and potential. It also teaches them about the self-developing attitude through their emotions and intelligence.
4. This unit complies with the overcoming ability of students dealt in stress and it also teaches the punctuality and time managing.
5. This lesson will help students make inferences and predictions about spoken, writing & listening discourse. And by utilizing digital literacy tools, their LCRW skills can be enhanced.

Unit no	Syllabus content	Hours/COs
1	1. Career Planning 2. Goal Settings	5 CO1
2	1. Personality Effectiveness 2. Building Personality and Discipline 3. Grooming, hygiene and Cleanliness	6 CO2

3	1. Self- Awareness & Self Confidence 2. Attitudes 3. Emotional & Intelligent Quotient	6 CO3
4	1. Time Management 2. Stress Management	4 CO4
5	1. LICRW Skills (Listening, Interpersonal, Conversation, Reading & Writing skills)	5 CO5

COURSE OUTCOME:

1. The students will be able to learn about the overview of their goals and also gets to know diversities in the field of their career planning.
2. The student will develop and improve their personal and professional effectiveness. At the end of this unit, students will have deploy themselves about the corporate culture.
3. At the completion of this unit, students will develop the self-confidence and emerge as the confident person.
4. After the completion of this unit students will understand the stress, time and emotional management. Also they will learn about the overcoming the fear and uncomfortable situations such as Public speaking.
5. After the completion of this unit, students will gain knowledge about the assertiveness of Listening, Reading, Writing& Interpersonal segments.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing

- The Pattern of question paper for test is MCQ (1 mark each).

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<table>
<tr><td>Course Title</td><td colspan="7">ADVANCED CALCULUS AND NUMERICAL METHODS</td></tr>
<tr><td>Course Code</td><td colspan="7">21MAT201</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>03</td><td>02</td><td>00</td><td>00</td><td>05</td><td>65</td><td>04</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: This course is intended to impart to the students the skills of employing the basic tools of Calculus and Numerical methods for solving basic and difficult engineering problems.

UNIT I	**8+5 hours**
Multiple Integrals: Evaluation of double and triple Integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find area as double integral and volume as triple integral. **Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. ***Self- Study: Centre of gravity, Moment of inertia.***	
UNIT II	**8+5 hours**
Vector Differentiation: Scalar and vector point functions, gradient, directional derivative, divergence, curl and Laplacian of a vector field. Solenoidal and irrotational vector fields. Vector identities (without proof). **Vector Integration**: Line integrals, Applications to work done by a force. Green's theorem in a plane and Gauss Divergence theorem (without proof) involving cubes and rectangular parallelepiped. ***Self- Study: Surface integrals and Stoke's theorem.***	
UNIT III	**8+5 hours**
Partial Differential Equations (PDE's): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDE's involving derivative with respect to the one independent variable only. Solution of one- dimensional heat equation and wave equation by the method of separation of variables. ***Self- Study: Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.***	

UNIT IV	**8+5 hours**
Numerical Methods-1: Solution of polynomials and transcendental equations: Regula–Falsi and Newton–Raphson method (without proof). Interpolation-Newton's forward and backward difference formulae, Newton's divided difference formula, Lagrange's interpolation formula and its inverse interpolation formula(without proof). **Numerical differentiation and Integration**: Approximation of derivatives using Newton's forward and backward interpolation polynomials. Numerical integration using Simpson's (1/3)rd and Simpson's (3/8)th rules (without proof). ***Self- Study: Newton–Raphson method for repeated roots, Weddle's rule.***	
UNIT V	**8+5 hours**
Numerical Methods-2: Numerical solutions of Ordinary Differential Equations of first order and first degree: Taylor's series method, Modified Euler's method, Fourth order Rungekutta method (without proof). Multi steps methods-Milne's predictor- corrector formula (No derivation). ***Self- Study: Euler's method, Picard's method, Adam- Bashforth method.***	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: At the end of the course the students are able to:

CO1: Show the equivalences of mathematical expressions involving differentiation and integration.

CO2: Find divergence, directional derivatives, area bounded, flux and work done.

CO3: Illustrate mathematical procedures to change the order of integration, method of separation, predictor and corrector.

CO4: Identify the mathematical tool for solving flow models, improper integrals, interpolation and quadrature.

CO5: Apply the integral operator and vector differential operator for mensuration and measurements in complex engineering field.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana : Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I& II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/ Cole, 2005.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3										
CO3	3	3										
CO4	3	3										
CO5	3	3	3									
Strength of correlation: Low-1, Medium- 2, High-3												

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<table>
<tr><td>Course Title</td><td colspan="7">PROFESSIONAL WRITING SKILLS IN ENGLISH</td></tr>
<tr><td>Course Code</td><td colspan="7">21HST208</td></tr>
<tr><td>Category</td><td colspan="7">Humanities & Social Sciences (HS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./ semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>-</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 02 Hours</td></tr>
</table>

Course objective:

To implement English vocabulary at command and ensure language proficiency, to achieve better Technical writing and Presentation skills, identify the common errors in speaking and writing English. Learn better sentence structures, acquire Employment and Workplace communication skills, to learn about Techniques of Information Transfer through presentation in different levels.

<table>
<tr><td>UNIT I</td><td>4 hours</td></tr>
<tr><td colspan="2">Identifying Common Errors in Writing and Speaking English, Subject Verb Agreement (Concord Rules with Exercises), Common errors in Subject-verb agreement, Noun-pronoun agreement, Adjective, Adverb, Verb, Sequence of Tenses, Misplaced modifiers, Common errors in Conjunctions, Common errors in the use of Idioms and phrases.</td></tr>
<tr><td>UNIT II</td><td>6 hours</td></tr>
<tr><td colspan="2">Nature and Style of sensible writing, organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Redundancies & Clichés.</td></tr>
<tr><td>UNIT III</td><td>6 hours</td></tr>
<tr><td colspan="2">Technical Reading and Writing Practices, Effective Technical Reading and Writing Practices, technical Reports writing and Technical Proposals Writing, Grammar – Voice (Active and Passive Voices), Reported Speech, Vocabulary – Analogies, Words Confused/Misused, Collocations</td></tr>
</table>

UNIT IV	5 hours
Communication for Employment, Components of a formal letter, Formats and types of business letters, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing and other recent communication types, Reading Skills and Reading Comprehension.	
UNIT V	**5 hours**
Communication at Workplace, Interpersonal Communication Skills, Non-Verbal Communication Skills (Body Language), Group Discussion and Employment Interviews, Presentation skills and Formal Presentations by Students, Dialogues in Various Situations (Practical Sessions by Students).	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Identify common errors in spoken and written communication.

CO2: Get familiarized with English vocabulary and language proficiency.

CO3: Improve nature and style of sensible writing & acquire employment and workplace skills.

CO4: Improve their Technical Communication Skills through Technical Reading and Writing practices.

CO5: Perform well in campus recruitment, engineering and all other general competitive examinations.

TEXT BOOKS:

1. Workbook
2. Functional English, Cengage learning India Pvt Limited [Latest Revised Edition] - 2020.
3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. Refer it's workbook for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018.
4. A Course in Technical English, Cambridge University Press – 2020.

REFERENCE BOOKS

1. Professional Writing Skills in English, Infinite Learning Solutions – (Revised Edition) 2021.
2. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
3. High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
4. Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.
5. Intermediate Grammar, Usage and Composition by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan – 2016.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Career Guidance and Placement Cell
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">Career Development Skills - II</td></tr>
<tr><td>Course Code</td><td colspan="7">21HSN210</td></tr>
<tr><td>Category</td><td colspan="7">HSS (Humanities)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>01</td><td>00</td><td>01*</td><td>00</td><td>02</td><td>26</td><td>00</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: -</td><td colspan="2">Total Max. Marks=50</td><td colspan="3">Duration of SEE: NIL</td></tr>
</table>

COURSE OBJECTIVE:

1. The main goal of this unit is to help students to overcome the fear of speaking in both personal and professional culture and it also focuses on the presenting the topics with confidence. This unit also teaches the students about the team building activities
2. This unit depicts the easier decision making and problem solving techniques for overcoming the hardships of interview process. It also teaches on behavior & mannerism that should be maintained during the interview.
3. The lessons under this unit help students' to learn to business communication activities which sought to help them to become an entrepreneur.
4. This unit deals with the preparation of Interview skill and also teaches the students about the various interview structures like Resume Building, GD etc..
5. This unit is completely an activity session, constructed to overcome the stage presence or fear.

Unit no	Syllabus content	Hours/COs
1	1. Presentation Speaking skills 2. Public Speaking skills 3. Team Building	**5** **CO1**

2	1. Decision Making & Problem Solving 2. Mannerism & Behavior 3. Reaching your potential	**5** **CO2**
3	1. Business Communication 2. Sales & Negotiations 3. Customer Service	**5** **CO3**
4	1. Interview Skills 2. Resume Building 3. Group Discussion (Each student will be assessed based on their body language, voice modulation, content & Creativity	**6** **CO4**
5	1. Activity Sessions > Debate > Picture Connector 2. Mock Interview	**5** **CO5**

COURSE OUTCOME:

1. The students will have learnt about the way of quality communication with the co-workers and it will also help to build a strong social relationship with outside society. And students will also learn to deliver the presentation in a more powerful and persuasive way.
2. At the end of this unit, students will have deploy themselves in the active thinking and also learns about the effective usage of words. And students will learn about the synchronization with the workmate and also gives them an opportunity to unlock their individual potentials.
3. After the completion of this unit, student will have learnt how to undergo business etiquettes with proper negotiations and customization.
4. After the completion of this unit student have learnt about the interview standards that being asked during the recruitment process. It also improves the clarity and confidence of the students.
5. At the end of this sessions, students will be confident on their speech and will be exposed to interview standards that being asked during the recruitment process.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing
7. Enhancing English and Employability Skills by State Board of Technical.
8. Soft skills an integrated approach to maximize personality by SANGEETHA SHARMA, GAJENDRA SINGH CHAUHAN, and Wiley Publishing.

- The Pattern of question paper for test is MCQ (1 mark each).

Aided By Govt. of Karnataka	**Course Title: PYTHON PROGRAMMING**		
	Course Code: 18CS34	**No. of Credits: 3: 0: 0 (L-T-P)**	**No. of lecture hours/week: 3**
	Exam Duration: 3 hours	**CIE + Assignment + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	**Description**
	1. Describe the core syntax and semantics of Python programming language. 2. Discover the need for working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions to navigate the file system. 5. Infer the Object-oriented Programming concepts in Python.

Unit No	**Syllabus Content**	**No of Hours**
1	**Parts of Python Programming Language,** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements,** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, **Functions**, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	**09**
2	**Strings,** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	**08**
3	**SELF-STUDY** **Dictionaries,** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	**08**
4	**Files,** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression**	**08**

	Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.	
5	**Object-Oriented Programming,** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.	**09**

Course Outcomes	**Description**	**RBT Levels**
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	**L2**
CO2	Express proficiency in the handling of strings and functions.	**L2**
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	**L3**
CO4	Identify the commonly used operations involving file systems and regular expressions.	**L2**
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	1	3	-	-	-	-	-	-	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1^{st} Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS:

1) Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data",** 1^{st} Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2) Aurelien Geron, **"Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 2^{nd} Edition, O'Reilly Media, 2019. ISBN – 13: 978-9352139057.
3) Wesley J Chun, **"Core Python Applications Programming",** 3^{rd} Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

<table>
<tr><td colspan="2">4) Miguel Grinberg, "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.</td></tr>
<tr><td colspan="2">SELF-STUDY REFERENCES/WEBLINKS:</td></tr>
<tr><td colspan="2">1. Dictionaries
https://www.youtube.com/watch?v=daefaLgNkw0
2. Tuples and Sets
https://www.youtube.com/watch?v=W8KRzm-HUcc</td></tr>
<tr><td>COURSE COORDINATOR:</td><td>Dr.Gowrishankar S.</td></tr>
</table>

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN		
	Sub Code:18CS31	**No. of Credits:4=4:0:0 (L-T-P)**	**No.of.lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1 Understand the basic digital principles and working of various logic gates, and different techniques for simplification of Boolean function.

2. Design combinational logic circuits and describe their applications.

3. Analyze working of Flip Flops and sequential circuits.

4. Study the basic organization and architecture of digital computers such as CPU, memory, I/O, and software

5. Discussions of digital logic and microprogramming to understand the design and application of computer systems and can be used as foundation for more advanced computer-related studies

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Combinational Logic Circuits:** Binary Logic, Integrated Circuits, Boolean Functions, Canonical And Standard Forms, The Map Method Two, Three, Four -Variable Maps, Map Manipulation, Essential Prime Implicants, Product-Of-Sums Optimization, Don't-Care Conditions ,minimal sum and minimal product. The Tabulation Method, Determination Of Prime Implicants.	11
2	**Data processing circuits:** Combinational Logic Design Procedure, Adders, Subtractors, Code Converter, Magnitude Comparator, Multiplexers, De multiplexers, Decoder, Encoders.	10
3	**Sequential Logic:** Introduction, FLIP-Flops, Triggering Of Flip Flops, Excitation Tables, Design Procedure. Registers, Shift Registers, Ripple Counter, Synchronous Counter.	10

4	**Processor Logic Design:** Introduction, Processor Organization, Arithmetic Logic Unit, Design Of Logic Circuit, Design Of Arithmetic Circuit, **Control logic design**: Introduction, Control Organization, Hard Wired Control, Hard Wired control –example.	10
5	**Computer Design**: Introduction, System of Configuration, Computer Instructions, Timing and Control, Execution of Instructions, **Microcomputer System Design**: Introduction, Microcomputer Organization, Microprocessor Organization, Instructions and Addressing Modes	11

Text Book:

1. M Morris Mano: Digital Logic and Computer Design, 14th Impression, Pearson, 2012.
ISBN 978-81-7758-409-7.

Reference Books:

1. M. Morris Mano and Charles Kime: Logic & Computer Design, Fundamentals, Pearson, 2014
ISBN 978-93-325-1872-8

2. Andrew S Tenenbaum: Structured Computer Organization, Pearson, 2006,
ISBN 81-7808-692-1

Course Outcomes:

Course Outcomes	**Statements**	**Blooms Level**
CO1	Demonstrate the various techniques like K-map, Quine-McCluskey method for minimization of combinational functions.	**L3**
CO2	Develop and Analyze different combinational and sequential circuits using Logic gates, Multiplexers Decoders, PLA, Flip flops.	**L3**
CO3	Describe the structure of CPU, memory and I/O unit	**L2**
CO4	Discuss the design of logic circuits for arithmetic operation in computer system	**L2**

CO5	Illustrate the use of timing and control signal in the execution of machine instructions of computer system	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	2	3	-	-	-	-	-	-	-	3	3	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-	2	3	-
CO3	2	1	2	2	3	-	-	-	-	-	-	-	1	2	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-	1	2	-
CO5	3	2	2	2	3	-	-	-	-	-	-	-	2	3	-

FACULTY NAME:

SREENIVASA A.H — **Associate Professor**

ARATHI P — **Assistant Professor**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN LAB		
	SUBJECT CODE: 18CSL37	No. of Credits:0:0:1	No. of Lecture hours per week:3
	Exam Duration :3 hours	Exam Marks:50	

Course Objectives:

This course will help students to achieve the ability to:

1. Implement different logic design circuits using components like logic gates, multiplexer, decoder, flip-flops.

2. Understand the various computer operations using simulation

Detailed Syllabus

Expt No.	Experiment List
	PART-A
1	Given a 4-variable logic expression, simplify it using K-Map and realize using logic gates.
2	Design and implement arithmetic combinational circuit.
3	Design and implement various flip flops.(SR,JK,D,T)
4	Design and implement synchronous counter using flip flops.
5	Design and implement asynchronous counter.
6	Design and implement shift registers.(ring ,switched tail)
	PART-B
1	Design and implementation of combinational circuits.
2	Design and implementation sequential circuits.
3	Design of memory units.(RAM and ROM)
4	Designing a logic circuit to perform various functions.
5	Designing an ALU to perform various operations.
6	Demonstrating the assembly language instruction execution.

Course Outcomes	Statements	Blooms Level
CO1	Implement different combinational and sequential logic circuits.	**L3**
CO2	Develop the different sequential circuits	**L3**
CO3	Demonstrate the various operations of computer using appropriate simulator (Logisim, Marie Sim, CPUos)	**L3**
CO4	Illustrate the working of computer components by analyzing their operation using simulator	**L3**
CO5	Describe the assembly language instruction execution using simulator	**L2**

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	3								3	3	-
CO2	3	3	3	3	3								3	3	-
CO3	3	3	3	2	3								2	3	-
CO4	3	3	3	2	3								2	3	-
CO5	3	3	3	2	3								3	3	-

FACULTY NAME:

SRINIVASA A.H — **Associate Professor**

ARATHI P — **Assistant Professor**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : Operating System		
Sub Code:18CS33	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 42**

Course objectives:

- Introduce concepts and terminology used in OS
- Explain threading and multithreaded systems
- Illustrate process synchronization and concept of Deadlock
- Introduce Memory and Virtual memory management, File system and storage techniques

UNIT No	Syllabus Content	No of Hours
1	Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot. Process Management Process concept; Process scheduling; Operations on processes; Inter process communication.	08
2	Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. Process Synchronization: Synchronization: The critical section problem; Peterson’s solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.	09
3	Deadlocks : Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.	09
4	Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. File System, Implementation of File System: File system: File concept; Access methods; Directory structure; File system mounting; File sharing.	08
5	Secondary Storage Structures, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.	08

Course Outcomes	Statements	Blooms Level
CO1	Illustrate the role of resource management, interfaces and system calls as handled by the operating system.	**L2**
CO2	Apply the process scheduling algorithms to select the processes for execution and compare their performances.	**L3**
CO3	Interpret the requirements for process synchronization and coordination handled by operating system.	**L2**
CO4	Describe and analyze the memory management and its allocation methods.	**L2**
CO5	Identify the storage management methods with respect to different storage management techniques.	**L2**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2	1	-	-	-	-	-	-	-	-	1	2	-
CO2	3	3	2	2		-	-	-	-	-	-	-	2	2	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	2	1	-
CO4	2	3	2	1	-	-	-	-	-	-	-	-	2	1	-
CO5	2	3	1	1		-	-	-	-	-	-	-	1	2	-

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Concepts, 8th edition, Wiley India, 2011. **ISBN: 9781118063330**

REFERENCE BOOKS/WEBLINKS:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012. **ISBN13: 9781259005589**
2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010. **ISBN-10: 9788120348363**
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011. **ISBN**: **9788131712894**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title: Python Programming Laboratory		
Sub Code: 18CSL38	No. of Credits: 1 = 0: 0: 1 (L: T: P)	No. of lecture hours/week : 2
Exam Duration: 3 hours	CIE + SEE = 50 + 50 = 100	

Course objectives:

1. Interpret the use of procedural statements like assignments, conditional statements, loops and function calls.
2. Infer the supported data structures like lists, dictionaries and tuples in Python.
3. Illustrate the application of matrices and regular expressions in building the Python programs.
4. Discover the use of external modules in creating excel files and navigating the file systems.
5. Describe the need for Object-oriented programming concepts in Python.

PART – A

Sl. No.	Programs
1.	Write a Python program to print all Disarium numbers between 1 and 100.
2.	Write a Python program to encrypt the text using Caesar Cipher technique. Display the encrypted text. Prompt the user for input and the shift pattern.
3.	Write a Python program to simulate ATM transactions by including the following operations: a) Check for correctness of the ATM pin. b) Perform Balance, Withdraw and Deposit Operations. The above operations should be menu-driven and display appropriate messages after performing each of these operations.
4.	The celebrity problem is the problem of finding the celebrity among n people. A celebrity is someone who does not know anyone (including themselves) but is known by everyone. Write a Python program to solve the celebrity problem.
5.	Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
6.	Perform the following file operations using Python a) Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories. b) Read a file content and copy only the contents at odd lines into a new file.

PART – B

Sl. No.	Programs
1.	Devise a Python program to implement the Rock-Paper-Scissor game.
2.	Create a menu drive Python program with a dictionary for words and their meanings. Write functions to add a new entry (word: meaning), search for a particular word and retrieve meaning, given meaning find words with the same meaning, remove an entry, display all words sorted alphabetically.
3.	Write a Python program to perform Jump Search for a given key and report success or failure. Prompt the user to enter the key and a list of numbers.
4.	Using Regular Expressions, develop a Python program to

	a) Identify a word with a sequence of one upper case letter followed by lower case letters. b) Find all the patterns of "1(0+)1" in a given string. c) Match a word containing 'z' followed by one or more o's.
5.	Write a Python program to plot the Line chart in MS Excel Sheet using XlsxWriter module to display the annual net income of the companies mentioned below.
6.	Devise a Python program to implement the Hangman Game.

Year	Company	Profit
2010	Microsoft	18.76
2011	Microsoft	23.15
2012	Microsoft	16.98
2013	Microsoft	21.86
2014	Microsoft	22.07
2015	Microsoft	12.19
2016	Microsoft	16.8
2017	Microsoft	21.2
2010	Alphabet	8.372
2011	Alphabet	9.706
2012	Alphabet	10.179
2013	Alphabet	12.733
2014	Alphabet	14.136
2015	Alphabet	16.348
2016	Alphabet	19.478
2017	Alphabet	12.662
2010	Amazon	1.152
2011	Amazon	0.631
2012	Amazon	0.139
2013	Amazon	0.274
2014	Amazon	0.241
2015	Amazon	0.596
2016	Amazon	2.371
2017	Amazon	3.033

COs	**Statements**	**Bloom's Level**
CO1	Describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics, science, and games.	**L2**
CO2	Examine the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.	**L3**
CO3	Interpret the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance.	**L3**
CO4	Discover the capabilities of Python regular expression for data verification and utilize matrices for building performance efficient Python programs.	**L2**
CO5	Identify the external modules for creating and writing data to excel files and inspect the file operations to navigate the file systems.	**L2**

Conduct of Practical Examination

- All laboratory programs are to be included for practical examination.
- The breakup of marks and instructions printed on the cover page of the answer script are to be strictly adhered by the examiners.
- Students should pick one program from Part A and one program from part B.
- Change of program is allowed only once (either Part A or Part B) and marks will be deducted as per the Dr.AIT Autonomous/Examination rules and regulations.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	-	-	-	-	-	-	-	1	3	-
CO2	3	2	2	3	3	-	-	-	-	-	-	-	2	3	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-	2	3	-
CO4	2	1	2	2	3	-	-	-	-	-	-	-	1	2	-
CO5	2	1	2	1	3	-	-	-	-	-	-	-	1	1	-

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Sub Title : DATA STRUCTURES AND ALGORITHMS		
Sub Code:18CS33	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:
The objectives of this course are to:

1. Understand the concept of pointers, arrays, structures and unions, dynamic memory allocation.
2. To analyse and implement some examples that comes under linear data structures.
3. Compare and implement different kinds of linked list by studying its pros and cons.
4. Understand and implement trees and graphs, its types and comparison with other data structures and implement searching techniques BFS & DFS.

UNIT No	Syllabus Content	No of Hours
1	**BASIC CONCEPTS:** Pointers and Dynamic Memory Allocation, **ARRAYS and STRUCTURES:** Arrays, Dynamically Allocated Arrays, Structures and Unions, Sparse Matrices, Representation of Multidimensional Arrays, Recursion.	**10**
2	**STACKS AND QUEUES:** Stacks, Stacks Using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions-Evaluation of Postfix Expression, and Conversion from infix to postfix.	**10**
3	**LINKED LISTS:** Singly Linked list, Linked Stacks and Queues, Circular Linked List.Polynomials-Adding Polynomials, Circular List representation of polynomials with header node, Doubly Linked Lists with header node.	**11**
4	**TREES:** Introduction, Binary Trees-Properties, representation, Binary Tree Traversals-Inorder, Preorder, Postorder, Level order, Heaps-Max heap, Min heap. Binary Search Trees-Insertion, Deletion, Searching. **Application of Trees-**Evaluation of Expression.	**10**
5	**Self Study:** **Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. **Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.	**11**

Course Outcomes	Statements	Blooms Level
CO1	Interpret advance C programming techniques such as pointers, dynamic memory allocation, structures & unions to develop solutions for problems such as polynomials, sparse matrix etc.	**L2**
CO2	Analyse problem and propose solution by selecting appropriate data structures like stacks, Queues, Linked List, Trees, Graphs, Hash Tables.	**L3**
CO3	Implement linked list data structure and handle operations like searching, insertion, deletion, traversing mechanism.	**L4**
CO4	Interpret trees and graphs representations, tree traversal, Searching using BFS and DFS.	**L2**

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO4	1	2	2	2	-	-	-	-	-	-	-	-	2	2	-

TEXT BOOK:

1. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures in C, 2ndEdition, Universities Press, 2014. **ISBN-13:** 9780929306407 / **ISBN-10:** 0929306406
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

REFERENCE BOOKS:

1. Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Delmar Learning India Pvt 2013.
2. Robert Kruse & Bruce Leung: Data Structures & Program Design in C, Pearson Education, 2014.

SELF STUDY REFERENCES/WEBLINKS:

http://cgm.cs.mcgill.ca/~godfried/teaching/algorithms-web.html#graphs

https://www.hackerearth.com/practice/data-structures/hash-tables/basics-of-hash-tables/tutorial/

FACULTY INCHARGE:

1. Asha Rani K P
2. Vinod Kumar K P
3. Shalini N

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	SUBJECT TITLE: **DATA STRUCTURES AND ALGORITHMS LAB**		
	SUBJECT CODE:18CSL36	**No. of Credits:0:0:1:0**	**No. of Lecture hours per week:2**
	Exam Duration :3 hours	**Exam Marks: 50**	

Course objectives:

The objectives of this course are:

1. To Strengthen the ability to identify and apply the suitable data structure for the given real world problem by developing algorithms for manipulating stacks, queues, linked lists, trees.
2. To understand recursion concept.
3. To explore different searching techniques BFS & DFS.

1.	**(SEARCH IN SPARSE MATRIX)→**Design, develop, and execute a program in C to read a sparse matrix of integer values and to search the sparse matrix for an element specified by the user. Print the result of the search appropriately. Use the triple <row, column, value> to represent an element in the sparse matrix
2.	**(STACKS)→**Write a C Program to construct a stack of integers and to perform the following operations on it: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow, stack underflow, and stack empty.
3.	**(INFIX TO POSTFIX)→**Design, develop, and execute a program in C to convert a given valid parenthesized infix arithmetic expression to postfix expression and then to print both the expressions. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).
4.	**(EVALUATE A POSTFIX EXPRESSION)→**Design, develop, and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).
5.	**(QUEUE)→**Design, develop, and execute a program in C to simulate the working of a queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display
6.	**(CIRCULAR QUEUE)→**Write a C Program to simulate the working of a circular queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display
7.	**(STACKS USING SINGLY LINKED LIST)→**Write a C Program using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow and stack empty.
8.	**(QUEUES USING SINGLY LINKED LIST)→**Write a C program using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations: a. Insert b. Delete c. Display The program should print appropriate messages for queue full and queue empty.

9.	**(POLYNOMIAL ADDITION USING LINLKED LIST)→**Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
10.	**(DOUBLY LINKED LIST)→**Design, develop, and execute a program in C to implement a doubly linked list where each node consists of integers. The program should support the following operations: i. Create a doubly linked list by adding each node at the front. ii. Insert a new node to the left of the node whose key value is read as an input. iii. Delete the node of a given data if it is found, otherwise display appropriate message. iv. Display the contents of the list. (Note: Only either (a,b and d) or (a, c and d) may be asked in the examination)
11.	**(TREES)→**Write a C Program a. To construct a binary search tree of integers. b. To traverse the tree using all the methods ▪ Inorder, Preorder, Postorder. c. To display the elements in the tree.
12.	**(MAX HEAP CREATION)→**Design, develop, and execute a program in C to create a max heap of integers by accepting one element at a time and by inserting it immediately in to the heap. Use the array representation for the heap. Display the array at the end of insertion phase.
13.	**(RECURSION)→**Write recursive C Programs for a. Searching an element on a given list of integers using the Binary Search method. b. Solving the Towers of Hanoi problem.
14.	**(BFS & DFS)→** Write a C Program to a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.

Course Outcomes	Statements	Bloom's Level
CO1	Analyse problem and propose solution by selecting appropriate data structures.	**L3**
CO2	Solve a problem using Recursion.	**L3**
CO3	Be able to compare different searching BFS & DFS techniques.	**L3**

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-

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	Course Title: WEB TECHNOLOGIES		
	Course Code: 18CS35	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To familiarize with terminologies, tools, protocols used in web. 2. Identify a valid conformed XHTML document involving a variety of Elements. 3. Apply JavaScript to design interactive web pages. 4. Design well-formed XML documents.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals**: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. **Introduction to XHTML:** Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links**.**	**8 Hours**
2	**XHTML (continued):** Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.	**8 Hours**
3	**The Basics of JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.	**8 Hours**
4	**JavaScript and XHTML**: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification. **Dynamic Document with JavaScript**: Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.	**10 Hours**
5	***Self-Study*****: Introduction to XML**: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Understand terminologies, tools and protocols used in web.	L2
CO2	Design, understand and analyze static web pages.	L4
CO3	Design, understand and analyze interactive, Dynamic web pages.	L4
CO4	Design, understand and analyze data Representation , management and display.	L4

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	3	2								
CO2			3									
CO3			3									
CO4			3	3	1							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Programming the World Wide Web – Robert W. Sebesta, 4thEdition, 2011, Pearson Education.

REFERENCE BOOKS:

1. Web Programming Building Internet Applications – Chris Bates, 3rd Edition, 2006, Wiley India,ISBN : 978-81-265-1290-4

2.Internet & World Wide Web How to H program – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, 2004, Pearson Education / PHI, ISBN-10: 0-130-89550-4

SELF STUDY REFERENCES/WEBLINKS:

http://www.w3schools.com

COURSE COORDINATOR:	**Harish Kumar H C** **Veena .A**

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	SUBJECT TITLE: **OOP Principles and Practices using C++ Lab**		
	SUBJECT CODE:18CSL47	**No. of Credits:1:0:0**	**No. of Lecture hours per week:3**
	Exam Duration :3 hours	**Exam Marks: 50**	

Course Objectives:

This course will help students to achieve the following objectives:

1. Design and develop programs based on the principles of object-oriented programming concepts.
2. Apply the concepts of data encapsulation, inheritance, operator overloading and polymorphism.
3. Understand and illustrate the concepts of exception handling and STL.

1	a) Implement the following requirement: An electricity board charges the following rates to domestic users to discourage large conceptions of energy. 0 - 100 units : Rs 1.50 per unit 101 - 200 units : Rs 1.80 per unit Beyond 200 units: Rs 2.50 per unit All users are charged a minimum of Rs 50. If the total amount is more than Rs 300 then an additional surcharge of 15% is added. The program must read the names of users; number of units consumed and displays the calculated charges. b) Write a program to find mean of two numbers belonging to two different classes using friend function.
2	a) Design and implement a class STUDENT with attributes like: roll number, name, three test marks. Implement member functions a) to read student data like name and test marks, b) to compute average marks (considering best two out of three test marks) and c) to display the student information. Declare an array of STUDENT objects in the main function, use static data member to generate unique student roll number. b) Design a program to illustrate the use of objects as function arguments by performing the addition of TIME in the hour and minutes format.
3	a) Write a program to create a class called COMPLEX and implement the following overloading functions ADD that return a COMPLEX number. i. s2 = s1. add (a) – where a is an integer (real part) and s1, s2 are complex numbers. ii. s3 = s1.add (s2) – where s1 ,s2 and s3 are complex numbers b) Create a class called Account. Write a program to deposit or withdraw money in a bank account. (Assume appropriate attributes and use constructor)
4	a) Create a class called STRING using dynamic memory allocation technique and implement the following operations. Display the results after every operation by overloading the operator <<. i. STRING s1 = “Dr AIT” ii. STRING s2 = “Bangalore”

	iii. STIRNG s3 = s1 + s2. (Overload + operator and Use overloaded constructors) b) Write a program that allows class LCD_TV to inherit two classes – Product and Manufacturer. Display the complete information of LCD TV by assuming appropriate attributes for each class using multiple inheritance.
5	Create a class called Customer (doubly linked list) with member functions to insert a customer at the front of the list as well as to delete a customer from a particular position in the list. Demonstrate all the functions after creating a pointer to a customer list. (Use Destructor)
6	Create a template class called QUEUE with member functions to add an element and to delete an element from the queue. Implement a queue of integers and doubles.
7	Implement the concept of operator overloading: Create a class called DATE. Accept two valid dates in the form dd/mm/yyyy. Implement the following by overloading +, - and << operators. i. no_of_days = d1 – d2; where d1 and d2 are DATE objects, d1 >=d2 and no_of_days is an integer. ii. d2 = d1 + no_of_days; where d1 is a DATE object and no_of_days is an integer.
8	Create a class called Number which has the characteristics of a decimal number. Derive a class OCTAL, which has the characteristics of an octal number inheriting the decimal value from the Number class. Derive a class HEX, which has the characteristics of a hexadecimal number inheriting the decimal value from the Number class. Implement the following operations (using operator overloading): i. int i = j + k where I is decimal , j is hexadecimal , k is OCTAL ii. int y = h + k ; where h is an OCTAL object and k is an integer. Display the result by overloading the operator <<.
9	Design and implement a program to create an abstract class - SHAPE to represent any shape in general. The class should have two pure-virtual functions to read dimensions and to compute the area. Create three derived classes - CIRCLE, RECTANGLE, and SQUARE by inheriting the features of class SHAPE. Implement the functions to read and compute the area. Add method to display the results as required. (Assume appropriate attributes).
10	Create two files named questions and answers. Design a program that reads Questions from questions file and their matched answers from answers file. Use an appropriate exception handling mechanisms to manage file exceptions and to display the output.
11	Write a program for custom exception handling. i. Implement a function to compute factorial of a given number. ii. Create a class "InvalidDataException" that contains the details about the exception – "Invalid data: negative number entered" iii. In the main function, accept a number from the user and throw an exception of type "InvalidDataException" if entered number is a negative number, else call the factorial function to compute the result. iv. Handle the exception.
12	Write a program to create a vector of integers. Copy the vector contents into a list, sort the contents, and then copy selected items into another vector.

Note: In the examination *each* student picks one question from a lot of *all the* 12 Questions.

Course Outcomes:

On successful completion of the course, students are able to:

Course Outcomes	Statements	Blooms Level
CO1	Construct classes incorporating the object-oriented techniques to solve engineering problems.	**L2**
CO2	Identify the dynamic memory management techniques using pointers, constructors and destructors.	**L2**
CO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.	**L2**
CO4	Illustrate and implement STL class of containers and need for exceptions to handle errors for object oriented programs.	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO1 2**	**PS O1**	**PS O2**	**PS O3**
CO1	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO2	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO3	2	2	1	2	3	-	-	-	-	-	-	-	1	2	-
CO4	2	3	1	3	3								1	2	

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Sub Title : Algorithm Design Techniques Laboratory		
Sub Code:18CSL48	**No. of Credits:1= 0 :0 : 1 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

1. To study about various designing paradigms of algorithms for solving problems
2. To analyze run time of algorithms and understand fundamental algorithmic problems
3. Make the students imbibe the art of writing elegant and efficient programs as well as debugging skills.

Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX / Windows environment.

1	Sort a given set of elements using **Bubble Sort/Selection Sort** and determine the time required to sort the elements. Plot a graph of number of elements versus time taken. Specify the time efficiency class of this algorithm.The elements can be read from a file or can be generated using the random number generator.
2	Implement **Merge Sort** algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3	Sort a given set of elements using the **Quicksort** method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
4	From a given vertex in a weighted connected graph, find shortest paths to other vertices using **Dijkstra's algorithm.**
5	Find Minimum Cost Spanning Tree of a given undirected graph using **Kruskal's algorithm**.
6	Find Minimum Cost Spanning Tree of a given undirected graph using **Prim’s algorithm.**
7	Obtain the **Topological ordering** of vertices in a given digraph.
8	a. Implement All-Pairs Shortest Paths Problem using **Floyd's algorithm**. b. Compute the transitive closure of a given directed graph using **Warshall's algorithm**.
9	Implement **0/1 Knapsack** problem using Dynamic Programming.
10	Implement **Traveling Salesperson problem** using Dynamic programming.
11	Implement **Horspool’s algorithm** for String Matching using space & time tradeoff concept
12	Implement **N Queen's** problem using Back Tracking.
13	Find a **subset** of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two

	solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

Note :In the examination *each* student picks one question from the lot of *all* 13 questions.

Course Outcomes	Statements	Blooms Level
CO1	Design an algorithms using appropriate design techniques.	**3**
CO2	Apply and implement learned algorithm design techniques and data structures to solve real world problems	**3**
CO3	Analyze and compare the performance of algorithms.	**3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PSO 3**
CO1	2	3	3	3	-	-	-	-	-	-	-	-	**3**	**3**	**-**
CO2	2	3	3	3	-	-	-	-	-	-	-	-	**3**	**3**	-
CO3	2	3	2	2	-	-	-	-	-	-	-	-	**3**	**2**	-

TEXT BOOK:

1. AnanyLevitin: Introduction to Design & Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran: Fundamentals of Computer Algorithms, 2nd Edition, University press, 2008. ISBN 10: 8173716129 ISBN 13: 9788173716126

REFERENCE BOOKS/WEBLINKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2010.
2. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

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	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY		
	SUBJECT CODE: 18CSL46	**No. of Credits:0:0:1**	**No. of Lecture hours per week:2**
	Exam Duration :3 hours	**Exam Marks:50**	

Course Objectives:

This course will help students to achieve the ability to:

1. Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator
2. Conduct the experiments on an ARM7TDMI/LPC2148 or any other evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/ python compiler.

Detailed Syllabus

Expt No.	Experiment List
	PART-A
1	Write an ALP to evaluate the following expressions i) C= A+B ii)P=Q+(R*S) Assume A, B, C, P, Q, R, S as data memory locations.
2	Write an ALP to perform a simple Boolean operation to calculate the bitwise calculation of the following functions. i)F1 = A·B + C·D ii)F2=(A+B).(C+D) Assume A, B, C, D as data memory locations.
3	Assume array of 16 bit number of size N and write the program to find sum of square of numbers and store the result in internal RAM memory
4	Write an ALP to find factorial of a non-negative number.
5	Write an ALP to multiply two signed numbers which are stored in internal RAM and store the result in
6	Write an ALP to add an array of 16 bit numbers of size N and store the result in internal RAM
7	Write an ALP to count the positive and negative numbers in an array of 16 bit numbers of size N
8	Write an ALP to find the largest and smallest number in an array of 32 numbers of size N
9	Write an ALP to arrange a series of 32 bit numbers in ascending/descending order of size N.
10	Write an assembly language program to search an element in an array of 16 bit number of size N using linear search.
	PART B
1	Interface two LEDs to Raspberry Pi and Write a Python code to input a number and switch ON the LEDs depending on the following conditions

Number		LED1	LED2
Negative	Odd	OFF	OFF
Negative	Even	OFF	ON
Positive	Odd	ON	OFF
Positive	Even	ON	ON

2	Interface a Stepper motor to Raspberry Pi and Write a Python code to rotate it in clockwise and anti-clockwise direction.
3	Interface a PIR Motion Sensor to Raspberry Pi and write a Python code to detect the movement of an object.
4	Interface a temperature sensor to Raspberry Pi and write a Python code to Read and calculate the temperature in Celsius.
5	Interface a button and a speaker to Raspberry Pi and write a Python code to play .wav sound file on press of the button.

Course Outcomes	**Statements**	**Blooms Level**
CO1	Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator	**L3**
CO2	Describe the ARM7TDMI/LPC2148/Raspberry Pi Evaluation board	**L2**
CO3	Demonstrate the working of Raspberry Pi device by connecting it with different components.	**L3**
CO4	Develop the python code for the interfacing components to Raspberry Pi	**L3**
CO5	Illustrate the working of stepper motor, temperature sensor, and PIR sensor	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO3**
CO1	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
CO2	1	1	2	1	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-

FACULTY NAME:

Dr. SIDDARAJU **SRINIVASA A.H**

Professor & Head **Associate Professor**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	SUBJECT TITLE: Computer Organization and Architecture		
	Sub Code:18CS45	**No. of Credits:3:0:0 (L-T-P)**	**No.of.lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:

1. Understand an overview of computer hardware and software which includes the basic functional units, interconnection, addressing techniques and instruction sequencing
2. Understand different integer and floating point arithmetic operation.
3. Understand various cache memory and I/O concepts.
4. Understand the concepts of parallel processing

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Basic concepts and computer evolution**: Organization and Architecture- Structure and Function, A Brief History of Computers, Designing for Performance, Multicore, MICs, and GPGPUs , The Evolution of the Intel x86 Architecture Embedded Systems and the ARM , Performance Assessment . **A Top-Level View of Computer Function and Interconnection:** Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, Point-To-Point Interconnect.	11
2	**Cache Memory:** Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design. **Internal Memory:** Semiconductor Main Memory, Error Correction, Advanced DRAM Organization, **External Memory:** Magnetic Disk, RAID , Solid State Drives , Optical Memory. **Input/output :** External Devices, I/O Modules Programmed I/O, Interrupt-Driven I/O, Direct Memory Access	10
3	**Computer Arithmetic :** The Arithmetic and Logic Unit, Integer Representation , Integer Arithmetic , Floating-Point Representation , Floating-Point Arithmetic **The Central Processing Unit:** Machine Instruction Characteristics , Types of Operands , Intel x86 and ARM Data Types ,Types of Operations , Addressing Modes	10
4	**Processor Structure and Function:** Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining **Reduced Instruction Set Computers:** Instruction Execution Characteristics, The Use of a Large Register File **Compiler**-Based Register Optimization **Reduced** Instruction Set Architecture **RISC** Pipelining. RISC vs CISC Controversy	10

5	**Self-Study:** **PARALLEL ORGANIZATION: Instruction-Level Parallelism and Superscalar Processors :**Overview, Design Issues, **Parallel Processing,** Multiple Processor Organizations ,Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors, Clusters , Non-uniform Memory Access	11

Text Books:

1. William Stallings, "Computer Organization and Architecture, Designing for Performance", 10^{th} Edition, Pearson, 2019

Reference Books:

1. C Hamacher, Z Vranesic, S Zaky: Computer Organization, Tata McGraw Hill, 5th Edition, 2011.
2. John L Hennessy, David A Patterson: Computer Architecture A Quantitative Approach, Elsevier, 5th Edition 2012.
3. Anrew S. Tanenbaum, Structured Computer Organization, Pearson Education Inc, 5^{th} Edition, 2006.
4. John P. Hayes, Computer Architecture and Organization, Tata McGrawHill, 3^{rd} Edition,1998

SELF STUDY REFERENCES/WEBLINKS:

1. William Stallings, "Computer Organization and Architecture, Designing for Performance", 10^{th} Edition, Pearson, 2019.

2. https://www.youtube.com/watch?v=ZGUP5nUdIyc

3. https://www.youtube.com/watch?v=-p9tfMMu1PE

Course Outcomes:

Course Outcomes	Statements	Blooms Level
CO1	Describe the architecture and functionality of central processing unit.	**L2**
CO2	Exemplify in a better way the I/O and memory organization	**L3**
CO3	Use different number systems, binary addition, subtraction, 2's complement representation, floating point representation and its operations.	**L3**
CO4	Demonstrate the execution of instruction and compare the architecture of RISC and CISC.	**L3**

	.	
CO5	Outline the concepts of parallel processing, pipelining and interprocessor communication	**L2**

CO-PO Mapping

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	1	2	-	-	-	-	-	-	-	3	2	-
CO2	3	2	2	1	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	2	1	2	-	-	-	-	-	-	-	2	2	-
CO4	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO5	3	3	2	2	2	-	-	-	-	-	-	-	3	2	-

3- Strong 2-Medium 1-Weak

FACULTY NAME:

SRNIVASA A H
Associate Professor

ARATHI P
Assistant Professor

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEM		
	Sub Code:18CS43	**No. of Credits:4=4:0:0 (L-T-P)**	**No.of.lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1. Differentiate between microprocessors and microcontrollers.
2. Explain the architecture of ARM processor with its instruction set.
3. Identify the applicability of the embedded system

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**The History of ARM and Microcontrollers:** Introduction to Microcontrollers, the ARM Family History, **ARM Architecture and Assembly Language Programming:** The General Purpose Registers in the ARM, The ARM Memory Map, Load and Store Instructions in ARM, ARM CPSR (Current Program Status Register), ARM Data Format and Directives, Introduction to ARM Assembly Programming, Assembling an ARM Program, The Program Counter and Program ROM Space in the ARM, Some ARM Addressing Modes, RISC Architecture in ARM, Viewing Registers and Memory with ARM Keil IDE	11
2	**Arithmetic and Logic Instructions and Programs:** Arithmetic Instructions, Logic Instructions, Rotate and Barrel Shifter, Shift and Rotate Instructions in ARM Cortex, BCD and ASCII Conversion, **Branch, Call, and Looping in ARM:** Looping and Branch Instructions, Calling Subroutine with BL, ARM Time Delay and Instruction Pipeline, Conditional Execution	11
3	**Self-Study:** **Signed Numbers and IEEE 754 Floating Point:** Signed Numbers Concept, Signed Number Instructions and Operations, IEEE 754 Floating-Point Standards, **ARM Memory Map, Memory Access, and Stack:** ARM Memory Map and Memory Access, Stack and Stack Usage in ARM, ARM Bit-Addressable Memory Region, Advanced Indexed Addressing Mode, ADR, LDR, and PC Relative Addressing, **ARM Pipeline and CPU Evolution:** ARM Pipeline Evolution, Other CPU Enhancements	10

4	**Introduction to Embedded Systems:** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Embedded firmware design and development: Embedded firmware design approaches, embedded firmware development languages.	10
5	**Typical Embedded System: Core of the Embedded System:** General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On board and External Communication Interfaces.	10

Text Books:

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, "ARM assembly language Programming and Architecture", MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906

2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition, 2009. ISBN 978-0070678798

Reference Books:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008
5. Ragunandan, An Introduction to ARM System Design, Cengage Publication

SELF STUDY REFERENCES/WEBLINKS

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, "ARM assembly language Programming and Architecture", MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906
2. https://www.youtube.com/watch?v=qBHUGy1xteg

3. https://www.youtube.com/watch?v=e3YvT3WkhRs

4. https://www.youtube.com/watch?v=q4fwx3h3mdg

Course Outcomes:

Course Outcomes	Statements	Blooms Level
CO1	Describe the architecture of ARM microcontroller.	**L2**
CO2	Write the assembly language program using ARM microcontroller instructions	**L3**
CO3	Illustrate the memory concepts and data representation in ARM microcontroller	**L3**
CO4	Identify and Analyze the applications of embedded systems	**L2**
CO5	Select the best components for the design of embedded systems.	**L2**

CO-PO Mapping

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2								3	3	-
CO2	3	3	3	2	3								3	3	-
CO3	2	2	2	3	2								3	3	-
CO4	2	3	2	2	2								2	3	-
CO5	2	3	2	2	2								1	2	-

FACULTY NAME:

Dr. SIDDARAJU
Professor & Head

SRINIVASA A.H
Associate Professor

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Sub Title: Theoretical Foundation of Computer Science		
	Sub Code: 18CS44	No. of Credits:4=4 : 0 : 0 (L-T-P)	No. of lecture hours/week : 4
	Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours :52

Course Objectives

The objective of the course is to

1. Present fundamental concepts and techniques for designing Automata.
2. Provide necessary background for formulating real-world problems to Finite state machines, construct regular expressions and conversion between themselves.
3. Use the pumping lemma to demonstrate the non-regularity of languages.
4. Learn CFGs, Design Pushdown Automata for various context-free Grammars.
5. Know various Normal forms with Simplification of Grammar and Design Turing Machines and know its various types.

Unit No	Syllabus Content	No. of Hours
1	**Introduction to Finite Automata:** Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata An application of finite automata. **Finite Automata, Regular Expressions:** Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions.	11
2	**Regular Languages, Properties of Regular Languages:** Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata	10
3	**Context-Free Grammars And Languages :** Context–free grammars; Parse trees; Applications; Ambiguity in grammars and Languages.	10
4	**Pushdown Automata:** Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata	10
5	**Properties of Context-Free Languages:** Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs **Introduction To Turing Machine:** Problems that Computers cannot solve; The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines; Turing Machine and Computers.	11

Course Outcomes	Statements	Bloom's Level
CO1	Design different finite state machines for regular languages, make conversion between them, construct the regular expression and study its applications.	**6**
CO2	Obtain a minimized DFA, convert the given automata to regular expressions and vice-versa and prove languages not to be regular using pumping lemma.	**4**
CO3	Know basic definitions in Grammar, Write CFGs, Construct parse trees, find and remove ambiguity in grammars.	**3**
CO4	Study Pushdown Automata, Design NPDA and DPDA after the CFG conversion and convert PDAs to grammar.	**2**
CO5	Convert grammar to Various Normal Forms, and simplify the Grammar, Prove that languages are not context free using pumping lemma. Design Turing machines and understand the working of various types of Turing machines.	**3**

Course Outcomes	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	2	-	-	-	-	-	-	2	2	-
CO2	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO3	2	-	2	-	2	-	-	-	-	-	-	-	2	1	-
CO4	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO5	2	2	2	-	2	2	-	-	-	-	-	-	2	1	-

Text Book:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, Publisher: Pearson Education; Third edition (2011)
(Chapters: 1.1, 1.5, 2.2 to 2.5, 3.1 to 3.3, 4, 5, 6, 7, 8.1 to 8.4, 8.6)
ISBN-10: 8131762688 & ISBN-13: 978-8131762684

Reference Books:

1. K.L.P. Mishra: Theory of Computer Science, Automata, Languages and Computation, 3rd Edition, PHI, 2007. ISBN-978-81-203-2968-3
2. Raymond Greenlaw, H.James Hoover: Fundamentals of the Theory of Computation, Principles and Practice, Morgan Kaufmann, 1998. ISBN 9781558605473, 9780080948355
3. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007. ISBN 10: 0070660484 / ISBN 13: 9780070660489
4. Kavi Mahesh: Theory of Computation, A Problem solving approach, Wiley-India. ISBN: 9788126533114

FACULTY NAME: Dr. Harish G & Veena Potdar

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	SUBJECT TITLE: **OOP Principles and Practices using C++**		
	SUBJECT CODE:18CS42	**No. of Credits:3:0:0**	**No. of Lecture hours per week:3**
	Exam Duration :3 hours	**Exam Marks: 100**	**Total No. of Lecture hours:42**

Course Objectives

The objectives of this course are to:

1. Understand the philosophy of object-oriented programming and the concepts of encapsulation, abstraction, inheritance, and polymorphism.
2. Implement the concept of constructors and destructors.
3. Design and test the implementation among objects using a class hierarchy and inheritance.
4. Identify the relationship between the run time polymorphism and compile time polymorphism.
5. Implement file I/O operations, exception handling mechanisms and STL.

Unit No	Syllabus Content	No. of Lecturer hours
1	**Introduction:** Overview of C++, Basic concepts of OOP, Sample C++ program, operators in C++, Function basics, inline functions, function overloading. **Classes and Objects:** Class Specification, Defining member functions, Static members, Friend functions and classes, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors, Templates: Generic functions and classes.	10
2	**Operator overloading:** Rules, Overloading +, - , pre-increment, post-increment, [ ], <<, >> using friend functions. **Inheritance:** Types, Inheritance and protected members, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.	08
3	**Virtual functions and Polymorphism:** Virtual functions, Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.	08
4	**I/O System Basics and File I/O:** C++ stream classes, Formatted I/O, Manipulators, fstream and the File classes, Opening and closing a File, Reading and Writing Text Files, Unformatted and Binary I/O, Random Access **Namespaces :** Fundamentals, using, options, the std namespace	08
5	**SELF-STUDY –** **Exception Handling:** Exception handling fundamentals, Handling Derived-Class Exceptions, Exception handling options **STL**: An overview, The container classes, vectors, lists, maps.	08

Course Outcomes
At the end of the course students should be able to:

Course Outcomes	Statements	Blooms Level
CO1	Identify the classes, objects, members of a class and the relationships among them to solve a specific problem.	**L2**
CO2	Illustrate the concept of constructors and destructors and describe the mechanism of overloading the operators.	**L2**
CO3	Examine the concept of data encapsulation, inheritance and function templates as used in C++ programming language.	**L3**
CO4	Discover the commonly used operations involving the file operations and manipulators.	**L3**
CO5	Interpret the concepts of exception handling and the built-in standard template library.	**L3**

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	2	1	-	-	-	-	-	-	-	1	2	-
CO2	2	3	2	2	1	-	-	-	-	-	-	-	1	2	-
CO3	2	2	3	2	1	-	-	-	-	-	-	-	2	3	-
CO4	2	2	3	2	1	-	-	-	-	-	-	-	1	2	-
CO5	2	3	3	2	1	-	-	-	-	-	-	-	2	2	-

Text Book(s)

1. Herbert Schildt, "*The Complete Reference C++, 5th Edition*", Tata McGraw Hill, 2013.
   ISBN - 978-0071634809

Reference Book(s)

1. Stanley B.Lippmann, JoseeLajore, "*C++ Primer*, *5th Edition*", Addison Wesley, 2013. **ISBN - 978-0321714114**
2. E Balagurusamy, "*Object Oriented Programming with C++*", 6th Edition, Tata McGraw Hill, 2013. **ISBN - 9781259029936**
3. Paul J Deitel, Harvey M Deitel, "*C++ for Programmers*", Pearson Education, 2009. **ISBN - 9780137018475**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

<table>
<tr><td rowspan="3"></td><td colspan="3">Course Title: ALGORITHM DESIGN TECHNIQUES</td></tr>
<tr><td>Course Code:18CS41</td><td>No. of Credits: 3=3 : 0 : 0 (L-T-P)</td><td>No. of lecture hours/week: 3</td></tr>
<tr><td>Exam Duration:
3 hours</td><td>CIE +Assignment + SEE =
45 + 5 + 50 =100</td><td>Total No. of Contact Hours :42</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="2">Course objectives:</td><td colspan="3">Description</td></tr>
<tr><td colspan="3">1. Present fundamental concepts for algorithm design and provide necessary background for writing algorithms in a formal way.
2. Identify for a problem adequate algorithm design strategies.
3. Present fundamental concepts and techniques for complexity analysis of algorithms.
4. Implement appropriate algorithm for different application problems.</td></tr>
</table>

UNIT No	Syllabus Content	No of Hours
1	Introduction: what is an algorithm? Algorithm Specification, Analysis Framework, Performance Analysis: Space complexity, Time complexity. Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω),Theta notation (Q), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples	**8**
2	Divide and Conquer: General Method, Binary Search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge Sort, Quick Sort, Strassen's matrix multiplication, Advantages and Disadvantages of divide and conquer.	**9**
3	The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm; Single Source Shortest Path problem, Optimal Tree problem: Huffman Trees and Codes.	**8**
4	Dynamic Programming: The General Method, Warshall's Algorithm, Floyd's Algorithm for All-Pairs Shortest Paths Problem, Optimal 0/1 Knapsack problem, Bellman-Ford Algorithm, Traveling Salesperson problem. Space-Time Tradeoffs: Introduction, Sorting by Counting, Sorting by Distribution method, Input Enhancement in String Matching.	**9**
5	**SELF-STUDY** Backtracking: General method, N-Queens problem, Sum of subsets problem. Branch and Bound: Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem. Approximation Algorithms for NP-Hard Problems – Traveling Salesperson Problem, Knapsack Problem.	**8**

Course Outcomes	Description	Blooms Level
CO1	Ability to analyze the performance of algorithms using different asymptotic notations.	**L2**
CO2	Identify the design techniques for engineering problems based on Divide & conquer and Greedy methods.	**L2**
CO3	Apply the ideas of dynamic programming and backtracking to solve the engineering problems and analyze their performance.	**L3**
CO4	Determine how space and time trade off technique is used to improve the performance of algorithm.	**L3**
CO5	Estimate the approximation algorithm and analyze the benefit of using them.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-

TEXT BOOKS:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3ndEdition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2ndEdition, University press, 2008.ISBN 10: 8173716129 , ISBN 13: 9788173716126

REFERENCE BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2010.
2. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

SELF-STUDY REFERENCES/WEBLINKS:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3ndEdition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. https://jeffe.cs.illinois.edu/teaching/algorithms/book/02-backtracking
3. https://www.codesdope.com/blog/article/backtracking-explanation-and-n-queens-problem/
4. https://www.geeksforgeeks.org/job-assignment-problem-using-branch-and-bound/

COURSE COORDINATOR:	**ASHA**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Aided By Govt. of Karnataka

	Course Title: PYTHON PROGRAMMING		
	Course Code: 18CSE012	**No. of Credits: 3: 0: 0 (L-T-P)**	**No. of lecture hours/week: 3**
	Exam Duration: 3 hours	**CIE + Assignment + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	**Description**
	1. Describe the core syntax and semantics of Python programming language. 2. Discover the need for working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions to navigate the file system. 5. Infer the Object-oriented Programming concepts in Python.

Unit No	**Syllabus Content**	**No of Hours**
1	**Parts of Python Programming Language,** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements,** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, **Functions**, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	**09**
2	**Strings,** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	**08**
3	**SELF-STUDY** **Dictionaries,** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	**08**
4	**Files,** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression**	**08**

	Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.	
5	**Object-Oriented Programming,** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.	**09**

Course Outcomes	Description	RBT Levels
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	**L2**
CO2	Express proficiency in the handling of strings and functions.	**L2**
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	**L3**
CO4	Identify the commonly used operations involving file systems and regular expressions.	**L2**
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	3	-	-	-	-	-	-	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Gowrishankar S, Veena A, **“Introduction to Python Programming”,** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS:

1) Jake VanderPlas, **“Python Data Science Handbook: Essential Tools for Working with Data”,** 1st Edition, O’Reilly Media, 2016. ISBN-13: 978-1491912058
2) Aurelien Geron, **“Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems”,** 2nd Edition, O’Reilly Media, 2019. ISBN – 13: 978-9352139057.
3) Wesley J Chun, **“Core Python Applications Programming”,** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

4) Miguel Grinberg, **"Flask Web Development: Developing Web Applications with Python",** 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.	
SELF-STUDY REFERENCES/WEBLINKS:	
1. Dictionaries https://www.youtube.com/watch?v=daefaLgNkw0 **2. Tuples and Sets** https://www.youtube.com/watch?v=W8KRzm-HUcc	
COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Subject title: UNIX AND SHELL PROGRAMMING		
	Subject code: 18CS653	**No. of Credits: 3:0:0:0**	**No. of Lecture hours per week: 3**
	Exam Duration : 3hrs	**Exam Marks: 100**	**Total No. of Lecture hours: 39**

Course Objectives:
This course will help students to achieve the following objectives:

1. **Understand the role of the shell as a command interpeter**
2. **Navigate the file system to perform different operations**
3. **Understand the behavioral pattern of the shell and its essential programming constructs using the vi editor**
4. **Understand the concept of filters**
5. **Realize the mechanism of process creation**

Unit No.	Syllabus Content	No. of hours
1.	**The UNIX operating system, architecture and command usage**-- The Operating System, The UNIX operating system, Architecture , Features of UNIX, POSIX and the Single UNIX pecification, Locating Commands, Internal and External Commands, Command structure, Understanding the man documentation, Flexibility of command usage, ***man, man –k, apropos and whatis*** **General – Purpose Utilities** – ***cal, date, echo, printf, bc, script, passwd, who, uname, tty, sty ,*** Basics of electronic mail and handling mail with ***mailx*** program	8
2.	**The File System –** Categorization of files into ***ordinary, device*** and ***directory,*** the hierarchical structure between files and directories - The Parent-Child Relationship, The home directory, HOME variable, file system navigation with ***cd*** and ***pwd*** commands, directory commands ***mkdir*** and ***rmdir*** , absolute and relative Pathnames, use of ***ls*** in different formats. **Handling Ordinary Files** – ***cat, cp, rm, mv, more, lp file, wc, cd cmp, comm, diff, dos2unix, unix2dos,*** compress and archive -- ***gzip*** and ***gunzip, tar, zip*** and ***unzip*** **The Shell**: The Shell's Interpretive Cycle, Pattern Matching – The wild-cards , Escaping and Quoting, Redirection: The Three Standard Files (streams) for redirection and pipelines, filters, Two Special Files ***/dev/null*** and ***/dev/tty***, Pipes, **tee**: Creating a Tee, Command Substitution, Shell Variables, Effects of quoting and escaping	8
3.	**Essential Shell Programming** --Shell Scripts, **read** and **readonly** commands, using command line arguments, **exit** and Exit Status of command, The logical Operators && and || -conditional execution, The **if** Conditional, Using **test** and **[ ]** to Evaluate Expressions, The **case** Conditional, **expr**: Computation and String Handling, $0: Calling a Script by Different names, the use of **while** and **for l**oops**, set** and **shift** statements and **trap**. **Customizing the environment** -- Environment Variables. **Basic File Attributes**: **ls – l**: Listing File Attributes, The **–d** Option: Listing Directory Attributes, File Ownership, File Permissions **,** chmod: Changing File Permissions, Directory Permissions, Changing File Ownership**.** **More file attributes** : More File Attributes : File Systems and Inodes, Hard Links,	9

	Symbolic Links and ln, The Directory, Umask.	
4.	-***Simple filters** : **pr**: Paginating Files, **head**: Displaying the Beginning of a File , **tail**: Displaying the End of a File, **cut**: Slitting a File Vertically, **paste**: Pasting Files, **sort**: Ordering a File, **uniq**: Locate Repeated and Non repeated Lines, **tr**: Translating Characters, An Example: Displaying a Word-count List, **Filters using Regular Expressions** -- grep	7
5. **Self-Study Component**	**The Process** : Process Basics, **ps**: Process Status, System Processes (-e or –a), Mechanism of Process Creation, Internal and External Commands , Running Jobs in Background, Killing Processes with Signals, Job Control, **at** and **batch**: Execute Later, **cron**: Running Jobs Periodically, **time**: Timing Processes. **Vi Editor**,: **vi** Basics, Input Mode-Entering and Replacing Text, Saving Text and Quitting – The ex Mode, Navigation, Editing Text, Undoing Last Editing Instructions(**u** and **U**), Repeating the Last Command (**.**) , Editing Text, Undoing Last Editing Instructions(**u** and **U**), Repeating the Last Command (**.**),Searching for a Pattern (**/** and **?**), Substitution – Search and Replace	7

Text Books

1. **Sumitabha Das: UNIX – Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.**

Reference Books

1. **Behrouz A. Forouzan and Richard F. Gilberg, UNIX and Shell Programming, Thomson, 2005.**
2. **M.G. Venkateshmurthy, UNIX & Shell Programming, Pearson Education, 2005.**

Course Outcomes

CO1. Analyze the role of the shell for programming in the UNIX environment
CO2. Analyze and use the different ways in which the tasks can be executed using the wide set of commands the system offers.
CO3. Develop small shell scripts using vi editor.
CO4. Analyze and Apply the use of appropriate filters in problem solving.
CO5. Analyze and Apply the mechanism of process creation

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Leena Giri G.

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: DATABASE MANAGEMENT SYSTEM		
	Course Code: 18CS53	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

	Description
Course Objectives:	1. To understand the different issues involved in the design and implementation of a database system. 2. To study the physical and logical database designs, database modeling, relational model. 3. To understand and use data manipulation language to query, update and manage a database 4. To develop an understanding of essential DBMS concepts such as: database security, integrity and concurrency.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** Introduction, An example, Characteristics of Database approach; Advantages of using DBMS approach; Data models, schemas and instances; three schema architecture and data independence; Database languages and interfaces; Classification of Database management systems. Entity-Relationship model; using High- Level conceptual Data Models for database Design; An example Database Application; Entity types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and structural Constraints; Weak Entity types; Refining the ER Design, ER to relational schema diagram mapping	9
2	**Relational Model and Relational Algebra:** Relational Model Concepts; relational Model constraints and Relational Database Schemas; update operations, Transactions and dealing with constraint violations; Unary Relational Operations; SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.	8
3	**SQL:** Specifying basic constraints in SQL; schema change statements in SQL; Basic queries in SQL; More complex SQL queries-Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL.	9
4	**Database Design:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Cod Normal form, Properties of Relational Decompositions; Algorithms for relational Database Schema Design; Multi-valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form	8
5	**Self study: Transaction Management:** Transaction and System Concepts, Desirable Properties of Transactions, characterizing schedules based on Recoverability, Characterizing schedules based on Serializability. Two-Phase Locking Techniques for Concurrency Control, Concurrency Control based on Timestamp ordering.	8

Course Outcomes	Description	RBT Levels
CO1	Understand the basic concepts and architecture associated with DBMS so as to employ the conceptual and relational models to design large database systems.	**L4**
CO2	Create, maintain and manipulate a relational database using SQL.	**L4**
CO3	Analyze the database design & normalize it so that the data conforms to design principles.	**L4**
CO4	Apply the characteristics of database transactions and assess how they affect database integrity and consistency.	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**2**								
CO2	**3**	**3**	**3**	**3**	**2**							
CO3	**3**	**3**	**2**	**2**								
CO4	**2**	**2**	**2**									

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015, **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education,2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

SELF STUDY REFERENCES / WEBLINKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015, **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

Chapter -18

COURSE COORDINATOR:	Asha Veena Potdar

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

	Course Title: Advance Algorithm		
	Course Code: **18CS552**	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 04**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. To enable students to acquire knowledge on how to design and analyze iterative and recursive algorithms for complex applications. 2. To design optimal solutions with respect to time and space for real time problems. 3. To understand and analyze graph based algorithms and give optimal solutions. 4. To understand the significance of Modular arithmetic in designing secured applications.

Unit No	**Syllabus Content**	**No of Hours**
1	Review of Analysis Techniques: Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method.	11
2	Graph Algorithms: Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method.	11
3	Number-Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem.	10
4	**Self-Study Component**: String-Matching Algorithms: Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata.	10
5	Data structures: Hash Tables, direct address tables, red-black trees: properties of red-black trees, rotations and insertion.	10

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand the significance and concepts of time and space complexity analysis for designing optimal algorithms	**R2**
CO2	Analyze and solve the time complexity of iterative , recursive and graph based algorithms	**R3,R4**
CO3	Apply mathematical models to implement secured and optimal algorithms	**R4**

CO4	Familiarize with operations, suitability and optimality of data structures in a given application	**R5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**										
CO3	**3**	**3**	**2**									
CO4	**3**	**3**	**3**	**3**	**3**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010. ISBN:9780262033848

REFERENCE BOOKS:

1. Ellis Horowitz, SartajSahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007, ISBN 8173716129, 9788173716126
2. Horowitz, Sahani, Dinesh Mehata, ―Fundamentals of Data Structures in C++‖, Galgotia Publisher, ISBN: 8175152788, 9788175152786.
3. M Folk, B Zoellick, G. Riccardi, ―File Structures‖, Pearson Education, ISBN:81-7758-37-5
4. Peter Brass, ―Advanced Data Structures‖, Cambridge University Press, ISBN: 978-1-107-43982-5
5. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.

WEBLINKS:

1. **Introduction to algorithms and analysis By Prof. Sourav Mukhopadhyay | IIT Kharagpur** https://swayam.gov.in/nd1_noc20_cs93/preview
2. **Khan Academy course on advanced algorithms and data structure**

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Sub Title : Artificial Intelligence		
	Sub Code:18CS553	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:	**Description**
	Course objectives: The objective of the course is to: 1. To understand agent programming for different applications. 2. To learn different problem solving methods for artificial agents. 3. To learn knowledge representation using predicate logic and propositional logic. 4. To learn implementing planning in agents.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** what is AI**,** the foundations of AI,history of AI,the state of the art, **Intelligent agents:** Agents and environments, good behavior, concept of rationality, nature of environments, structure of agents.	**8**
2	**Problem-solving by Searching:** Problem solving agents, searching for solutions, uninformed search strategies, informed search strategies, heuristic functions, games, optimal decision in games ,alpha-beta pruning.	**9**
3	**Logical agents:** knowledge based agents, the wumpus world, logic, propositional logic, reasoning patterns in propositional logic, effective propositional inference ,agents based on propositional logic first order logic, syntax and semantics of first order logic, Propositional vs. Fist order inference.	**8**
4	**Self_study:Knowledge representation**: ontological engineering, categories and objects, actions, situations and events, mental events and mental objects .Planning: the planning problem, planning with state space search, partial order planning, planning graph.	**8**
5	**Making simple decisions:** combining beliefs and desires under uncertainty, the basics of utility theory, utility functions, multi attribute utility functions, decision networks, the value information ,decision theoretic expert system **,Learning from examples**: forms of learning, inductive learning, learning decision trees,	**9**

NOTE:
1. Include Self study component in any one of the Unit.
2. Total number of COs is decided by concerned Course Coordinator

COURSE OUTCOMES:

Course Outcomes	Description	RBT Levels
CO1	Describe and implement different types of agents for real time applications with proper understanding of agent programming	**L3**
CO2	Analyze and apply search methods of problem solving techniques in real time applications.	**L4**
CO3	Understand and derive agent's behavior and environment by applying predicate logic and propositional logic.	**L3**
CO4	Design and apply different planning methods and learning algorithms for improving agents performance	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO 8	PO 9	PO1 0	PO11	PO12
CO1	2	2										
CO2	2	3	3	2								2
CO3	3	3	3									2
CO4	2	3	3	2								2

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, by Stuart Russell and Peter Norvig, 2nd Edition, Publisher: Pearson education ltd-2013 ISBN: 978-81-7758-367-0

REFERENCE BOOKS:

1. Luger, G. F., & Stubblefield, W. A., Artificial Intelligence - Structures and Strategies for Complex Problem Solving. New York, NY: Addison Wesley, 5th edition (2005).
2. Nilsson, N. J. Artificial Intelligence - A Modern Synthesis. Palo Alto: Morgan Kaufmann. (1998).
3. Nilsson, N. J., Principles of Artificial Intelligence. Palo Alto, CA: Tioga (1981).
4. Rich, E., & Knight, K., Artificial Intelligence. New York: McGraw-Hill (1991).

SELF STUDY REFERENCES/WEBLINKS:

1. **http://Nptel.ac.in/courses/106/106/106140**
2. **http://Nptel.ac.in/courses/106/102/102220**

COURSE COORDINATOR:	**ARATHI .P**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Course Title: Core JAVA		
SubjectCode: **18CS52**	**No. of Credits: 4 : 0 : 0 :** **(L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours :52**

	Description
Course Objectives	**CO1:** Understand the fundamental features of Object-Oriented paradigm of the Java programming language. **CO2:** To learn the usage of Inheritance, Packages,Interfaces and Exception Handling. **CO3:** To create multiple threads and understand the basic Networking concepts and RMI in Java. **CO4:** Able to design Event Handling, GUI applications with advanced Java concepts.

Unit No	Syllabus Content	No of Hours
1	**Introduction to Java**: History of Java; Java Programming Environment; Fundamental Programming Structures in Java; Data Types,Variables and Constants,Operators,Strings,Input and Output;Control Flows;Arrays. **Object and Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize() Method, A Stack Class; Introducing Access Control, Understanding static, Introducing final. **Package and Interface:** Packages,Access Protection, Importing Packages, Interfaces; **Applet Fundamentals**.	11
2	**Inheritance:**Inheritance Basics;Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance; **Exception Handling**: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try statements, throw, throws, finally, Chained Exceptions.	10
3	**MultiThreaded Programming:** Thread model; The Main Thread; Creating a Threads;Using isAlive() and join();Thread priorities; Synchronization;	10

	Inter-thread communication; Deadlock. **Networking:** Networking Basics; The Networking Classes and Interfaces;TCP/IP Client Sockets;TCP/IP Server Sockets. **Java Remote Method Invocation(RMI):**Remote Method Invocation concept and technology.	
4	**Self study component** **Event Handling:** History of user interface toolkit; Displaying the Frames; Event Handling Mechanisms; The Delegation Event Model(DEM); Sources of events; Adapter classes; Inner classes. **Introducing GUI Programming with Swing:**Introducing Swing; **JDBC:**The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Statement Objects; ResultSet; Transaction Processing.	**11**
5	**Servlet:** The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API;Packages; Handling HTTP Requests and Responses; Handling Cookies; Session Tracking. **Java Server page (JSP)**: Overview of JSP; JSP tags; Invoking java code with Scripting Elements.	**10**

Course Outcomes	Description	RBT Levels
CO1	Design Classes and establish relationship among Classes for various applications from problem definition.	**L4**
CO2	Analyze and implement reliable object-oriented applications using Java features such as Inheritance and Exception Handling.	**L4**
CO3	Write Java programs to implement Event Handling mechanisms, Multithreaded Programming, Networking concepts, and GUI Programming.	**L3**
CO4	Demonstrate the advanced Java concepts such as Servlets, JDBC and Java Server Pages.	**L4**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2	-	-	-	-	-	-	-
CO2	3	3	2	1	2	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	3	3	3	2	2	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. **The Complete Reference - Java , Herbert Schildt 9th Edition, 2016, TMH Publications, ISBN :978-93-392-1209-4.**
(Chapters: 1, 2, 3, 4, 5, 6, 7,8,9,10,11,13,16,20,22,23,24,31,38)

2.The Complete Reference -J2EE , Jim Keogh, 3rd Edition, 2015, TataMcGRAW Hill Publications, ISBN : 9780070529120. (Chapters: 6,10,11,15)

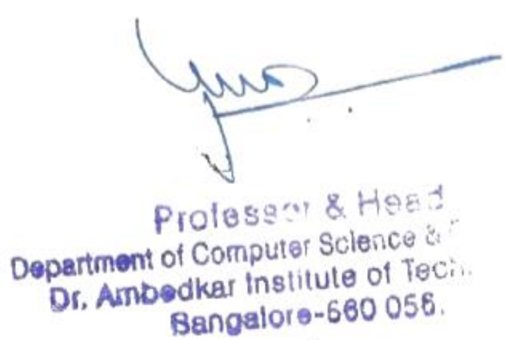
REFERENCE BOOKS:

1. Cay S.Horstmann :Core Java volume I-Fundamental ,11th Edition, Pearson Education, 2019.

SELF STUDY REFERENCES/WEBLINKS:

1. **https://www.youtube.com/watch?v=mQj34vUhpts&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44&t=0s**
2. **https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44**

COURSE COORDINATOR:	**Dr.SMITHA SHEKAR B** **Prof.PUSHPAVENI H P** **Prof.VEENA A**



	Course Title: OOPS with C++ (IDE)		
	Course Code: 18CSE011	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Understand the philosophy of object-oriented programming and the concepts of encapsulation, abstraction, inheritance, and polymorphism. 2. Implement the concept of constructors and destructors. 3. Design and test the implementation among objects using a class hierarchy and inheritance. 4. Identify the relationship between the run time polymorphism and compile time polymorphism. 5. Implement file I/O operations, exception handling mechanisms and STL.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Overview of C++, Basic concepts of OOP, Sample C++ program, operators in C++, Function basics, inline functions, function overloading. **Classes and Objects:** Class Specification, Defining member functions, Static members, Friend functions and classes, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors.	**10**
2	**Operator overloading:** Rules, Overloading +, - , pre-increment, post-increment, [ ], <<, >> using friend functions. **Inheritance:** Types, Inheritance and protected members, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.	**8**
3	**Virtual functions and Polymorphism:** Virtual functions, Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.	**8**
4	**I/O System Basics and File I/O:** C++ stream classes, Formatted I/O, Manipulators, fstream and the File classes, Opening and closing a File, Reading and Writing Text Files, Unformatted and Binary I/O, Random Access **Namespaces :** Fundamentals, using, options, the std namespace.	**8**
5	**SELF-STUDY –** **Exception Handling:** Exception handling fundamentals, Handling Derived-Class Exceptions, Exception handling options **STL**: An overview, The container classes, vectors, lists.	**8**

Course Outcomes	Description	RBT Levels
CO1	Identify the classes, objects, members of a class and the relationships among them to solve a specific problem.	**L2**
CO2	Illustrate the concept of constructors and destructors and describe the mechanism of overloading the operators.	**L2**
CO3	Examine the concept of data encapsulation, inheritance and polymorphism as used in C++ programming language.	**L3**
CO4	Discover the commonly used operations involving the file operations and manipulators.	**L3**
CO5	Interpret the concepts of exception handling and the built-in standard template library.	**L3**

CO-PO Mapping	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	2	3	2	2	1							
CO3	2	2	3	2	2			2				
CO4	2	2	3	2	1			1				
CO5	2	3	3	2	1							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Herbert Schildt, "*The Complete Reference C++, 5th Edition*", Tata McGraw Hill, 2013. **ISBN - 978-0071634809**

REFERENCE BOOKS:

1. Stanley B.Lippmann, JoseeLajore, "*C++ Primer, 5th Edition*", Addison Wesley, 2013. **ISBN - 978-0321714114**
2. E Balagurusamy, "*Object Oriented Programming with C++*", 6th Edition, Tata McGraw Hill, 2013. **ISBN - 9781259029936**

SELF STUDY REFERENCES/WEBLINKS:

1. https://en.wikibooks.org/wiki/C%2B%2B_Programming/Weblinks

2. https://github.com/EbookFoundation/free-programming-books/blob/master/free-programming-books.md

COURSE COORDINATOR:	**Praveena M V**

	Course Title: WEB TECHNOLOGIES		
	Course Code: 18CS551	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To familiarize with terminologies, tools, protocols used in web. 2. Identify a valid conformed XHTML document involving a variety of Elements. 3. Apply JavaScript to design interactive web pages. 4. Design well-formed XML documents.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals**: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. **Introduction to XHTML:** Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links**.**	**8 Hours**
2	**XHTML (continued):** Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.	**8 Hours**
3	**The Basics of JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.	**8 Hours**
4	**JavaScript and XHTML**: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification. **Dynamic Document with JavaScript**: Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.	**10 Hours**
5	***Self-Study*: Introduction to XML**: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Understand terminologies, tools and protocols used in web.	L2
CO2	Design, understand and analyze static web pages.	L4
CO3	Design, understand and analyze interactive, Dynamic web pages.	L4
CO4	Design, understand and analyze data Representation , management and display.	L4

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**3**	**3**	**2**								
CO2			**3**									
CO3			**3**									
CO4			**3**	**3**	**1**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Programming the World Wide Web – Robert W. Sebesta, 4thEdition, 2011, Pearson Education.

REFERENCE BOOKS:

1. Web Programming Building Internet Applications – Chris Bates, 3rd Edition, 2006, Wiley India,ISBN : 978-81-265-1290-4

2.Internet & World Wide Web How to H program – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, 2004, Pearson Education / PHI, ISBN-10: 0-130-89550-4

SELF STUDY REFERENCES/WEBLINKS:

http://www.w3schools.com

COURSE COORDINATOR:	Harish Kumar H C Veena .A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Computer networks and internet protocols		
	Course Code: **18CS54**	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	Description
	1. To understand the fundamental and advanced concepts of communication networks OSI,TCP/IP model , and simulation of computer networks in depth 2. To understand and analyze the data link layer protocols 3. To understand and analyze packet switching networks and congestion control. 4. To understand and analyze the IP protocols. 5. To create the awareness of internet routing protocols, transport layer protocols, and application layer protocols.

Unit No	Syllabus Content	No of Hours
1	**Introduction to networking:** Data Communications, Networks, Layered Tasks, The OSI model, Layers in OSI model, TCP/IP Protocol suite, simulation of computer networks	9
2	**(self study)** **Medium access:** Framing, Stop and wait ARQ, Go-back-N ARQ, Random access, Channelization,connecting devices(hubs, repeaters, bridges, switches)	9
3	**Packet-Switching Networks:** Datagram Networks, Virtual Circuit Networks, Shortest-path routing, congestion and congestion control(open loop, closed loop), techniques to improve QoS (scheduling, traffic shaping, token bucket, leaky bucket)	8
4	**IP protocols**: IPV4–addressing, header format, subnet addressing, fragmentation and reassembly; IPV6-addressing, header format.	8
5	**TCP,UDP and Internet Protocols** : User datagram protocol; Transmission control protocol; TCP congestion control; Internet routing protocols (RIP,OSPF) **Application layer :** DNS, Telnet, Electronic mail ,World wide web	8

Course Outcomes	Description	RBT Levels
CO1	Understand the concepts of communication networks, OSI, and TCP/IP model and Identify the different types of network topologies and protocol models	**L2**

CO2	Differentiate between different access control methods to the shared transmission media	**L3**
CO3	Examine routing and congestion control protocols and analyze the concepts of packet switching networks	**L4**
CO4	Investigate the functionalities and services provided by layer 3 and above and analyze application layer protocols, internet routing protocols, transport layer protocols and different protocols used to implement internetworking	**L4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**1**								
CO2	**3**	**3**	**2**	**1**								**1**
CO3	**3**	**3**	**2**	**1**								**1**
CO4	**3**	**3**	**2**	**1**								**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, *ISBN*-13, 9780073250328,2014.- units,1,2,3

2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014. Shortest-path routing, units 4, 5

REFERENCE BOOKS:

1. William Stallings: Data and Computer Communication, 10th Edition, Pearson Education, ISBN-13: 978-0133506488, 2013.

2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 5th Edition, The Morgan Kaufmann Series, ISBN-9780123850591, 2011.

3. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th edition, Pearson, ISBN 13: 9780132126953, 2011.

4. Nader F. Mir: Computer and Communication Networks, 2nd Edition, ISBN-13: 978-0133814743, 2014.

SELF STUDY REFERENCES/WEBLINKS:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, *ISBN*-13, 9780073250328,2014.

2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014.

COURSE COORDINATOR:	**Dr. Mary Cherian**

	Course Title: Network programming lab using JAVA and NS		
	CourseCode: **18CSL57**	**No. of Credits: 0 : 0 :1** **(L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE+ SEE = 50+50=100**	

Course Objectives:	**Description**
	1. To understand and apply the basics of Java Programming. 2. To demonstrate some concepts of Networking using Java Programming. 3. To introduce network topologies using NS2 and check the performance of TCP and UDP protocols 4. To understand the creation of an Ethernet LAN by changing error rate and data rate to verify the throughput. 4. To understand and design wireless and wired network using NS2.

Unit No	**Syllabus Content**
	PART-A
1.	Write a Java program using synchronized threads to demonstrate producer-consumer concepts.
2.	Write a Java Swing program that consists of three tabs named Select Semester, Select Course and Select Electives. The “Select Semester” tab must contain four Buttons. The “Select Course” should contain a list of check boxes named with the courses such as Java, Compiler Design, and Machine Learning. “The Select Electives” tab should contain a drop down list of elective names of subjects. Hint: Swing application which uses, **i)** JTabbed Pane **ii)** Each tab should Jpanel which include any one component given below in each JPanel **iii)**CheckBox/List/RadioButton
3.	Design and implement a simple Client Server Application using RMI.
4.	Design and implement Client Server communication using TCP socket programming. (Client requests a file, Server responds to client with contents of that file which is then displayed on the screen by Client).
5.	Implement a JAVA Servlet Program to create a dynamic HTML web page. (user name and password should be accepted using HTML and displayed using a Servlet).
6.	Using Java JDBC and MySQL, develop a program to accept book information such as accession number, title, authors, edition and publisher from JSP web page from the stored table in the database. Perform the following: 1.Search for a book with the title specified by the user 2.Display the search results with proper headings.

PART-B	
1	Simulate a three nodes point-to-point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2	Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
3	Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP. 3 Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
4	To create scenario and study the performance of Stop and Wait ARQ Protocol through simulation.
5	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

Course Outcomes	Description	RBT Levels
CO1	Design solutions using programming constructs in Java to create User interface.	**L4**
CO2	To Demonstrate the usage of Java networking concepts and creation of dynamic web pages.	**L5**
CO3	Apply and compare the performance of transport layer protocols.	**L4**
CO4	Analyze the working of LAN by inducing error model.	**L4**
CO5	Evaluate the parameters to be configured for wired and wireless communication.	**L5**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2							
CO2	3	3	3	1	2							
CO3	3	3	3	1	1							
CO4	3	3	3	1	2							
CO5	3	3	3	1	2							

Strong -3 Medium -2 Weak -1

Instructions to Students:

Part-A: The programs formulated should be executed using Java Programming Language using eclipse IDE.

Part-B: The programs formulated should be executed using NS2 Simulation Software.

COURSE COORDINATOR:	1.Dr.Mary Cherian 2.Dr.Smitha Shekar B 3.Prof Madhu B 4.Prof.Pushpaveni H P 5.Prof.Veena A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Course Title: Software Engineering		
Course Code: 18CS51	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To provide the idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases. 2. To provide an idea of using various process models in the software industry according to given circumstances. 3. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

Unit No	Syllabus Content	No of Hours
1	**SOFTWARE AND SOFTWARE ENGINEERING:** The Nature of Software, Software Engineering, The Software Process, Software Engineering Practice. **THE SOFTWARE PROCESS and PROCESS MODELS:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Final Word on Evolutionary Processes, Specialized Process Models: Component-Based Development, The Formal Methods Model, The Unified Process, Phases of the Unified Process, Personal and Team Process Models. **AGILE DEVELOPMENT:** What Is Agility? Agility and the Cost of Change, What Is an Agile Process? , Extreme Programming, Other Agile Process Models: Scrum, Dynamic Systems Development Method, Agile Modeling, Agile Unified Process.	**10**
2	**UNDERSTANDING REQUIREMENTS:** Definition of Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements and Validating Requirements. **REQUIREMENTS MODELING: SCENARIO-BASED METHODS:** Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case.	**8**
3	**DESIGN CONCEPTS:** Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model. **ARCHITECTURAL DESIGN:** Software Architecture, Definition of software architecture, Architectural Genres, Architectural Styles, Architectural Design. **COMPONENT-LEVEL DESIGN:** What Is a Component? Designing Class-Based Components, Conducting Component-Level Design, Designing Traditional Components and Component-Based Development.	**8**

4	**SOFTWARE TESTING STRATEGIES:** A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging. **TESTING CONVENTIONAL APPLICATIONS:** Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing.	**8**
5	**SELF-STUDY –** **PROJECT MANAGEMENT CONCEPTS:** The management spectrum, People, Product, Process, Project, W^5HH principle. **PROCESS AND PROJECT METRICS:** Metrics in the process and project domains, Software measurement, metrics for Software quality, Integrating metrics within the software process, Metrics for small organizations, Establishing a software metrics program. **ESTIMATION FOR SOFTWARE PROJECTS:** Observations on estimation, The project planning process, Software scope and feasibility, Resources, Software project estimation, Decomposition techniques, Empirical estimation models.	**8**

Course Outcomes	**Description**	**RBT Levels**
CO1	Decompose the given project in various phases of a lifecycle.	Knowledge, Understand (Level1, Level2)
CO2	Choose appropriate process model depending on the user requirements.	Apply, Create (Level 2)
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	Evaluate(Level 3)
CO4	Analyze various processes used in all the phases of the product.	Analyze(Level 3)
CO5	Apply the knowledge, techniques, and skills in the development of a software product.	Apply (Level 3)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**2**									
CO2	**3**	**2**	**1**									
CO3	**2**	**2**	**1**		**3**			**1**				
CO4	**2**	**2**		**2**		**1**		**1**			**2**	**2**
CO5	**1**	**2**										**2**
Strong -3 Medium -2 Weak -1												

TEXT BOOKS:

1. Software Engineering - A Practitioner's approach, Roger S. Pressman and Bruce R. Maxim, 8th Edition, Tata McGraw-Hill, 2019.

REFERENCE BOOKS:

1. Software Engineering, 10th Edition, Ian Sommerville, Pearson Education Ltd., 2017.

2. Software Engineering - A Precise Approach, Pankaj Jalote, Wiley, 2010.

SELF STUDY REFERENCES/WEBLINKS:

1. http://www.site.uottawa.ca/school/research/lloseng/weblinks.html

2. https://www.ece.rutgers.edu/~marsic/books/SE/links/

COURSE COORDINATOR:	**Praveena M V**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	Course Title: DATABASE APPLICATIONS LABORATORY		
	Course Code: 18CSL56	**No. of Credits: 0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE + SEE = 50+50=100**	

Course Objectives:	**Description**
	1. Provide a strong formal foundation in database concepts and technology and techniques relating to query processing by SQL. 2. Design and implement a real time database application for a given problem-domain. 3. Demonstrate the use of relational data model and systematic database design approaches covering conceptual design, logical design through the mini project. 4. Introduce MongoDB, CRUD Operations & its usage in Enterprise Applications.

COURSE CONTENTS:

Part A	1. Execution of given 3 exercises. 2. Introduction to MongoDB and CRUD Operations. 3. MongoDB Usage in Enterprise Applications.
Part B	Implementation of mini project.

PART – A

INSTRUCTIONS:

1. The exercises are to be solved in an RDBMS environment like Oracle or DB2.
2. Suitable tuples have to be entered so that queries are executed correctly.
3. Relevant queries other than the ones listed along with the exercises may also be asked in the examinations.
4. Questions must be asked based on lots.

1	**Consider the schema for Movie Database:** ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by ‘Hitchcock’. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by ‘Steven Spielberg’ to 5.
2	**Consider the following schema for Order Database:** SALESMAN(Salesman_id, Name, City, Commission) CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id) Write SQL queries to

	1. Count the customers with grades above Bangalore’s average. 2. Find the name and numbers of all salesmen who had more than one customer. 3. List all the salesmen and indicate those who have and don’t have customers in their cities (Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order of a day. 5. Demonstrate the DELETE operation by removing salesman with id 12345. All his orders must also be deleted.
3	**Consider the schema for College Database:** STUDENT(USN, SName, Address, Phone, Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN, SSID) SUBJECT(Subcode, Title, Sem, Credits) CIEMARKS(USN, Subcode, SSID, CIE1, CIE2, CIE3, FinalCIE) Write SQL queries to 1. List all the student details studying in fourth semester ‘C’ section. 2. Compute the total number of male and female students in each semester and in each section. 3. Create a view of Test1 marks of student USN ‘1DA15CS101’ in all subjects. 4. Calculate the FinalCIE (average of best two test marks) and update the corresponding table for all students. 5. Categorize students based on the following criterion: If FinalCIE = 17 to 20 then CAT = ‘Outstanding’ If FinalCIE = 12 to 16 then CAT = ‘Average’ If FinalCIE< 12 then CAT = ‘Weak’ Give these details only for 8th semester A, B, and C section students.

PART – B

A mini project should be implemented by the students in teams. The maximum size of a team can be 3 from the same batch. The students have to finalize a project topic by discussing with the faculty. The mini project must be carried out in the college only.

Design a Database application for a particular case study using Visual Basic/Java Script in visual studio /Eclipse Tool.

The tasks when implementing mini project would be:

1. Understand the complete domain knowledge of the application and derive the complete data requirement specification for the mini project.
2. Design the ER diagram for the application.
3. Design Relational Schema diagram for the application.
4. Normalization of the relational design.
5. Implement minimum 5 queries for the application.
6. Documentation & submission of report.

General guidelines:

- Database for the project - Oracle / MySQL/ DB2 / SQL Server / MongoDB etc.

Sample Mini Projects.

Inventory Control System.	Placement management system
Material Requirement Processing.	Library management system
Hospital Management System.	Web Based User Identification System.

Railway Reservation System.	Timetable Management System
Hotel Management System	Personal Information System

Note: In the examination, the marks will be evaluated based on database execution from Part A and project demonstration, project report and viva-voce from Part B.

Course Outcomes	Description	RBT Levels
CO1	Understand, analyze, and effectively explain the underlying concepts of database technologies.	**L4**
CO2	Use SQL to create, secure, populate, maintain and query a database.	**L4**
CO3	Design and implement real time applications according to design principles that balance data retrieval performance with data consistency.	**L5**
CO4	Identify the Core MongoDB Operations.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3	3									
CO3	3	3	3	3	3				3			
CO4	3				2							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015 **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education, 2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

SELF STUDY REFERENCES/WEBLINKS:

1. https://www.mongodb.com/
2. https://docs.mongodb.com/manual/crud/

COURSE COORDINATOR:	Asha Veena Potdar

	Course Title: Digital Image Processing		
	Course Code: **18CS642**	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	Description
	1. To understand the image fundamentals. 2. To understand the mathematical transforms necessary for image processing and to study the image enhancement techniques. 3. To understand the image degradation/restoration model and different noise models. 4. To understand the uses of pseudo colors and to study the image compression models. **5.** To understand Morphological Image Processing and the image segmentation.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** Basic concepts, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System. **Digital Image Fundamentals:** Elements of visual perception, Image sensing and acquisition, Image sampling and quantization, Some basic relationships between pixels.	**9**
2	**Image Enhancement in Spatial domain:** Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing and Sharpening Spatial Filtering. **Self Study:** **Image Enhancement In Frequency Domain:** Introduction to Fourier Transform, Smoothing and Sharpening frequency domain filters	**9**
3	**Image Restoration:** Model of image degradation/restoration process, noise models, Restoration in the Presence of Noise, Only– Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position– Invariant Degradations, inverse filtering.	**8**
4	**Color Image Processing**: Color fundamentals, color models, pseudo color Image processing, basics of full color image processing, color transformations. **Image Compression:** Fundamentals, Image compression models, Elements of Information Theory	**8**
5	**Image Segmentation** Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region Based Segmentation. **Morphological image processing:** Dilation and Erosion, Opening and Closing, Some Basic Morphological Algorithms	**8**

Course Outcomes	Description	RBT Levels

CO1	**Acquire** fundamental concepts and applications of digital image processing.	**L1, L3**
CO2	**Interpret and Apply** the two categories of image enhancement techniques.	**L2, L3**
CO3	**Explain** image restoration by applying filters and analyze the use of color images.	**L1, L2**
CO4	**Apply** suitable morphological operations for the given image and understand different techniques of Image compression.	**L3**
CO5	**Develop** algorithms for segmenting the given image and explain different methods of object recognition.	**L4,L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**2**			**2**				**1**			**1**
CO2	**2**	**2**	**2**	**2**	**2**				**1**			**1**
CO3	**2**	**2**	**2**	**2**	**2**				**1**			**1**
CO4	**2**	**2**	**2**	**2**	**2**				**1**			**1**
CO5	**2**	**2**	**2**	**2**	**2**				**1**			**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Third Edition, Prentice Hall, 2007

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing – Anil K Jain, Pearson Education/Prentice- Hall of India Pvt. Ltd., 1997.
2. S Jayaraman, S Esakkirajan, T Veerakumar; "Digital Image Processing"; Tata McGraw Hill; 2009;
3. Chris Solomon and Tony Breckon, Fundamentals of Digital Image Processing- A Practical Approach with examples in MATLAB, John Wiley & Sons Ltd., 2011

SELF STUDY REFERENCES/WEBLINKS:

1. Dr. G. Harit - Digital Image Processing (NPTEL course) – https://nptel.ac.in/courses/106105032/

Professor & Head
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Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: DISTRIBUTED OPERATING SYSTEM		
	Course Code: 18CS641	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Identify the issues involved in designing distributed systems. 2. Describe various communication mechanism involved distributed systems. 3. Analyze process migration approach and distributed deadlock management 4. Describe features distributed shared memory and file system 5. List and describe load balancing mechanisms in distributed systems.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals:** What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE). **Message Passing:** Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication	**9 Hours**
2	**Remote Procedure Calls:** Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance	**9 Hours**
3	**Distributed Shared Memory:** Introduction, General Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. **Synchronization:** Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms.	**8 Hours**
4	**Resource Management:** Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach. **Process Management:** Introduction, Process Migration, Threads.	**8 Hours**
5	***Self-study*: Distributed File Systems:** Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File–Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Identify the issues involved in designing distributed systems, and their internal communication mechanism.	L2
CO2	Demonstrate message passing mechanism of distributed methods	L3
CO3	Compare various process migration approaches and distributed deadlock management approaches.	L3
CO4	Apply features distributed shared memory and file system.	L3
CO5	Examine the various resource management techniques for distributed systems.	L1

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1			**3**							**1**		
CO2			**3**									
CO3		**2**	**3**									
CO4		**2**	**3**		**1**							
CO5					**3**			**1**			**2**	

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Pradeep. K. Sinha: Distributed Operating Systems: Concepts and Design, PHI, 2007.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum: Distributed Operating Systems, Pearson Education, 2013.
2. George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair: Distributed System Concepts and Design. Pearson Education, 5th Edition, Pearson Education, 2012.

SELF STUDY REFERENCES/WEBLINKS:

COURSE COORDINATOR:	**Harish Kumar H C**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : UNIX PROGRAMMING		
Sub Code:18CS63	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of ContactHours :42**

Course objectives: 1. To familiarize with Unix standards and basic commands 2. To understand standard UNIX utilities to implement shell programs. 3. To illustrate the manipulation of system resources such as files, processes and signals. 4. To Explain IPC using different methodologies.

UNIT No	Syllabus Content	No of Hours
1	**Introduction To UNIX:** The UNIX Architecture, features of UNIX, command structure, Command arguments and options, Introduction to vi editor. Basic Unix commands such as echo, printf, ln, who, date, passwd, cal, Combining commands. The root login. Becoming the super user: su command. **Unix Files:** Basic file types, Organization of files. Parent child relationship. The home directory and the HOME variable. Relative and absolute pathnames. **Directory commands** – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. **File handling commands:** cat, cp, rm, mv, cmp. **File Attributes and Permissions:** The ls command with options. Changing file permissions: the relative and absolute permissions changing methods. Directory permissions. Networking and other detailed command sets to be covered are ping, telnet, ftp, ps, du,df, mount, unmount, find and tar.	8
2	**Working with the Shell**: Shell, The shells interpretive cycle, types of shell, Wild cards, pipes and i/o redirection, simple Filters: head, tail, cut, and sort. Filters using Regular Expression: The grep and egrep Typical examples involving different regular expressions **Shell programming**: shell syntax, Ordinary and environment variables, read command, Command line arguments, Logical operators for conditional execution, The if, while and for statements. Handling positional parameters, here (<<) document, Simple shell program examples.	8
3	**UNIX File APIs:** General File APIs, File and Record Locking, Directory	8

	File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. **Signals:** Signals, The UNIX Kernel Support for Signals, signal sets, Signal Mask, sigaction, The SIGCHLD Signal, Kill, and Alarm function.	
4	<u>**Self-Study Component**</u> **UNIX Processes and Process Control:** **The Environment of a UNIX Process:** Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. **Process Control:** Introduction, Process Identifiers, fork, vfork, exit, Zombie process, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, system Function.	9
5	**Interprocess Communication:** Overview of IPC Methods, Pipes, popen, pclose functions, FIFOs, Message Queues. **Introduction To Sockets:** Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.	9

<u>Note 1</u>: All 5 Units will have internal choice.
<u>Note 2</u>: Three assignments are evaluated for 5 marks. Assignment-1 from units 1and 2. Assignment-2 from units 3 and 4. Assignment-3 from unit 5.

Course Outcomes:

1. Apply UNIX commands to create Shell Scripts.

2. Analyze and apply the knowledge of different UNIX system calls to manipulate system resources like files and processes to create new applications.

3. Create Networking, Client-Server or Distributed Applications using any IPC techniques.

TEXT BOOK:

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999. (Chapters 7, 8.1, 9)

2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005.(Chapters 7, 8, 14)

3. Sumitabha Das: UNIX Concepts and Applications, 4th Edition McGraw Hill Education (India)

Private Limited

REFERENCE BOOKS/WEBLINKS:

1. Marc J. Rochkind: Advanced UNIX Programming, 2nd Edition, Pearson Education, 2005.

2. UreshVahalia: UNIX Internals: The New Frontiers, Pearson Education, 2001.

3. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, (2002) UNIX Network Programming - The Sockets Networking API, 3rd edition, Volume 1, PHI Learning Private Limited India, New Delhi.
4. Yashavant Kanetkar- UNIX Shell Programming

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	Course Title: Machine Learning		
	Course Code:18CS62	**No. of Credits: 4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. Understand some basic machine learning algorithms and techniques and their applications. **2.** Able to analyze the underlying mathematical relationships among Machine Learning algorithms. **3.** Able to identify, formulate and solve machine learning problems that arise in practical applications.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias. Text Book1, Sections: 1.1 – 1.3, 2.1-2.5, 2.7	**10 hours**
2	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. Text Book1, Sections: 3.1-3.7	**10 hours**
3	**Artificial Neural Networks:** Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, important terminologies of ANN, McCulloch-Pitts Neuron, Linear Separability, Hebb Network, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network, Radial Basis function network. Text book 2, Sections: 2.1 – 2.7,3.1-3.3,3.5,3.6	**12 hours**
4	**Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS	**10 hours**

	error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm Text book 1, Sections: 6.1 – 6.6, 6.9, 6.11, 6.12	
5	**Self Study** **Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. **Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, Text book 1, Sections: 5.1-5.6, 8.1-8.5	**10 hours**

Course Outcomes	Description	RBT Levels
At the End of the Course, the students should be able to		
CO1	Acquire knowledge about basic concepts of Machine Learning.	**L2**
CO2	Identify and apply machine learning techniques suitable for a given problem	**L3**
CO3	Design and implement machine learning solutions to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2							
CO2	3	3	2		2							
CO3	3	3	3	3	3							
CO4	3	3		3	3							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2. S N Sivanandam, S N Deepa, Principles of Soft Computing,3rd Edition, Wiley Publication,2019.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.
3. Samir Madhavan ,Mastering python for data science, 2015, Packt Publishing, ISBN: 9781784390150
4. Sebastian Raschka, Vahid Mirjalili,Python Machine Learning - Second Edition: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow Kindle Edition.

WEBLINKS:

1. https://towardsdatascience.com/real-world-implementation-of-logistic-regression-5136cefb8125
2. https://towardsdatascience.com/linear-regression-python-implementation-ae0d95348ac4
3. https://towardsdatascience.com/decision-tree-in-machine-learning-e380942a4c96
4. https://towardsdatascience.com/basics-of-bayesian-network-79435e11ae7b
5. https://towardsdatascience.com/introduction-to-artificial-neural-networks-ann-1aea15775ef9

COURSE COORDINATOR:	**Dr. K R Shylaja** **Mrs. Asha K N**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : INTERNET OF THINGS (IOT) LAB		
Sub Code:18CSL65	**No. of Credits:1=0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:
The objectives of this course are:

1. Provide Comprehend knowledge about the core concepts of IoT and operating systems used to build IoT applications
2. Develop hands-on IoT programming knowledge for real-world applications.
3. Implement the network and communication protocols that helps in wireless communication
4. Understand the data transfer between IoT device and cloud Platform.

List of Programs

1.	Write a program that Uses different components like Led, switch, ADC, PWM & serial communication on TM4C123 Launchpad using Energia software
2.	Write a program to connect the Launchpad with Wi-Fi network & print the dynamic IP and static IP Addresses on the Serial Monitor
3.	Write a program to connect the Launchpad with Wi-Fi & print the local IP, Subnet Mask, Gateway IP on the Serial Monitor
4.	Illustrate TCP based Client Server Communication Model.
5.	Illustrate UDP based Client Server Communication Model
6.	Write a program for HTTP based webserver to manipulate the GPIO's of WiFi Module and monitor the Sensor data connected with WiFi Module.
7.	Write a program that Uses Blynk API's and to control the Launchpad with Blynk Application
8.	Devise a program to control the Launchpad with IFTTT Application
9.	Design a Simple MQTT Based communication model to retrieve the sensor data from a cloud Storage

Course Outcomes:
At the end of this lab session, the student will

CO1: Examine the features and process of integration of Launchpad with IoT applications.
CO2: Discover the role of TCP/UDP protocols in serving as communication models for IoT.
CO3: Interpret the Sensor data collected by interfacing the sensors to the Wi-Fi module on an embedded platform.
CO4: Determine the IoT devices to work with Cloud Computing infrastructure and enable the transfer of data between IoT devices and the cloud providers

Reference:

1. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh and Priyanka Tyagi, “Getting Started for Internet of Things with Launch Pad and ESP8266”, River publisher
2. “http://www.ti.com/tool/MSP-EXP430G2”
3. “https://www.udemy.com/course/internet-of-things-iot-for-beginners-getting-started/”

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Strong -3 Medium -2 Weak -1												

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	Course Title: Machine Learning Laboratory		
	Course Code: 18CSL66	**No. of Credits: 0: 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course Objectives:	**Description**
	This course will enable students to 1. Implement the machine learning algorithms using the Data Set. 2. Learn to use Various python tools for Machine Learning 3. Analyze and interpret the outcomes of the machine learning algorithms.

Lab Experiments:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

NOTE:

1. The programs should be implemented in Python.
2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in APIs of Python.
3.Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or (https://www.kaggle.com/datasets) or constructed by the students.

Conduction of Practical Examination:

1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Marks distribution: Procedure + Conduction + Viva:**10 + 30 +10 (50)**
4. **Change of experiment is allowed only once and marks allotted to the procedure part tobe made zero.**

Course Outcomes	Description	RBT Levels
The students should be able to:		
CO1	Understand and interpret the implementation procedures and python Libraries for the machine learning algorithms.	**L2**
CO2	Analyse the correctness of the data sets to apply appropriate Machine Learning algorithms.	**L3**
CO3	Design and implement Machine Learning algorithms to solve real world problems.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**		**3**							
CO2	**3**	**3**	**3**	**3**	**3**							
CO3	**3**	**3**	**3**	**3**	**3**	**2**						**2**
CO4	**3**	**3**		**3**	**3**							

Strong -3 Medium -2 Weak -1

COURSE COORDINATORS:	**Dr. Shylaja K R** **Mrs. Asha K N**

Professor & Head
Department of Computer Science &
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	Course Title: Wireless Sensor Networks		
	Course Code: 18CSE021	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours :42**

Course Objectives:	**Description**
	The student should be made to 1. Learn Sensor Network fundamentals. 2. Understand the different routing protocols. 3. Have an in-depth knowledge on sensor network architecture and design issues. 4. Understand the transport layer and security issues possible in Sensor networks.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction and Overview of Wireless Sensor Networks**: Introduction-Background of Sensor Network Technology, Applications of Sensor Networks, Basic Overview of the Technology- Basic Sensor Network Architectural Elements, Brief Historical Survey of Sensor Networks, Challenges and Hurdles **Applications of Wireless Sensor Networks**: Introduction, Background, Range of Applications, Examples of Category 2 WSN Applications- Home Control, Building Automation, Industrial Automation, Medical Applications, Examples of Category 1 WSN Applications- Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology	**09**
2	**Basic Wireless Sensor Technology**: Introduction, Sensor Node Technology- Overview, Hardware and Software, Sensor Taxonomy, WN Operating Environment, WN Trends Wireless Transmission Technology and Systems: Introduction, Radio Technology Primer- Propagation and Propagation Impairments, Modulation, Available Wireless Technologies-Campus Applications, MAN/WAN Applications	**09**
3	**Medium Access Control Protocols for Wireless Sensor Networks**: Introduction, Background, Fundamentals of MAC Protocols- Performance Requirements, Common Protocols, MAC Protocols for WSNs- Schedule-Based Protocols, Random Access-Based Protocols, Sensor-MAC Case Study- Protocol Overview, Periodic Listen and Sleep Operations, Schedule	**09**

	Selection and Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange, Message Passing.	
4	**Routing Protocols for Wireless Sensor Networks**: Introduction, Background, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks- Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks- WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing .	**08**
5	**Self study :** **Transport control protocols for wireless sensor networks**: traditional transport control protocols, transport protocol design issues, examples of existing transport control protocols. **Operating Systems for Wireless Sensor Networks**: Introduction, Operating System Design Issues, Examples of Operating Systems- TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS, SenOS, EMERALDS, PicOS.	**07**

Course Outcomes	Description	RBT Levels
CO1	**Describe the Wireless Sensor Network architecture and applications**	**L1**
CO2	**Identify the suitable routing and transport layer algorithm based on the network and user requirement**	**L2**
CO3	**Apply the knowledge to select appropriate physical and MAC layer protocols**	**L3**
CO4	**Summarize the operating system used in Wireless Sensor Networks**	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2								
CO2	2	3	3	2								

CO3	**2**	**3**	**3**	**2**								
CO4	**2**	**3**	**2**	**2**								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. KazemSohraby, Daniel Minoli and TaiebZnati, “ Wireless Sensor Networks Technology, Protocols, and Applications“, John Wiley & Sons, 2007.

REFERENCE BOOKS:

1. Holger Karl and Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons, Ltd, 2005.
1.K. Akkaya and M. Younis, “A survey of routing protocols in wireless sensor networks”, Elsevier Ad Hoc Network Journal, Vol. 3, no. 3, pp. 325--349
2.Philip Levis, “ TinyOS Programming”
3.Anna Ha´c, “Wireless Sensor Network Designs”, John Wiley & Sons Ltd,

SELF STUDY REFERENCES/WEBLINKS:

1. KazemSohraby, Daniel Minoli and TaiebZnati, “ Wireless Sensor Networks Technology, Protocols, and Applications“, John Wiley & Sons, 2007.

COURSE COORDINATOR:	**Prof. Srinivasa A H**

Professor & Head
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	Course Title: Internet of Things		
	Course Code: 18CS61	**No. of Credits: 4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. Understand the building blocks of IOT and its characteristics and its application Area. 2. Realize the difference between M2M and IOT 3. Explore the architecture, components and working of IOT with the help of Microcontroller. 4. Comprehend the evolution of IOT in Mobile Devices, Cloud & Sensor Networks. 5. Elaborate the need for Data Analytics mechanism & tools in IoT.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction & Concepts:** Introduction to Internet of Things, Definitions and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT levels and Development Templates.	11
2	**IoT and M2M Communication** Introduction, M2M, Difference between IoT and M2M, SDN & NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF- YANG. **IoT Platform Design Methodology:** Introduction, IoT Design Methodology, Case Study: Weather Monitoring.	10
3	**Domain Specific IOTs** Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. **IoT Physical Devices and Endpoints** Basic Building blocks - The Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Controlling led.	10
4	**IoT Physical servers & Cloud Offerings** **Cloud:** introduction to cloud storage models and communication Networks, WAMP – AutoBahn for IoT, Xively cloud for IoT. **Python web application** frame work - django, Designing a RESTful web API, amazon web services for IoT, SkyNetIoT messaging platforms.	11
5	**Self Study:** **Data Analytics for IoT:** Introduction AppacheHadoop, using Hadoop MapReduce for Batch Data Analysis, Apache oozie, Apache Spark, Apache Storm, using Apache Storm for Real-time Data Analysis. **Ethics** - Characterizing the Internet of Things, Privacy, Control,	10

	Environment, Solutions	

Course Outcomes	Description	RBT Levels
CO1	**Apply** the knowledge of the internet and computer network on to IoT paradigm.	**L1, L3**
CO2	**Adequately** learn and **demonstrate** the IoT communication.	**L3**
CO3	**Apply** the knowledge of python in Raspberry PI programming.	**L2**
CO4	**Analyze** different configuration setups for connecting different types of sensors and upload the code on the board and communicate to the cloud.	**L4**
CO5	**Apply** the knowledge of data analytics and ethics behind a IoT development	**L4, L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**				**1**							**1**
CO2	**3**	**2**	**3**	**1**	**2**							**1**
CO3	**3**	**2**	**2**	**1**	**2**					**1**		**1**
CO4	**3**	**3**	**1**	**2**	**2**					**1**		**1**
CO5	**3**	**2**	**1**	**2**	**3**				**1**	**1**		**1**

Strong -3   Medium -2   Weak -1

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, First Edition, VPT, 2014.

REFERENCE BOOKS:

1. Raj Kamal, “Internet of Things: Architecture and Design Principles”, 1st Edition, McGraw Hill Education, 2017
2. Ovidiu Vermesan, PeterFriess, “Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems”. River Publishers Series in Communication.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, 1st Edition, Pearson Education

SELF STUDY REFERENCES/WEBLINKS:

1. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861

COURSE COORDINATOR:	

Professor & Head
Department of Computer Science &
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	Course Title: Adhoc Wireless Networks		
	Course Code: 18CSE023	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	Course objectives: 1. To understand the fundamental concepts of Ad hoc Networks. 2. To understand the concepts of MAC layer protocols of Ad hoc Networks 3. To understand and analyze routing protocols of Ad hoc Networks. 4. To understand the Transport layer and security of Ad hoc Networks. 5. To create the awareness of QoS in Ad hoc Networks.

Unit No	**Syllabus Content**	**No of Hours**
1	**Ad hoc wireless Networks**: Introduction, Cellular and Ad Hoc Wireless Networks, Applications. Issues in Ad hoc wireless networks- Medium access, routing, multicasting, transport layer, pricing, Quality of service, self-organization, security, addressing, energy management, scalability, deployment. Ad hoc wireless internet.	9
2.	(self study) **MAC:** MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad-hoc wireless Networks, Classification of MAC protocols, Contention based protocols(MACAW,MACA-BI,MARCH)	8
3	**Routing- Routing protocols for Ad hoc wireless Networks**: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table driven routing protocols (DSDV,WRP,CGSR), On-demand routing protocols (DSR,AODV,TORA).	9

4	**Transport Layer:** Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks(TCP-F,TCP-BUS,ATCP,SPLIT-TCP). Security in ad hoc wireless networks: issues and challenges in security provisioning, network security attacks.	8
5	**QoS:** Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions(cluster TDMA), network layer solutions(Ticket based, TDR, QoS enabled AODV,OQR).	8

Course Outcomes	Description	RBT Levels
CO1	Understand the characteristics, challenges and design goals of wireless ad hoc networks.	**L2**
CO2	Apply the knowledge of MAC and different routing protocols for switching of data between nodes.	**L3**
CO3	Analyze the concepts of transport protocols and security issues in Adhoc networks.	**L4**
CO4	Discuss different QOS protocols for wireless Ad-hoc networks	**L4**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1								
CO2	3	3	2	1								
CO3	3	3	2	1								
CO4	3	3	2	1								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. C. Siva Ram Murthy & B. S. Manoj, Ad hoc Wireless Networks Architectures and Protocols, ISBN: 978-81-317-0688-6,2014.

REFERENCE BOOKS:

1.Stefano Basagni , Marco Conti , Silvia Giordano , and Ivan Stojmenovic, Mobile ad hoc networking , ISBN: 978-0-471-65688-3,2010 . 2.C.K. Toh: Adhoc Mobile Wireless Networks- Protocols and Systems, Prentice-Hall PTR, ISBN:0130078174,2007. 3.Jonathan Loo , Jaime Lloret Mauri and Jesús Hamilton Ortiz, Mobile ad hoc networks: current status and future trends, Kindle edition, ISBN 9781439856505 - CAT# K12654, 2011.	
SELF STUDY REFERENCES/WEBLINKS:	
1. C. Siva Ram Murthy & B. S. Manoj, Ad hoc Wireless Networks Architectures and Protocols, ISBN: 978-81-317-0688-6, 2014.	
COURSE COORDINATOR:	**Madhu B**

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	Course Title: Storage Area Network		
	Course Code: 18CSE022	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 42 Hours**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 3 hrs/Week**

Course Objectives:	**Description**
	Course Objectives: The objectives of this course are to: 1. To understand the fundamentals of storage centric and server centric systems 2. To understand the metrics used for Designing storage area networks 3. To understand the RAID concepts 4. To enable the students to understand how data centre's maintain the data with the concepts of backup mainly remote mirroring concepts for both simple and complex systems.

Unit No	**Syllabus Content**	**No of Hours**
1	Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks; **Intelligent Disk Subsystems:** Architecture of Intelligent Disk Subsystems, Hard disks and Internal I/O Channels, JBOD, Storage virtualization using RAID, Different RAID levels, Cashing, Intelligent Disk Subsystem, Availability of Disk Subsystems.	**09**
2	**I/O Techniques:** The Physical I/O path from the CPU to the Storage System, SCSI, Fiber Channel Protocol Stack, Fiber Channel SAN, IP Storage.	**08**
3	**SELF STUDY** **Storage Virtualization:** Limitations of Non-virtualized Storage, Definition of Storage virtualization, Implementation Considerations, Storage virtualization on Block or file level, Storage virtualization on various levels of the storage Network, Symmetric and Asymmetric storage virtualization in the Network.	**09**
4	**Network Attached Storage:** The NAS Architecture, The NAS hardware architecture**,** The NAS Software Architecture, Network Connectivity, NAS as a Storage System. **Storage Area Network:** Architecture Overview; Hardware devices; Software components.	**08**
5	**Applications of Storage Networks:** Definitions of the term 'Storage Network', Storage Sharing, Availability of Data, Adaptability and Scalability of IT Systems. **Network Back-up:** General conditions for Back-up, Network Backup Services, Server Components, Back-up clients, Performance Gains as a result of Network Back-Up, Performance Bottlenecks of Network Back-up.	**08**

Course Outcomes	Description	RBT Levels
CO1	Identify key challenges in managing information and analyze different storage technologies and distinguish different channels.	**L2**
CO2	Interpret the storage virtualization and implementation considerations of virtualization.	**L2**
CO3	Explain components and the working of NAS and SAN	**L3**
CO4	Illustrate the applications and storage infrastructures.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2								
CO2	2	3	2	2								
CO3	2	3	2	2								
CO4	2	3	2	2								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

TEXT BOOKS:

1. Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India,2013. ISBN 978-81-265-1832-6
2. Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011. ISBN 978-0-07-053292-2

REFERENCE BOOKS:

1. Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2011. ISBN-10: 1-58705-162-1ISBN-13: 978-1-58705-162-3
2. Richard Barker and Paul Massiglia: "Storage Area Network Essentials "A Complete Guide to understanding and Implementing SANs", Wiley India, 2012. ISBN: 978-0-471-03445-2
3. EMC Education Services, "Information Storage and Management", Wiley India Publications, 2009. ISBN: 9781118094839

COURSE COORDINATOR:	Suresha. D

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: PRINCIPLES OF ECONOMICS		
	Course Code: 18CS644	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Choose the concept of scarcity to explain economic trade-offs, opportunity costs, and rational behavior. 2. Interpret measures of elasticity and investigate the production and costs of the firm. 3. Demonstrate how markets function and what happens in the presence of market failures. 4. Analyze the different types of market structures such as monopoly and a competitive market. 5. Determine how economic growth, unemployment and inflation macroeconomics affects the economy of the nation in the short and long-run. 6. Discover the determinants of foreign trade flows and exchange rates, and their effects on the domestic economy.

Unit No	**Syllabus Content**	**No of Hours**
1	**Welcome to Economics,** What Is Economics, and Why Is It Important? Microeconomics and Macroeconomics, How Economists Use Theories and Models to Understand Economic Issues, How To Organize Economies: An Overview of Economic Systems, **Choice in a World of Scarcity**, How Individuals Make Choices Based on Their Budget Constraint , The Production Possibilities Frontier and Social Choices, Confronting Objections to the Economic Approach, **Demand and Supply**: Demand, Supply, and Equilibrium in Markets for Goods and Services, Shifts in Demand and Supply for Goods and Services, Changes in Equilibrium Price and Quantity: The Four-Step Process, Price Ceilings and Price Floors, Demand, Supply, and Efficiency, **Labor and Financial Markets,** Demand and Supply at Work in Labor Markets, Demand and Supply in Financial Markets, The Market System as an Efficient Mechanism for Information.	**09**
2	**Elasticity,** Price Elasticity of Demand and Price Elasticity of Supply, Polar Cases of Elasticity and Constant Elasticity, Elasticity and Pricing, Elasticity in Areas Other Than Price, **Consumer Choices**, Consumption Choices, How Changes in Income and Prices Affect Consumption Choices, Behavioral Economics: An Alternative Framework for Consumer Choice, **Production, Costs, and Industry Structure**, Explicit and Implicit Costs, and Accounting and Economic Profit, Production in the Short Run, Costs in the Short Run, Production in the Long Run, Costs in the Long Run.	**08**

3	**Self-Study** **Perfect Competition,** Perfect Competition and Why It Matters, How Perfectly Competitive Firms Make Output Decisions, Entry and Exit Decisions in the Long Run, Efficiency in Perfectly Competitive Markets. **Monopoly,** How Monopolies Form: Barriers to Entry, How a Profit-Maximizing Monopoly Chooses Output and Price, **Monopolistic Competition and Oligopoly**, Monopolistic Competition, Oligopoly.	08
4	**The Macroeconomic Perspective,** Measuring the Size of the Economy: Gross Domestic Product, Adjusting Nominal Values to Real Values, Tracking Real GDP over Time, Comparing GDP among Countries, How Well GDP Measures the Well-Being of Society, **Economic Growth,** The Relatively Recent Arrival of Economic Growth, Labor Productivity and Economic Growth, Components of Economic Growth, Economic Convergence, **Unemployment,** How Economists Define and Compute Unemployment Rate, Patterns of Unemployment, What Causes Changes in Unemployment over the Short Run, What Causes Changes in Unemployment over the Long Run.	09
5	**Inflation,** Tracking Inflation, How to Measure Changes in the Cost of Living, How the U.S. and Other Countries Experience Inflation, The Confusion Over Inflation, Indexing and Its Limitations. **The International Trade and Capital Flows**, Measuring Trade Balances, Trade Balances in Historical and International Context, Trade Balances and Flows of Financial Capital, The National Saving and Investment Identity, The Pros and Cons of Trade Deficits and Surpluses, The Difference between Level of Trade and the Trade Balance.	08

Course Outcomes	Description	RBT Levels
CO1	Identify the determinants of supply and demand; demonstrate the impact of shifts in both market supply and demand curves on equilibrium price and output.	**L2**
CO2	Determine the roles that prices and markets play in organizing and directing economic activity.	**L3**
CO3	Calculate and graph the short-run and long-run costs of production, supply and demand elasticities.	**L3**
CO4	Describe governmental efforts to address market failure such as monopoly power, externalities, and public goods.	**L2**
CO5	Examine and interpret a nation’s economic performance indicators such as economic growth, unemployment and inflation from a macroeconomic perspective.	**L3**
CO6	Articulate the mechanics and institutions of international trade and their impact on the macro economy.	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1	3	3	2	3	2	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	2	3	2	2	2	-	-	-	-	-	-	-
CO5	3	3	2	3	1	-	-	-	-	-	-	-
CO6	3	3	2	2	1	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Steven A. Greenlaw, David Shapiro, **"Principles of Economics",** 2nd Edition, Rice University - OpenStax, 2020. ISBN-13: 978-1947172371 (Available under CC-BY license at https://openstax.org/details/books/principles-economics-2e)

REFERENCE BOOKS:

1) N. Gregory Mankiw, **"Principles of Economics",** 8th Edition, Cengage Learning, 2016. ISBN-13: 978-0357038314
2) Niall Kishtainy, **"The Economics Book: Big Ideas Simply Explained",** 1st Edition, DK Publishers, 2012. ISBN-13: 978-0756698270
3) Yves Hilpisch, **"Python for Finance: Mastering Data-Driven Finance",** 2nd Edition, O'Reilly Media, 2018 ISBN-13: 978-1492024330
4) Quentin Batista, Thomas Sargent and Jesse Perla, **"QuantEcon DataScience: Introduction to Economic Modeling and Data Science",** Center for Innovative Data in Economics, Vancouver School of Economics, UBC, 2020.

SELF STUDY REFERENCES/WEBLINKS:

1. Perfect Competition
https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section8
2. Monopoly
https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section9
3. Monopolistic Competition and Oligopoly
https://www.khanacademy.org/economics-finance-domain/ap-microeconomics/imperfect-competition/monopolistic-competition/v/oligopolies-and-monopolisitc-competition

COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Compiler Design		
	Course Code: 18CS643	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 03
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42

Course Objectives:	Description
	1.Present fundamental concepts and techniques for the design of a compiler. 2. Identify the methods and strategies for parsing techniques along with its construction. 3. To enrich the knowledge of storage management and allocation strategies. 4. Optimize the intermediate code and generate its target language code.

Unit No	Syllabus Content	No of Hours
1	**Introduction :** Language Processors, The Structure of a Compiler, The Evolution of Programming Languages, The Science of Building a Compiler, Applications of Compiler Technology, Programming Language Basics.	8
2	**Self study /Online class** **Lexical Analysis :** The Role Of Lexical Analyzer, Input Buffering, Specifications Of Tokens, Recognition Of Tokens. **Syntax Analysis I :** Introduction, Context Free Grammars.	8
3	**Syntax Analysis II :** Writing a Grammar, Top Down Parsing. Bottom Up Parsing, Operator precedence Parsing, Precedence Functions	9
4	**Syntax Analysis III :** Introduction to LR Parsing, Simple LR Parser, More Powerful LR Parsers, Using Ambiguous Grammars.	8
5	**Run-Time Environments :** Storage Organization, Storage Allocation of Space, Access to Non Local Data on the Stack, Heap Management, Introduction to Garbage Collection. **Code Generation :** Issues In The Design Of Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks And Flow Graphs, Next-Use Information, Optimization of Basic Blocks, A Simple Code Generator.	9

Self study component

1.

Course Outcomes	Description	RBT Levels
CO1	Understand the various phases of compiler and design the lexical analyzer. Demonstrate the phases of the compilation process and be able to describe the purpose and operation of each phase.	L2
CO2	Acquire the working principles of parser with its types and extend the knowledge by parsing LL parser and Operator Precedence parser.	L4

CO3	Design and describe the various LR parsers for a given CFG.	**L4**
CO4	Describe the storage organization of compiler's run time environment and demonstrate the algorithms to perform code optimization and code generation.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**3**	**2**								
CO2	**3**	**2**	**2**	**2**								
CO3	**2**	**2**	**2**									
CO4	**3**	**3**	**3**	**2**								

Strong -3 Medium -2 Weak -1

TEXT BOOK:

Alfred W Aho, Monica S Lam, Ravi Sethi, and Jeffrey D Ullman, "**Compilers-Principles, Techniques and Tools**" Publisher: Pearson Education; Second edition (1 January 2011)

ISBN-10: 8131759024
ISBN-13: 978-8131759028

REFERENCE BOOKS:

1. Kenneth C Louden, "**Compiler Construction Principles & Practice**", Thomson Education, 2003.
2. Charles N Fischer, Richard J LeBlanc, "**Crafting a Compiler with C**", Benjamin Cummings, 2003.
3. Allen I. Holub "**Compiler Design in C**", Prentice Hall of India, 2003.

SELF STUDY REFERENCES/WEBLINKS:

1.Lecture Notes
2.http://sgbm.in/ebooks/cs/Compiler.pdf

COURSE COORDINATOR:	**Dr. Harish G**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Artificial Intelligence and Prolog Programming		
	Course Code: **18CSE031**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To Implement non-trivial AI techniques in a relatively large system 2. To understand uncertainty and Problem solving techniques. 3. To understand various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent. 4. To understand different logical systems for inference over formal domain representations, and trace how a particular inference algorithm works on a given problem specification. 5. To understand how to write a Prolog programs for Artificial Intelligence 6. Analyzing and Solving Artificial Intelligence programs by using Backtracking methods

Unit No	**Syllabus Content**	**No of Hours**
1	What is Artificial Intelligence: The AI Problems, The Underlying assumption, What is an AI Technique?, The Level of the model, Criteria for success, real world Problems, problem spaces and search: Defining, the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs. **Intelligent Agents**: Agents and Environments, The nature of environments, The structure of agents. *(Text Book 1: Chapter 1 & 2 Text Book 2: Chapter 2)*	**8**
2	**Problem-solving by Searching:** Problem solving agents, example problems, searching for solutions, uninformed search strategies, informed search strategies, heuristic search-a*algorithm, adversarial search-minimax algorithm, of game playing, alpha-beta pruning.*(Text book2:chapter 3.1,3.2,3.3,3.4,3.5,5.1,5.2,5.3)*	**8**
3	Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem. Using predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates. Self study:Logical Agents: Knowledge –based agents, the Wumpus world, Logic-Propositional logic, Propositional theorem proving, syntax and semantics of first order logic, propositional and first order inference *(Text Book 1: chapter 3 ,4. Text book2: chapter 7.1,7.2,7.3,7.4,7.5,8.1.8.2,9.1)*	**8**
4	Prolog Programming for Artificial Intelligence, An Overview of Prolog, An example program: defining family relations, Extending the example program by rules, A recursive rule definition, How Prolog answers	**9**

	questions, Declarative and procedural meaning of programs; Syntax and Meaning of Prolog Programs, Data objects, Matching Declarative meaning of Prolog programs, Procedural meaning, Example: monkey and banana, Order of clauses and goals, Remarks on the relation between Prolog and logic. *(Text Book 3: Chapters 1 & 2)*	
5	Lists, Operators, Arithmetic, Representation of lists, Some operations on lists, Operator notation, Arithmetic, Using Structures: Example Programs, Retrieving structured information from a database, Doing data abstraction, Simulating a non-deterministic automaton, Backtracking, Preventing backtracking, Examples using cut, Negation as failure, Problems with cut and negation, Input and Output, Communication with files. *(Text Book 3: Chapter 3, 4 ,5 & 6)*	**9**

Course Outcomes	**Description**	**RBT Levels**
CO1	Understanding intelligent agents design for general intelligence tasks	R1, R2,R3
CO2	Apply AI technique on current applications for Problem solving, knowledge representation, searching, reasoning and learning.	R4 and R5
CO3	Write prolog codes for implementing Artificial Intelligence problems	R4
CO4	Analyze and Solve real-time AI problems using function of prolog programming	R5

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**	**2**									
CO3	**3**	**3**		**2**	**2**							**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**	**2**					**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2019, ISBN: 978-93-325-4351-5
2. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher**:** Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

REFERENCE BOOKS:

1. Nils J. Nilsson: “Principles of Artificial Intelligence”, Elsevier, ISBN-13: 9780934613101

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science & E
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Machine Learning		
	Course Code: **18CSE032**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Understand some basic machine learning algorithms and techniques and their applications. **2.** Able to analyse the underlying mathematical relationships among Machine Learning algorithms. **3.** Able to identify formulate and solve machine learning problems that arise in practical applications.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.	**9 hours**
2	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. Text Book1, Sections: 3.1-3.7	**8 hours**
3	**Artificial Neural Networks-Basics:** Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, important terminoligies of ANN, McCulloch-Pitts Neuron, Linear Separabality, Hebb Network. Text book 2, Sections: 2.1 – 2.7	**8 hours**
4	**Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks. Text book 1, Sections: 6.1 – 6.6, 6.9, 6.11	**9 hours**
5	**SELF STUDY** **Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. **Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning,	**8 hours**

	Text book 1, Sections: 5.1-5.6, 8.1-8.5	

Course Outcomes	Description	RBT Levels
At the End of the Course, the students should be able to		
CO1	Acquire knowledge about basic concepts of Machine Learning.	**L2**
CO2	Identify and apply machine learning techniques suitable for a given problem	**L3**
CO3	Design and implement machine learning solutions to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2							
CO2	3	3	2		2							
CO3	3	3	3	3	3							
CO4	3	3		3	3							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2. S N Sivanandam, S N Deepa, Principles of Soft Computing,3rd Edition, Wiley Publication,2019.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

SELF STUDY REFERENCES/WEBLINKS:

1. https://machinelearningmastery.com/statistics-for-evaluating-machine-learning-models/
2. https://towardsdatascience.com/ml-algorithms-one-sd-%CF%83-instance-based-algorithms-4349224ed4f3

COURSE COORDINATOR:	**Mrs. Asha K N** **Mrs. Asha Rani K P**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Sub Title :Android Programming		
	Sub Code: 18CS71	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Aided By Govt. of Karnataka	**Exam Duration : 3 hours**	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 42**

Course objectives:

1. To understand the Mobile-Android OS architecture and Features.
2. Understand how Android application works, their life cycle, manifestation,intents and using external resources.
3. Design and use appropriate tools for android development including IDE, device emulator, and profiling tools.
4. To build user interface, text inputs, lists and study database.
5. To understand windows Mobile Programming for Smartphone's.

UNIT No	Syllabus Content	No of Hours
1	**Introduction To Android:** A Little Background; J2ME to Android; What is Android?; An Open-Platform for Mobile Development; Introducing the open handset alliance; Android Architecture (Layers of Android), Android SDK Features; Why Develop for Mobile?; Variants of Android ;Types of Application developed using Android; Native Android Applications and Hybrid Application; Dalvik Virtual Machine; **Android Application Manifestation:** What is a .dex files; What is an .apk file; Basic Building Blocks of Android (Activities, Intents, Content Providers, Services Broadcast Receivers); Structure of Android Project; What Makes an Android Application? Introducing the Application Manifest; Drawable Resources; Resolution and Density Independence;	08
2	**Android Application Life Cycle:** Introducing the Android Application Class; Activity Life Cycle; Creating User Interfaces; The Android Application Life Cycle; Layout Managers (Linear Layout and Relative Layout); Hello World Android Application; View Click Handling; Let's Make a Toast; Fundamental Android UI Design, Introducing Views, Creating and Using Menus; Introducing Intents, Types of Intents; Creating Dialogs; Bundle, Working with Adapters.	09
3	**Data Storage, Retrieval, and Sharing:**Shared Preferences; Types of Preferences; Storing and Retrieving Data from Shared Preferences. Working with Files (Reading and Writing Files). **Introduction to Android Databases:** Introducing Android Databases: SQLite, Working with SQLite Databases, OnCreate() and onUpgrade() methods. Cursors and Content Values, Creating a New Content Provider, Using Content Providers, Creating and Using an Earthquake Content	09

	Provider, Accessing Android Content Providers.	
4	**Background processing:**Asynchronous Tasks, Working with Threads; **Android Services:**Services in Android; Types of Services; Local Service; Remote Service; Intent Service. Broadcast Receivers; Types of Broadcasts; Creating a Broadcast Receivers;Introducing Notifications, Using Alarms;	08
5	**<u>Self-Study Component:</u>** **Location Based Services**: Using Location-Based Services, Configuring the Emulator to Test Location-Based Services, Updating Locations in Emulator Location Providers, Selecting a Location Provider, Finding Your Location, Using Proximity Alerts, Using the Geocoder, Creating Map-Based Activities. **Multimedia and Sensors:** Playing Audio and Video, Recording Audio, Using the Camera and Taking Pictures, Telephony, Introducing SMS and MMS; Android Development Best Practices in designing and developing Android application, Static code Analysis-Lint, Develop your own Android Applications and Publish them on **Google play**.	08

<u>Note 1:</u>Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:	
CO1	Understand the basic history, structure, software components of Android OS
CO2	Apply the knowledge of Android application, Activity classes, UI elements, Intents and Adapters to create robust Android applications.
CO3	Apply the knowledge of Native Android libraries to **Store, Retrieve, and Share** the data within the application that created them and between applications.
CO4	Analyze and apply the knowledge of **Thread**s and **Services** to implement an Android application that runs in the background.
CO5	Create location based, Multimedia and other Applications that provide low-level access to the hardware available on mobile devices using appropriate Application Frameworks.

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-

CO3	3	1	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

TEXT BOOK:

1. Professional Android 2 Application Development by Reto Meier, Wiley Publishing, 2010.
2. Pro Android by Sayed Y. Hashimi, SatyaKomatineni, Apress, 2009.
3. Professional Android Application Development by Reto Meier, Wiley Publishing, 20009.

REFERENCE BOOKS

1. Beginning Android by Mark Murphy, Apress, 2009.
2. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To, Addison-Wesley Professional; 2010.
3. The Busy Coders guide to Android development by Mark L Murphy, COMMONSWARE, 2009.
4. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link).

SELF STUDY REFERENCES / WEBLINKS:

1. Beginning Android 4 Application Development by Wei-Meng Lee, Worx Wiley Publishing, 2014. http://www3.ul.ie/ictlc/Android.pdf
2. Android Tutorial Simply Easy Learning, https://www.tutorialspoint.com//android/android_tutorial.pdf
3. https://www.coursera.org/learn/posacontent\
4. https://www.edx.org/xseries/java-android-beginners
5. https://medium.com/@intelia/getting-the-most-out-of-android-lint-6df05a7ab054
6. JAVA CODING STANDARDS (nea.gov.bh)

FACULTY INCHARGE:

Prof. UMA K M

Prof. LAVANYA SANTHOSH

Prof. VEENA A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Internet of Things		
	Course Code: 18CSE033	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42

Course Objectives:	Description
	1. Understand the building blocks of IOT and its characteristics and its application Area. 2. Realize the difference between M2M and IOT 3. Explore the architecture, components and working of IOT with the help of Microcontroller. 4. Comprehend the evolution of IOT in Mobile Devices, Cloud & Sensor Networks. 5. Elaborate the need for Data Analytics mechanism & tools in IoT.

Unit No	Syllabus Content	No of Hours
1	**Introduction & Concepts:** Introduction to Internet of Things, Definitions and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT levels and Development Templates.	08
2	**IoT and M2M Communication** Introduction, M2M, Difference between IoT and M2M, SDN & NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF- YANG. **IoT Platform Design Methodology:** Introduction, IoT Design Methodology, Case Study: Weather Monitoring.	09
3	**Domain Specific IOTs** Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. **IoT Physical Devices and Endpoints** Basic Building blocks - The Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Controlling led.	09
4	**IoT Physical servers & Cloud Offerings** **Cloud:** introduction to cloud storage models and communication Networks, WAMP – AutoBahn for IoT, Xively cloud for IoT. **Python web application** frame work - django, Designing a RESTful web API, amazon web services for IoT, SkyNetIoT messaging platforms.	09
5	**Self Study:** **Data Analytics for IoT:** Introduction AppacheHadoop, using Hadoop MapReduce for Batch Data Analysis, Apache oozie, Apache Spark, Apache Storm, using Apache Storm for Real-time Data Analysis. **Ethics -** Characterizing the Internet of Things, Privacy, Control, Environment, Solutions	07

Course Outcomes	Description	RBT Levels
CO1	**Apply** the knowledge of the internet and computer network on to IoT paradigm.	L1, L3

CO2	**Adequately** learn and **demonstrate** the IoT communication.	**L3**
CO3	**Apply** the knowledge of python in Raspberry PI programming.	**L2**
CO4	**Analyze** different configuration setups for connecting different types of sensors and upload the code on the board and communicate to the cloud.	**L4**
CO5	**Apply** the knowledge of data analytics and ethics behind a IoT development	**L4, L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**				**1**							**1**
CO2	**3**	**2**	**3**	**1**	**2**							**1**
CO3	**3**	**2**	**2**	**1**	**2**					**1**		**1**
CO4	**3**	**3**	**1**	**2**	**2**					**1**		**1**
CO5	**3**	**2**	**1**	**2**	**3**				**1**	**1**		**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", First Edition, VPT, 2014.

REFERENCE BOOKS:

1. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017
2. Ovidiu Vermesan, PeterFriess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems". River Publishers Series in Communication.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education

SELF STUDY REFERENCES/WEBLINKS:

1. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861

COURSE COORDINATOR:	**Dr.Smitha Shekar B** **Lavanya Santhosh**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Introduction to Robotics		
	Course Code: **18CS752**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand how to build basic robots 2. To understand how to use robot architectures to build robots in realtime 3. To distinguish differences between various architectures and apply in realtime 4. To program the AI robots for various behaviours of different complexity

Unit No	**Syllabus Content**	**No of Hours**
1	From Teleoperation To Autonomy: Overview, How Can a Machine Be Intelligent? What Can Robots Be Used For? Social implications of robotics, A Brief History of Robotics, Industrial manipulators , Space robotics and the AI approach, Teleoperation , telepresence, Semi-autonomous control, The Seven Areas of AI	**8**
2	The Hierarchical Paradigm: Overview, Attributes of the Hierarchical Paradigm, Strips, More realistic Strips example, Strips summary, Closed World Assumption and the Frame Problem, Representative Architectures, Nested Hierarchical Controller, NIST RCS, Evaluation of hierarchical architectures, Advantages and Disadvantages.	**8**
3	Biological Foundations of the Reactive Paradigm: Overview, Why explore the biological sciences? Agency and computational theory, What Are Animal Behaviors? Reflexive behaviours, Coordination and Control of Behaviors, Innate releasing mechanisms, Concurrent behaviours, Perception in Behaviors, Action-perception cycle, Two functions of perception, Gibson: Ecological approach, Neisser: Two perceptual systems, Schema Theory, Behaviors and schema theory, Principles and Issues in Transferring Insights to Robots	**8**
4	The Reactive Paradigm : Overview 105 4.2 Attributes of Reactive Paradigm, Characteristics and connotations of reactive behaviours, Advantages of programming by behaviour, Representative architectures, Subsumption Architecture, Example, Subsumption summary, Potential Fields Methodologies, Visualizing potential fields, Magnitude profiles, Potential fields and perception, Programming a single potential field, Combination of fields and behaviours, Example using one behavior per sensor, Pfields compared with subsumption, Advantages and disadvantages , Evaluation of	**9**

	Reactive Architectures	
5	Designing a Reactive Implementation: Overview, Behaviors as Objects in OOP, Example: A primitive move-to-goal behaviour, Example: An abstract follow-corridor behaviour, Where do releasers go in OOP? Steps in Designing a Reactive Behavioral System , Case Study: Unmanned Ground Robotics Competition, Assemblages of Behaviors, Finite state automata, A Pick Up the Trash FSA, Implementation examples , Abstract behaviors , Scripts	**9**

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand basic operations of robots and their sub-components involved in designing.	R1, R2,R3
CO2	To interpret the biological behaviours of human or animal and mapping them to different robot behaviours	R4 and R5
CO3	To Analyze and design the robot behaviours using different robot architectures that work in real-time environments.	R4
CO4	To use appropriate programming approaches to design and build the robot behaviours	R5

CO-PO Mapping	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**	**2**									
CO3	**3**	**3**		**2**	**2**							**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**	**2**					**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Robin R Murphy, 2000, Introduction to AI Robotics, 2nd Edition, MIT Press, Cambidge, MA, USA, ISBN:978-0-262-13383-8

REFERENCE BOOKS:

1. Kathy Ceceri, Making Simple Robots: Exploring Cutting-Edge Robotics with Everyday Stuff, Make Community, LLC; 1st edition (March 2, 2015), ISBN-10 : 9781457183638; ISBN-13 : 978-1457183638

EXTERNAL REFERENCES/WEBLINKS:	
COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

<table>
<tr><td rowspan="3"></td><td colspan="3">SUBJECT TITLE: CLOUD COMPUTING LABORATORY</td></tr>
<tr><td>SUBJECT CODE: 18CSL77</td><td>No. of Credits:0:0:1</td><td>No. of Lecture hours per week:3</td></tr>
<tr><td>Exam Duration :3 hours</td><td colspan="2">Exam Marks:50</td></tr>
</table>

Course Objectives:

This course will help students to achieve the ability to:

1. Develop web applications in cloud
2. Learn the design and development process involved in creating a cloud-based application
3. Use cloud simulator and analyze the working of data centers using simulator

Note: Use Cloud Analyst Simulator for Simulation

<table>
<tr><td colspan="2">Exp. No</td><td>Experiment List</td></tr>
<tr><td colspan="3">PART-A</td></tr>
<tr><td>1</td><td>a)</td><td>Creation of web applications on Salesforce cloud Platform.</td></tr>
<tr><td></td><td>b)</td><td>Use the following userbase configuration to simulate following scenarios for the given data centre and virtual machine configuration and answer to the following questions.
Scenario-1: Nearest data center with round robin policies
Scenario-2: Optimize response time with round robin policies
<table>
<tr><td>User base</td><td>Region</td><td>Data center</td><td>Peak-hour users</td><td>Off-peak hour users</td><td>Virtual machines</td></tr>
<tr><td>UB1</td><td>North America</td><td>--</td><td>1000</td><td>500</td><td rowspan="6">DC1-50</td></tr>
<tr><td>UB2</td><td>South America</td><td>--</td><td>800</td><td>1200</td></tr>
<tr><td>UB3</td><td>Europe</td><td>DC1</td><td>2000</td><td>1000</td></tr>
<tr><td>UB4</td><td>Africa</td><td>--</td><td>500</td><td>300</td></tr>
<tr><td>UB5</td><td>Asia</td><td></td><td>3000</td><td>300</td></tr>
<tr><td>UB6</td><td>Ocenia</td><td></td><td>1500</td><td>150</td></tr>
</table>
i) Tabulate the overall response time of all the scenarios and plot a line graph
ii) Plot a bar graph for the data processing time of all the scenarios
iii) Compare average response time by regions of all scenarios by plotting line graph
iv) Using Pie chart show the total cost spent for each scenario</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>2</td><td>a)</td><td>Install Virtualbox/VMware Workstation with different flavours of linux and execute some C programs</td></tr>
</table>

b) Simulate the following scenarios for the given userbase, data centre and virtual machine configuration and answer to the given questions

Scenario	Scenario Description	Load Balancing algorithm	Service broker policy
1	One data center with 50 Virtual Machines for UB1	Nearest Data Centre	Round robin
2	Two data centers with 25 and 50 Virtual Machines respectively for UB1		
3	Three data centers with 100,75 and 25 Virtual Machines respectively for UB1		

i) Tabulate the overall response time and data processing of all the scenarios and plot the bar graph
ii) Plot a line graph of data center request servicing time of all the data centers for all the scenarios
iii) Compare average response time by regions of all scenarios by plotting line graph
iv) Mention the data centers used by the UB2,UB3, UB4 and UB5

3 a) Install Google App Engine. Create hello world app and other simple web applications using python/java.

b) Simulate the following scenarios for given data centre, data centre and virtual machine configuration and answer the following questions
Scenario 1: closest data center and round robin policies
Scenario 2: optimize response time and round robin policies
Use the following userbase configuration for all the scenarios

User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines
UB1	North America	DC1, DC3	1000	500	DC1-50 DC3-100
UB2	South America	---	800	1200	
UB3	Europe	DC4	2000	1000	DC4-150
UB4	Africa	--	500	300	

i) Tabulate and compare the Average response time and data processing time of all the scenarios by plotting the line graph
ii) Tabulate the response time of user bases in all scenarios and compare these by plotting bar graph. Which user base is taking maximum time among three scenarios? Why
iii) Calculate the data transmission time from DC1 to UB2
iv) Plot the bar graph for data center cost of all scenarios

4	a)	Create a RDS and launch in your custom VPC network.
	b)	Analyze the various service broker policies for the following configuration and answer the following questions.

Parameter	Value Used
UB Name	UB1
Region	2
Request Per User Per Hour	60
Data Size Per Request	100
Peak hour start(GMT)	3
Peak hour end (GMT)	9
Avg Peak Users	40000
Avg Off Peak Users	4000
DC 1 – No Of VM	75
DC 2 – No Of VM	50
DC 3 – No Of VM	25
VM Image Size	10000 MB
VM Memory	512 MB
VM Bandwidth	1000 bps
DC 1 – No Of Physical Machine	2
DC 2 – No Of Physical Machine	2
DC 3 – No Of Physical Machine	2
DC – Memory Per Machine	204800 Mb
DC – Storage Per Machine	100000000 Mb
DC – Available BW Per Machine	1000000
DC – No Of Processors Per Machine	4
DC – Processor Speed	10000 MIPS
DC – VM Policy	Time Shared
User Grouping Factor	1000
Request Grouping Factor	100
Executable Instruction Length	500
Load Balancing Policy	Throttled

a) Tabulate and compare the data processing time of service broker policies by plotting the line graph
b) Tabulate and compare response time of service broker policies by plotting the bar graph
c) Tabulate the cost for service broker policies and represent it using pie chart
d) Which service broker policy is best and why?

5	a)	Create a file in one virtual machine and transfer it another virtual machine files from one virtual machine.
	b)	Analyze the various load balancing algorithms for the given userbase, data centre and virtual machine configuration and answer the following questions. Consider the following userbase configuration for all load balancing algorithms

Number of User bases	06
Region for the userbases	UB1-South America, UB2-Asia, UB3-North America, UB4-Europe, UB5-Africa, UB6-Ocenia
Average peak users for all the user bases	10000

Average off-peak users for all the user bases	100
Peak hours' time	Depends on the region
Data centers in each user base	UB1-1, UB2-2, UB3-1, UB4-3, UB5-2, UB6-1
Virtual machines in each data center	6
Simulation time	10 mins
Service broker policy	Nearest data center

a) Tabulate and compare the data processing time of load balancing algorithms by plotting the line graph
b) Tabulate the response time of load balancing algorithms by plotting the bar graph
c) Tabulate the response time by region for load balancing algorithms and plot bar graph
d) Which load balancing algorithm is best and why?

PART-B

Mini Project: Design and implementation of mini projects using concepts of cloud computing.

Course Outcomes	**Statements**	**Blooms Level**
CO1	Develop applications on different cloud platforms Use various services of AWS	**L3**
CO2	Describe the working of Cloud Analyst simulator	**L2**
CO3	Demonstrate the working of datacenters using simulator	**L3**
CO4	Illustrate the working virtualization using Virtualbox/VMware	**L3**
CO5	Implement mini project using cloud services	**L4**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO3**
CO1	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
CO2	1	1	2	1	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
Strong -3 Medium -2 Weak -1															

COURSE COORDINATOR:	**Dr.Siddaraju** **Mr.Srinivasa A. H.**

<table>
<tr><td rowspan="3"></td><td colspan="3">SUBJECT TITLE: ANDROID PROGRAMMING LAB</td></tr>
<tr><td>SUBJECT CODE:18CSL76</td><td>No. of Credits:0:0:1:0</td><td>No. of Lecture hours per week:3</td></tr>
<tr><td>Exam Duration :3 hours</td><td>Exam Marks: 50</td><td></td></tr>
</table>

Course objectives:

1) To learn and acquire art of Android programming.
2) To configure initial application, run in emulator.
3) Understand and implement Android's advanced User interface functions, audio video applications
4) Create, modify and query on SQlite database.
5) Present different ways of sharing data through the use of services.

1.	i) Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number. ii) Develop a simple application with one EditText so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.
2.	Write a program to create an Activity to read Employee Details (EmpId, Name, Age, Address) from user and store to database and create a menu with menu item (Show Details) on pressing menu details it must go to another activity with employee id search box and search button and display the employee details on the screen.
3.	Write a program to create an activity with a text box and three buttons (save, open and create) open must allow to browse the text file from sdcard and must display the contents of the file on textbox, save button must save the contents of text box to file, create button must allow file user to create a new file and save the entered contents of the textbox.
4.	Write a program to create an activity with two text boxes (date /time and note contents). Create a content provider to store the date and time and note contents to the database. Create another program with a Button (Fetch Today Notes) on press must access the note provider and display the notes stored for today's date.
5.	Write a program to create an activity with two buttons start and stop. On pressing start

	button the program must start the counter and must keep on counting until stop button is pressed.
6.	Create a program to receive the incoming SMS to the phone and put a notification on screen, on clicking the notification it must display sender number and message content on screen.
7.	Write a program to create a service that will put a notification on the screen every 5 seconds.
8.	Create an .aidl service to do add, subtraction and multiplication and create another application with two buttons to read the inputs and three button add,subtract and multiply to call add, subtract and multiply operation on .aidl service.
9.	Create an activity like a phone dialer with (1,2,3,4,5,6,7,8,9,0,*,#) buttons including call, save and delete buttons. On pressing the call button, it must call the phone number and on pressing the save button it must save the number to the phone contacts.
10.	Create a file of JSON type with values for city_name, Latitude, Longitude, Temperature and Humidity. Develop an application to create an activity with button to parse the JSON file which when clicked should display the data in the textview.

At the end of the course the student will be able to

Course Outcomes:

CO1: Create, test and debug Android application by setting up Android development environment.
CO2: Implement adaptive, responsive user interfaces that work across a wide range of devices.
CO3: Infer long running tasks and background work in Android applications.
CO4: Demonstrate methods in storing, sharing and retrieving data in Android applications.
CO5: Infer the role of permissions and security for Android applications.

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	1	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

Text Books

1. Google Developer Training, **"Android Developer Fundamentals Course – Concept Reference",**

Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link)

Reference Books

1. Erik Hellman, **“Android Programming – Pushing the Limits”,** 1st Edition, Wiley India Pvt Ltd, 2014. ISBN-13: 978-8126547197
2. Dawn Griffiths and David Griffiths, **“Head First Android Development”,** 1st Edition, O’Reilly SPD Publishers, 2015. ISBN-13: 978-9352131341
3. Bill Phillips, Chris Stewart and Kristin Marsicano, **“Android Programming: The Big Nerd Ranch Guide”,** 3rd Edition, Big Nerd Ranch Guides, 2017. ISBN-13: 978-0134706054

Lab Incharge

1 Uma K M
2 Lavanya Santhosh
3 Veena A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Soft Computing		
	Course Code: **18CS753**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week :** **03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To learn the key aspects of Soft computing 2. To know about the components and building block hypothesis of Genetic algorithm. 3. To gain insight onto Neuro Fuzzy modeling and control. 4. To gain knowledge in machine learning through Support vector machines

Unit No	**Syllabus Content**	**No of Hours**
1	Introduction to Soft computing: Neural networks, Fuzzy logic, Genetic algorithms, Hybrid systems and its applications. Fundamental concept of ANN, Evolution, basic Model of ANN, Terminologies used in ANN, MP model, linear separability, Hebb Network.	**11**
2	Supervised Learning: Perceptual Network, Adaptive linear neuron, Multiple adaptive linear neurons, Back propagation Network,Associative Memory Network: introduction, training algorithms for pattern association, associative memory network,	**10**
3	Classical sets and Fuzzy Sets – classical and Fuzzy Relations – Features of membership functions, Fuzzification and methods of membership value assignment. Defuzzification lambda cuts for fuzzy relations and fuzzy sets.	**10**
4	Fuzzy Decision Making: introduction, individual decision making, multiperson Decision making, multiobjective decision making, multiattribute decision making, fuzzy Bayesian decision making, Fuzzy logic control systems: introduction, control system design, architecture and operation of FLC systems, FLC system Models, Applications of FLC systems	**11**
5	**Self Study Component** Genetic algorithms: Introduction - Basic operations - Traditional optimization and search techniques. Genetic algorithms and search space, Operators of genetic algorithms – Genetic programming	**10**

Course Outcomes	**Description**	**RBT Levels**

CO1	Understand the basics of soft computing, ANN and Terminologies to relate and understand the real time problems	**R2 R3**
CO2	Solve the real-time problems using ANN representations	**R3 R4**
CO3	Analyze and adopt fuzzy logic in designing and implementing soft computing applications.	**R3 R4**
CO4	Analyze and apply genetic algorithms to solve the optimization problems	**R3 R4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**									
CO2	**3**	**3**	**2**									
CO3	**3**	**3**	**3**									**2**
CO4	**3**	**3**	**3**	**2**	**2**							**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Principles of Soft computing, S N Sivanandam, and S N Deepa, Wiley India, 3rd edition ISBN 13: 978812658744-5, 2019

REFERENCE BOOKS:

1. Neuro-fuzzy and soft computing, J.S.R. Jang, C.T. Sun, E. Mizutani, Phi (EEE edition), 2012, ISBN 0-13-261066-3
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Third Edition

WEBLINKS:

1. **Introduction to Soft Computing by Prof. Debasis Samanta NPTEL course**
2. **L. A. Zadeh, "Fuzzy Algorithms", Information and Control, vol. 12, pp. 94-102, 1968. CrossRef Google Scholar**
3. **2. L. A. Zadeh, "A Rationale for Fuzzy Control", J.Dynamic Systems Measurement and Control, vol. 94, pp. 3-4, 1972. CrossRef Google Scholar**
4. **3. L. A. Zadeh, "Outline of a New Approach to the Analysis of Complex Systems and Decision Processes", IEEE Trans. Systems Man and Cybernetics, vol. SMC-3, pp. 28-44, 1973**

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Computer Vision		
	Course Code: 18CS751	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42

Course Objectives:	Description
	1. To understand the basics of computer vision and image processing. 2. To understand the different kinds of detectors and matching applications. 3. To understand the need of motion and its techniques. 4. To understand the importance of detection and recognition. 5. To understand the basics of motion estimation and image stitching.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** What is computer vision? , A brief history, overview. **Image formation**: Geometric primitives and transformations, Photometric image formation, The digital camera. **Image processing:** Steps in image processing, filtering, Fourier transformation, neighborhood operation.	8
2	**Feature detection and matching**:-Points and patches , Feature detectors , Feature descriptors ,Feature matching , Feature tracking ,Application: Performance-driven animation ,Edges- Edge detection, Edge linking ,Application: Edge editing and enhancement, Lines- Successive approximation , Hough transforms , Vanishing points	9
3	**Structure from motion:** Triangulation, Two-frame structure from motion, Projective (uncalibrated) reconstruction ,Self-calibration Application: View morphing, Factorization ,Perspective and projective factorization , Application: Sparse 3D model extraction ,Bundle adjustment ,Exploiting sparsity ,Application: Match move, and augmented reality ,Uncertainty and ambiguities ,Application: Reconstruction from Internet photos ,Constrained structure and motion ,Line-based techniques Plane-based techniques.	9
4	**Recognition:** object detection, face detection, face recognition, instance recognition, category recognition, context and scene understanding, recognition databases and test sets.	9
5	**Self study: Dense motion estimation:** translational alignment, parametric motion, Spline based motion, optical flow, layered motion, **Image Stitching**: motion models, global alignment, compositing and blending.	7

Course Outcomes	Description	RBT Levels
CO1	**Acquire** fundamental concepts and applications of computer vision and image processing.	L1, L3
CO2	**Interpret and Apply** the various detectors and matching applications.	L2, L3
CO3	**Explain** the importance motion and usage of its techniques.	L1, L2

CO4	**Apply** the analysis on scene and recognizing all of its constituent objects.	**L3**
CO5	**Develop** motion estimation algorithms that can be used for wide variety of applications.	**L4,L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**3**			**2**	**3**			**1**			**3**
CO2	**3**	**3**	**2**	**2**	**2**	**3**			**1**			**3**
CO3	**3**	**3**	**2**	**2**	**2**	**3**			**2**			**3**
CO4	**3**	**3**	**2**	**2**	**2**	**3**			**1**			**3**
CO5	**2**	**2**	**2**	**2**	**2**	**3**			**2**			**3**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Computer vision: algorithms and applications by Richard Szelski 2010 Springer.

REFERENCE BOOKS:

1. Forsyth A. David and Ponce Jean, Computer Vision, A Modern Approach. 2nd ed., 2011.
2. Trucco and Verri, Introductory Techniques for 3D Computer Vision, 1998.

SELF STUDY REFERENCES/WEBLINKS:

1. http://szeliski.org/Book/.
2. **http://www.amazon.com/Computer-Vision-Models-Learning-Inference/product-reviews/1107011795/ref=dp_top_cm_cr_acr_txt?showViewpoints=1**

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

	Software Project Management		
	Course Code: 18CS743	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand the Software Project Planning and Evaluation techniques. 2. To plan and manage projects at each stage of the software development life cycle (SDLC). 3. To learn about the activity planning and risk management principles. 4. To manage software projects and control software deliverables. 5. To develop skills to manage the various phases involved in project management and people management.

Unit No	**Syllabus Content**	**No of Hours**
1	**Project Evaluation and Project Planning :** Importance of Software Project Management, Activities, Methodologies, Categorization of Software Projects, Setting objectives, Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation, Strategic program Management, Stepwise Project Planning.	**9**
2	**Project Life Cycle and Effort Estimation :** Software process and Process Model, Choice of Process models, Rapid Application development, Agile methods, Dynamic System Development Method, Extreme Programming, Managing interactive processes, Basics of Software estimation, Effort and Cost estimation techniques - COSMIC Full function points, COCOMO II - a Parametric Productivity Model.	**8**
3	**Activity Planning and Risk Management :** Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Formulating Network Model, Forward Pass and Backward Pass techniques - Critical path (CRM) method, Risk identification, Assessment, Risk Planning, Risk Management, PERT technique, Monte Carlo simulation, Resource Allocation, Creation of critical paths, Cost schedules.	**9**
4	**Project Management and Control:** Framework for Management and control, Collection of data, Visualizing progress, Cost monitoring, Earned Value Analysis, Prioritizing Monitoring, Project tracking, Change control, Software Configuration Management, Managing contracts, Contract Management.	**9**
5	**SELF-STUDY –** **Staffing in Software Projects:** Managing people, Organizational behavior, Best methods of staff selection, Motivation, The Oldham, Hackman job characteristic model, Stress, Health and Safety, Ethical and Professional concerns, Working in teams, Decision making, Organizational structures, Dispersed and Virtual teams, Communications genres, Communication plans, Leadership.	**7**

Course Outcomes	Description	RBT Levels
CO1	Understand Project Management principles while developing software.	Level1, Level2
CO2	Gain extensive knowledge about the basic project management concepts, framework and the process models.	Level 2
CO3	Obtain adequate knowledge about software process models and software effort estimation techniques.	Level 3
CO4	Estimate the risks involved in various project activities.	Level 3
CO5	Learn staff selection process and the issues related to people management	Level 3

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**								**2**	**2**
CO2	**3**	**2**	**1**								**2**	**2**
CO3	**2**	**2**	**1**		**3**			**1**				
CO4	**2**	**2**		**2**		**1**		**1**			**2**	**2**
CO5	**1**	**2**										**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Software Project Management, Bob Hughes, Mike Cotterell and Rajib Mall*, Fifth Edition, Tata McGraw Hill, New Delhi, 2012.*

REFERENCE BOOKS:

1. Effective Software Project Management, Robert K. Wysocki, Wiley Publication, 2011.
2**. Managing Global Software Projects, Gopalaswamy Ramesh,** McGraw Hill Education (India), Fourteenth Reprint 2013.

SELF STUDY REFERENCES/WEBLINKS:

1. https://mopinion.com/top-20-best-project-management-software-an-overview/

2. https://www.thebalancesmb.com/best-project-management-software-4175032

COURSE COORDINATOR:	**Praveena M V**

	Course Title: Cyber Forensics		
	Course Code: 18CS742	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	This course will enable students to: 1. Define and classify cybercrimes and further understand the associated Cyber laws in India 2. Explore various Cyber forensic concepts and Forensic examination processes. 3. Learn the acquisition, analysis and validation of forensics data. 4. Get familiarized with existing forensics tools.

Unit No	Syllabus Content	No of Hours
1	**Introduction to Cybercrime** Cybercrime: Introduction, Role of Electronic Communication devices and Information and Communication Technologies in Cyber crime, Types of Cyber crime, Classification of Cybercriminals, Cybercrime, The Present and the Future: Cryptocurrency characteristics and types, Deep web and Dark web	8
2	**Introduction to Cyber forensics** Interrelation among Cybercrime, Cyber Forensics and Cyber Security, Cyber Forensics: Definition, Need, Objectives, Computer Forensics Investigations, Steps in Forensic Investigation, Forensic Examination Process, Methods employed in Forensic Analysis, Classification of Cyber Forensics:Disk, Network, Wirelesss, Database, Malware, Mobile, GPS, Email and Memory Forensics	8
3	**Digital Evidence Analysis using Forensics tools and techniques** Digital evidence: Sources, Collection procedure, Preliminaries of Digital evidence; Digital evidence acquisition and seizure, Acquisition of evidence from : Computer and Electronic device, Mobile phone and PDA, Optical and removable media ; Chain of Custody ; Forensic Tools, types and categories, Cyber Forensic Suite; Forensic tools for: Drive Imaging and Validation, Integrity verification and Hashing, Data recovery, RAM analysis, Encryption/Decryption, Password recovery, Analyzing network, Metadata	9

	processing, Forensic auditing, Antiforensics ; Analysis of Digital Evidence: Capturing Forensic copy of memory and hard drive with Toolkit Forensic imager, RAM analysis with Volitility, Analysing hard drive with Win Hex, Working with Autopsy, email tracing and tracking ; Admissibility of Digital Evidence : Introduction, Digital evidence electronic record	
4	**Cyber security: Organizational Implications** Introduction , Cost of Cybercrimes and IPR issues, Web threats for organizations, Security and privacy implications from Cloud computing Social media marketing: security risks, Protecting people's privacy in organization, Organizational guidelines for internet usage, safe computing and computer usage policy, Incident Handling : essential component of cyber security, Forensics best practices for organizations, Media and asset protection. Importance of end-point security	9
5	**Cyber Forensics case studies and Cyber Laws** Cyber breaches examples and case studies discussion: New zealand's Waikato District Health Board cyber attack, Colonial pipeline cyber attack (ransomware case study) etc. ; Introduction to Cyber laws: need, legal issues; Cyber laws in India and case studies: Cyber laws in India, Information Technology Act 2000; Cyber Laws associated to Cyber crime against Individual, Property and Nation, Cyber laws for Cyber security	8

NOTE:
1. Unit 5 will be the Self study component

Course Outcomes	**Description**	**RBT Levels**
CO1	Discuss the various types of cyber crimes and Cyber Laws applicable to them	**L1, L2**
CO2	Apply Forensic examination process	**L1,L2,L3, L4**
CO3	Analyze and validate forensics data	**L1,L2,L3,L4**
CO4	Use forensics tools	**L1, L2, L3**
CO5	Identify the best practices followed in the organization with respect to cyber security	**L1, L2**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	**3**	**2**										
CO2	**3**	**3**	**1**	**3**								**2**
CO3	**3**	**3**	**2**	**3**								**1**
CO4	**3**	**2**	**1**	**2**	**3**							**2**
CO5	**3**	**2**	**2**									**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1.Dejey, S Murugan, "**Cyber Forensics**", Oxford University Press, 2018.

2.Nina Godbole, SunitBelapure, "**Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives**",Wiley Publications, 2017.

REFERENCE BOOKS:

1. John R.Vacca, "**Computer Forensics**", Cengage Learning, 2005

3. Marjie T.Britz, "**Computer Forensics and Cyber Crime": An Introduction**", 3rd Edition, Prentice Hall, 2013.

SELF STUDY REFERENCES/WEBLINKS:

Dejey, S Murugan, "**Cyber Forensics**", Oxford University Press, 2018.

COURSE COORDINATOR:	**Vinutha H**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: BUSINESS INTELLIGENCE		
	Course Code: 18CS741	**No. of Credits: 3: 0: 0 (L-T-P)**	**No. of Lecture Hours/Week: 3**
	Exam Duration: 3 Hours	**CIE + Assignment + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	**Description**
	1. Describe the concepts and components of Business Intelligence. 2. Understand the technological architecture that underpins the Business Intelligence systems. 3. Determine how dimensional modeling fits in an enterprise. 4. Examine the data integration techniques to discover previously hidden insights that can profoundly impact the success of any business. 5. Develop Business Intelligence systems using data analytics tools to aid the decision making process.

Unit No	**Syllabus Content**	**No of Hours**
1.	**The Business Demand for Data, Information, and Analytics,** Just One Word: Data. Welcome to the Data Deluge, Taming the Analytics Deluge, Too Much Data, Too Little Information, Data Capture versus Information Analysis, The Five Cs of Data, Common Terminology from our Perspective, **Justifying BI: Building the Business and Technical Case,** Why Justification is Needed, Building the Business Case, Building the Technical Case, Assessing Readiness, Creating a BI Road Map, Developing Scope, Preliminary Plan, and Budget, Obtaining Approval, Common Justification Pitfalls, **Defining Requirements -** Business, Data and Quality, The Purpose of Defining Requirements, Goals Deliverables, Roles, Defining Requirements Workflow, Interviewing, Documenting Requirements.	**08**
2.	**Architecture Framework,** The Need for Architectural Blueprints, Architectural Framework, Information Architecture, Data Architecture, Technical Architecture, Product Architecture, Metadata, Security and Privacy, Avoiding Accidents with Architectural Planning, Do Not Obsess over the Architecture, **Information Architecture,** The Purpose of an Information Architecture, Data Integration Framework, DIF Information Architecture, Operational BI versus Analytical BI, Master Data Management, **Data Architecture,** The Purpose of a Data Architecture, History, Data Architectural Choices, Data Integration Workflow, Data Workflow - Rise of EDW Again, Operational Data Store.	**09**
3.	**SELF-STUDY** **Foundational Data Modeling,** The Purpose of Data Modeling, Definitions - The Difference Between a Data Model and Data Modeling, Three Levels of Data Models, Data Modeling Workflow, Where Data Models Are Used, Entity-Relationship (ER) Modeling Overview, Normalization, Limits and Purpose of Normalization, **Dimensional Modeling,** Introduction to Dimensional Modeling,	**09**

	High-Level View of a Dimensional Model, Facts Dimensions, Schemas, Entity Relationship versus Dimensional Modeling, Purpose of Dimensional Modeling Fact Tables, Achieving Consistency, Advanced Dimensions and Facts, Dimensional Modeling Recap, **Business Intelligence Dimensional Modeling,** Introduction, Hierarchies, Outrigger Tables, Slowly Changing Dimensions, Causal Dimension, Multivalued Dimensions, Junk Dimensions, Value Band Reporting, Heterogeneous Products, Alternate Dimensions, Too Few or Too Many Dimensions.	
4.	**Data Integration Design and Development,** Getting Started with Data Integration, Data Integration Architecture, Data Integration Requirements, Data Integration Design, Data Integration Standards, Loading Historical Data, Data Integration Prototyping, Data Integration Testing, **Data Integration Processes,** Introduction: Manual Coding versus Tool-Based Data Integration, Data Integration Services.	**08**
5.	**Business Intelligence Applications,** BI Content Specifications, Revise BI Applications List, BI Personas, BI Design Layout - Best Practices, Data Design for Self-Service BI, Matching Types of Analysis to Visualizations, **BI Design and Development,** BI Design, BI Development, BI Application Testing, **Advanced Analytics,** Advanced Analytics Overview and Background, Predictive Analytics and Data Mining, Analytical Sandboxes and Hubs, Big Data Analytics, Data Visualization.	**08**

Course Outcomes	**Description**	**RBT Levels**
CO1	Establish Business Intelligence in the enterprise by defining the requirements for businesses that demand information.	**L3**
CO2	Employ a well architected foundation that provides information that helps in aligning the company's data with its business strategies.	**L3**
CO3	Articulate how the data and dimensional models are considered the cornerstone to building Business Intelligence applications.	**L3**
CO4	Illustrate the Data Integration workflow of source data as it is transformed to become actionable information.	**L3**
CO5	Develop Business Intelligence applications with user interfaces and standards that resonate with the intended audience and employ analytics for forecasting.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1	2	2	-	-	-	-	-	-	-
CO2	2	3	3	3	3	-	-	-	-	-	-	-
CO3	1	2	2	2	3	-	-	-	-	-	-	-

CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Rick Sherman, **“Business Intelligence Guidebook: From Data Integration to Analytics”,** 1st Edition, Morgan Kaufmann Publishers/Elsevier Publishers Pvt Ltd., 2014. ISBN-13: 978-0124114616.

REFERENCE BOOKS:

1. R N Prasad and Seema Acharya, **“Fundamentals of Business Analytics”,** 2nd Edition, Wiley Publications, 2016. ISBN-13: 978-8126563791.
2. U Dinesh Kumar, **“Business Analytics: The Science of Data - Driven Decision Making”,** 1st Edition, Wiley Publications, 2017. ISBN-13: 978-8126568772.
3. Foster Provost and Tom Fawcett, **“Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking”,** 1st Edition, O'Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2013. ISBN-13: 978-9351102670.
4. Ramesh Sharda, Dursun Delen and Efraim Turban, **“Business Intelligence, Analytics, and Data Science: A Managerial Perspective”,** 1st Edition, Pearson Education, 2019, ISBN-13: 978-9353067021.
5. Carolo Vercellis, **“Business Intelligence: Data Mining and Optimization for Decision Making”,** 1st Edition, Wiley Publications, 2013. ISBN-13: 978-8126541881.

SELF-STUDY REFERENCES/WEBLINKS:

1. **Foundational Data Modeling**
   https://www.youtube.com/watch?v=CyP8UfeXVWg
2. **Dimensional Modeling**
   https://www.youtube.com/watch?v=lWPiSZf7-uQ
3. **Business Intelligence Dimensional Modeling**
   https://www.youtube.com/watch?v=rcpM0MZX-qc

COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

	Course Title: Introduction To Big Data Analytics		
	Course Code: 18CS73	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	This course will enable students to: • Understand fundamentals process of adopting Big Data analytics • Learn the Hadoop framework and NOSQL concepts • Learn to use Spark APIs, write SQL queries, Streaming concepts • Design distributed Machine Learning models with Spark's MLlib • Get exposed to case studies of complex real world problems

Unit No	Syllabus Content	No of Hours
1	**Introduction to Big Data Analytics:** Big data and its characteristics, Market and Business Drivers for Big Data Analytics, Business Problems Suited to Big Data Analytics, Developing a Strategy for Integrating Big Data Analytics into the Enterprise, Introduction to High-Performance Appliances for Big Data Management, NoSQL Data Management for Big Data	8
2	**Introduction to Hadoop:** Introduction, Hadoop and its Ecosystem, Hadoop Distributed File System, MapReduce Framework and Programming Model, Hadoop Yarn, Hadoop Ecosystem Tools **Introduction to Apache Spark:** The genesis of Spark, Hadoop at Yahoo and Spark early years, What is Apache Spark, Unified Analytics, Apache Spark's Distributed Execution, Spark Application and Spark session, Spark Jobs, Spark stages , Spark tasks, Transformation, Actions and Lazy Evaluation, Narrow and wide transformation, The Spark UI, Your first Standalone application.	9
3	**Adding structure to Apache Spark:** Apache Spark's structured APIs : The Dataframe API, The dataset API, Spark SQL and the underlying engine, Using Spark SQL in Spark Applications, SQL Tables and Views, Data sources for Data frames and SQL Tables, Common Data frames and Spark SQL operations, Structured Streaming, Programming model of Structured streaming, The fundamentals of Structured Streaming query, Streaming data sources and sinks : Apache Kafka.	9
4	**Reliable Storage solutions with Apache Spark:** Importance of Optimal storage solutions, Databases, Data lakes, Data houses, Apache Hudi, Apache Iceberg, Delta lake **Machine Learning with MLlib:**Supervised and Unpervised Machine	8

	Learning, Designing machine Learning pipelines, Hyperparameter Tuning, Model Management using MLflow	
5	**Advanced analytics with Spark, Case studies**: Exploring key machine learning algorithms on Spark for Recommender engines, Anomaly detection in network, Latent Semantic analysis in Natural language processing, Geospatial and temporal data Analysis, Image data analysis	**8**

Course Outcomes	**Description**	**RBT Levels**
CO1	Explore the fundamentals and process of adopting Big Data analytics	**L1, L2**
CO2	Explore Hadoop framework and NOSQL Data Management for Big Data	**L1, L2, L3**
CO3	Use Spark to process structured data to perform data engineering tasks	**L1,L2, L3, L4**
CO4	Build distributed Machine Learning models with Spark's MLlib	**L1, L2, L3**
CO5	Create complex analytics on large datasets using Machine learning tools by building and evaluating models	**L1,L2, L3, L4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**2**	**1**	**2**								**2**
CO2	**1**	**2**	**2**									
CO3	**3**	**2**	**2**		**2**							
CO4	**3**	**3**	**2**	**2**								
CO5	**3**	**2**	**2**	**2**	**2**							**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

2. Holden Karau, Andy Konwinski, Patrick WendellMatei Zaharia, "Learning Spark: Lightning-Fast Big Data Analysis", O'Reilly, 2015, Edition 1.

3. Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills,"Advanced Analytics with Spark by Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills (O'Reilly). Copyright 2015 .

REFERENCE BOOKS:

1. Raj Kamal and Preeti Saxena, "**Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning",** McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966 2. Douglas Eadline, **"Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem",** 1st Edition, Pearson Education, 2016. ISBN-13: 978-9332570351 3. Raj Kamal and Preeti Saxena, "**Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning",** McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966	
SELF STUDY REFERENCES/WEBLINKS:	
COURSE COORDINATOR:	**Vinutha H**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: CLOUD COMPUTING		
	Course Code: 18CS72	**No. of Credits: 4: 0: 0 (L-T-P)**	**No. of Lecture Hours/Week: 4**
	Exam Duration: 3 Hours	**CIE + Assignment + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours: 52**

Course Objectives:	**Description**
	1. Explain the fundamentals of cloud computing. 2. Illustrate the cloud applications and services. 3. Compare the different cloud platforms used in the industry.

Unit No	**Syllabus Content**	**No of Hours**
1.	**Scalable Computing Over the Internet:** The Age of Internet Computing, Scalable Computing Trends and New Paradigms, Virtual Machines and Virtualization Middleware, Data Center Virtualization for Cloud Computing, **System Models for Distributed and Cloud Computing:** Clusters of Cooperative Computers, Grid Computing Infrastructures, Peer-to-Peer Network Families, Cloud Computing over the Internet, **Software Environments for Distributed Systems and Clouds:** Service-Oriented Architecture (SOA), **Performance, Security and Energy Efficiency:** Performance Metrics and Scalability Analysis, Fault Tolerance and System Availability, Network Threats and Data Integrity, Energy Efficiency in Distributed Computing	**10**
2.	**Implementation of Virtualization:** Levels of Virtualization Implementation, VMM Design Requirements and Providers, Virtualization Support at the OS Level, Middleware Support for Virtualization, **Virtualization Structures/Tools and Mechanisms:** Hypervisor and Xen Architecture, Binary Translation with Full Virtualization, Para-Virtualization with Compiler Support, **Virtualization of CPU, Memory and I/O Devices:** Hardware Support for Virtualization, CPU Virtualization, Memory Virtualization, I/O Virtualization, **Virtual Clusters and Resource Management:** Physical versus Virtual Clusters, Migration of Memory, Files, and Network Resources, Dynamic Deployment of Virtual Clusters, **Virtualization for Data-Center Automation:** Server Consolidation in Data Centers, Virtual Storage Management, Cloud OS for Virtualized Data Centers.	**10**
3.	**Cloud Computing and Service Models:** Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS), **Data-Center Design and Interconnection Networks:** Warehouse-Scale Data-Center Design, Data-Center Interconnection Networks, Modular Data Center in Shipping Containers, Interconnection of Modular Data Centers, Data-Center Management Issues, **Architectural Design of Compute and Storage Clouds:** A Generic Cloud Architecture Design, Layered Cloud Architectural Development, Virtualization	**12**

	Support and Disaster Recovery, Architectural Design Challenges, **Public Cloud Platforms: GAE, AWS, AND AZURE:** Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Services (AWS), Microsoft Windows Azure, **Inter-Cloud Resource Management:** Extended Cloud Computing Services, Resource Provisioning and Platform Deployment, , Virtual Machine Creation and Management, Global Exchange of Cloud Resources, **Cloud Security and Trust Management:** Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques.	
4.	**Features of Cloud and Grid Platforms:** Cloud Capabilities and Platform Features, Traditional Features Common to Grids and Clouds, Data Features and Databases, Programming and Runtime Support, **Programming Support of Google APP Engine:** Programming the Google App Engine, Google File System (GFS), BigTable, Google's NOSQL System, Chubby, Google's Distributed Lock Service, **Programming on Amazon AWS and Microsoft AZURE:** Programming on Amazon EC2, Amazon Simple Storage Service (S3), Amazon Elastic Block Store (EBS) and SimpleDB, Microsoft Azure Programming Support, **Emerging Cloud Software Environments:** Open Source Eucalyptus and Nimbus, OpenNebula, Sector/Sphere, and OpenStack, Manjrasoft Aneka Cloud and Appliances.	**10**
5.	**SELF-STUDY** **Cloud Trends in Supporting Ubiquitous Computing:** Use of Clouds for HPC/HTC and Ubiquitous Computing, Large-Scale Private Clouds at NASA and CERN, Cloud Mashups for Agility and Scalability, Cloudlets for Mobile Cloud Computing, **Performance of Distributed Systems and the Cloud:** Review of Science and Research Clouds, Data-Intensive Scalable Computing (DISC), Quality of Service in Cloud Computing, Benchmarking MPI, Azure, EC2, MapReduce, and Hadoop, Communities and Applications of Social Networks, Twitter for Microblogging, News, and Alert Services.	**10**

Course Outcomes	**Description**	**RBT Levels**
CO1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.	**L2**
CO2	Discuss virtualization and outline its role in enabling the cloud computing system model.	**L2**
CO3	Identify the architecture and infrastructure of cloud computing and explain the core issues of cloud computing such as security and privacy.	**L3**
CO4	Determine the appropriate cloud computing solutions and provide recommendations according to the applications used.	**L3**
CO5	Compute the performance of cloud systems under different scenarios.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	2	1	2	1	-	-	-	-	-	-	-
CO2	3	2	3	3	2	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	2	2	3	3	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, **"Distributed and Cloud Computing: From Parallel Processing to the Internet of Things",** 1st Edition, Morgan Kaufmann/Elsevier Publications, 2012, ISBN-13: 978-0123858801.

REFERENCE BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, **"Mastering Cloud Computing",** 1st Edition, McGraw Hill Education, 2013, ISBN-13: 978-1259029950.
2. Dan C. Marinescu, "Cloud Computing - Theory and Practice", 1st Edition, Morgan Kaufmann/Elsevier Publications, 2013, ISBN-13: 978-9351070948.
3. Dinkar Sitaram and Geetha Manjunath, "Moving to the Cloud - Developing Apps in the New World of Cloud Computing", 1st Edition, Syngress/Elsevier Publications, 2012, ISBN-13: 978-9381269251

SELF-STUDY REFERENCES/WEBLINKS:

1. https://www.youtube.com/watch?v=PE-zbhDgf1c
2. https://www.youtube.com/watch?v=sS7fyW_qDrg

COURSE COORDINATOR:	**Dr.Siddaraju** **Mr.Srinivasa A. H.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Syllabus for 2018-19 Batch UG (CV)

Semester: VII / VIII	
Course Title: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)	
Course Code: **18HS72 / 82**	Evaluation Procedure:
Credits: **02**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 26 Hrs. (L:T:P:S) - 2:0:0:0	SEE Duration: 2 Hrs

Course Learning Objectives:	
1	To gain an historical, economic, and organizational perspective of occupational safety and health.
2	To investigate current occupational safety and health problems and solutions.
3	To identify the forces that influence occupational safety and health.
4	To demonstrate the knowledge and skills needed to identify work place problems and safe work practice.

UNIT - I	
OCCUPATIONAL HAZARD AND CONTROL PRINCIPLES: Safety, History and development, National Safety Policy. Occupational safety and Health Act (OSHA), Occupational Health and Safety administration - Laws governing OSHA and right to know. Accident – causation, investigation, investigation plan, Methods of acquiring accident facts, Supervisory role in accident investigation.	**6 Hrs**
UNIT - II	
ERGONOMICS AT WORK PLACE: Ergonomics Task analysis, Preventing Ergonomic Hazards, Work space Envelops, Visual Ergonomics, Ergonomic Standards, Ergonomic Programs. Emergency Response - Decision for action – purpose and considerations.	**5 Hrs**
UNIT - III	
FIRE PREVENTION AND PROTECTION: Fire Triangle, Fire Development and its severity, Effect of Enclosures, early detection of Fire, Classification of fire and Fire Extinguishers. Electrical Safety.	**5 Hrs**
UNIT – IV (Blended Learning)	
HEALTH CONSIDERATIONS AT WORK PLACE: Types of diseases and their spread, Health Emergency. Personal Protective Equipment (PPE) – types and advantages, effects of exposure and treatment for engineering industries, municipal solid waste. Environment management plans (EMP) for safety and sustainability.	**5 Hrs**
UNIT - V	
OCCUPATIONAL HEALTH AND SAFETY CONSIDERATIONS: Handling of chemicals and safety measures in water and wastewater treatment plants and labs, Construction material manufacturing industries like cement plants, RMC Plants, precast plants and construction sites. Policies, roles and responsibilities of workers, supervisors and managers.	**5 Hrs**

Course Outcomes: The students will be able to	
1	Acquire knowledge on OSHA policies, Laws and regulations.
2	Identify hazards in the workplace that pose a danger or threat to the safety or health, or that of others.
3	Control unsafe or unhealthy hazards and propose methods to eliminate the hazards.
4	Discuss the role of health and safety in the workplace and effects of industries on environment.
5	Identify workplace hazards, safety considerations and roles and responsibilities of workers, supervisors and managers.

Question paper pattern:
• Each unit has two full questions with internal choice. • Each full question will have a maximum of two sub question. • Each full question will be for 10 Marks. • Students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	S Sharma, Vineet Kumar, "Safety, Occupational Health and Environmental Management in Construction". Khanna Publisher, 2013.
2	R K Jain, Sunil S Rao, "Industrial Safety, Health and Environment Management Systems". Createspace Independent Publishing Flat form, 2000.
3	Charles D Reese, "Occupational Safety and Health Fundamental principles and Philosophies", Tailor and Francis Ltd, 2017.
4	Sudhakar Paul T Rani, "Occupational Safety and Health", Createspace Independent Publishing Platform, 2018.
5	Akhil Kumar Das, "Principles of Fire Safety Engineering-Understanding Fire and Fire Protection-", PHI Learning Pvt. Ltd, 2019.
6	Lakhwinder Pal Singh, "Work study and Ergonomics", Cambridge University Press, 2018.
7	Industrial safety Sectional Committee CHD8, IS-14489:2018; Occupational Health and Safety Audit- Code' of Practice (First Revision) Bureau of Indian Standards.

Reference Books:	
1	Mishra R K, "Safety Management", AITBS Publisher.
2	Rana S P, Goswami P K, and Indu Rathee, "Handbook of Occupational Safety and Industrial Psychology". S. Chand and Company Ltd, 2014.
3	Narayanaraju G (Secretary to GOI), "The Occupational Safety, Health and Working Conditions Code, 2020", NO. 37 OF 2020, Govt. of India, Ministry of Law and Justice.
4	Goetsch D. L., "Occupational Safety and Health for Technologists, Engineers and Managers", Prentice Hall Publishers, 2010.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2					✓							
CO3					✓							
CO4							✓					
CO5									✓			✓

2019 Syllabus

Dr. Ambedkar Institute of technology, Bengaluru-56

Department of Computer Science & Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. Siddaraju

Department of Computer Science & Engineering

Professor & Head
Department of Computer Science & Engineerin
Dr. Ambedkar Institute of Technology
Bangalore-560 056.

	Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY *** **Department of Computer Science & Engineering**

Scheme for the Batch 2018 (175 CREDITS)

Semester	Credits
1^{st}	20
2^{nd}	20
3^{rd}	24
4^{th}	24
5^{th}	25
6^{th}	24
7^{th}	23
8^{th}	15
Total	**175**

Dr.Ambedkar Institute of Technology, Bengaluru-56

Scheme of Teaching and Examination from the Academic Year 2018 – 19

Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

I SEMESTER B.E (CHEMISTRY GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week: Theory Lecture	Tutorial	Dra Practi	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
						L	T	P					
1	BC	18MA11	Calculus and Linear Algebra	Mathematics	Science	3	2	--	3	50	50	100	4
2	BC	18CH12	Engineering Chemistry	Chemistry	Science	3	2	--	3	50	50	100	4
3	ES	18CS13	Programming for Problem Solving	Computer Science and Engineering	Computer Science and Engineering	2	2	--	3	50	50	100	3
4	ES	18EC14	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	2	--	3	50	50	100	3
5	ES	18ME15	Elements of Mechanical Engineering	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	2		3	50	50	100	3
6	BC	18CHL16	Engineering Chemistry Laboratory	Chemistry	Science	--	--	2	3	50	50	100	1
7	ES	18CSL17	Computer Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	3	50	50	100	1
8	HS	18HS11/ 18HS12	English/ Kannada	Humanities	Humanities	1	--	2	2	50	50	100	1
					TOTAL	**13**	**10**	**6**	**23**	**350**	**350**	**700**	**20**

First year scheme

Dr.Ambedkar Institute of Technology, Bengaluru-56														
Scheme of Teaching and Examination from the Academic Year 2018 – 19														
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)														
II SEMESTER B.E (PHYSICS GROUP)														
Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination					Credits
						Theory L	Tutorial T	Practical P	Duration	CIE Marks	SEE Marks	Total Marks		
1	BC	18MA21	Advanced Calculus and Numerical Methods	Mathematics	Science	3	2	--	3	50	50	100		4
2	BC	18PH22	Engineering Physics	Physics	Science	3	2	--	3	50	50	100		4
3	ES	18EE23	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	2	--	3	50	50	100		3
4	ES	18CV24	Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	2	--	3	50	50	100		3
5	ES	18MEL25	Engineering Graphics and Design	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	--	2	3	50	50	100		3
6	BC	18PHL26	Engineering Physics Laboratory	Physics	Science	--	--	2	3	50	50	100		1
7	ES	18EEL27	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--		2	3	50	50	100		1
8	HS	18HS21/ 18HS22	English/ Kannada	Humanities	Humanities	1		2	2	50	50	100		1
					TOTAL	13	8	8	23	400	400	800		20

Note: BS: Science Course, ES: Engineering Science, Hu: Humanity and Social Science.

Definition of Credit:	1 hour Lecture (L) per week per semester = 1 Credit
	2 hour Tutorial (T) per week per semester =1 Credit
	2 hour Practical/Laboratory/Drawing (P) per week per semester=1 Credit.

Second year scheme

III SEMESTER												
Sl. No	Course and Course Code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BC	18MA31	Discrete Mathematical Structures	Mathematics	2	2	--	04	50	50	100	3
2	PC	18CS31	Digital Logic and Computer Design	CSE	4	0	--	04	50	50	100	4
3	PC	18CS32	Data Structures and Algorithms	CSE	4	0	--	04	50	50	100	4
4	PC	18CS33	Operating System	CSE	3	0	--	03	50	50	100	3
5	PC	18CS34	Python Programming	CSE	3	0	--	03	50	50	100	3
6	PC	18CS35	Web Technology	CSE	3	0	--	03	50	50	100	3
7	PC	18CSL36	Data Structures and Algorithms Laboratory	CSE	--	--	2	02	50	50	100	1
8	PC	18CSL37	Digital Logic and Computer Design Laboratory	CSE	--	---	2	03	50	50	100	1
9		18CSL39	Python Programming Laboratory	CSE	--	---	2	02	50	50	100	1
10	HS	18HS31/32	Constitution of India Professional Ethics and Human Rights/ / Env. Studies	Hu/Civ	1	--	--	02	50	50	100	1
11	MC	18HS33	Soft skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**24**	**02**	**06**	**33**	**450**	**450**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
11	MC	18MAD31	Advance Mathematics - I	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, MC: Mandatory Course.
18CSL38: Student must complete a certification under anyone online course as specified in the scheme

Second year scheme

IV SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BC	18MA41	Probability Statistics & Queuing Theory	Mathematics	2	2	--	04	50	50	100	3
2	PC	18CS41	Algorithms Design Techniques	CSE	3	0	--	03	50	50	100	3
3	PC	18CS42	OOP Principles and Practices using C++	CSE	3	0	--	03	50	50	100	3
4	PC	18CS43	Microcontroller and Embedded System	CSE	4	0	--	04	50	50	100	4
5	PC	18CS44	Theoretical Foundation of Computer Science	CSE	4	0	--	04	50	50	100	4
6	PC	18CS45	Computer Organisation and Architecture	CSE	3	0	--	03	50	50	100	3
7	PC	18CSL46	Microcontroller and Embedded System Laboratory	CSE	--	--	2	03	50	50	100	1
8	PC	18CSL47	Object Oriented Programming Laboratory	CSE	--	---	2	03	50	50	100	1
9	PC	18CSL48	Algorithm Design Techniques Laboratory	CSE	--	---	2	03	50	50	100	1
10	HS	18HS41/42	Constitution of India Professional Ethics and Human Rights/ Env. Studies	Hum/Civ	1	--	--	02	50	50	100	1
11	MC	18HS43	Employability skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**24**	**02**	**06**	**35**	**450**	**450**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
	MC	18MAD41	Advance Mathematics - II	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, NCMC: Non-Credit Mandatory Course.
ENV: Environmental Studies, CIP: Constitution of India Professional Ethics and Human Rights
18CSL48: Student must complete a certification under anyone online course as specified in the scheme

Third year scheme

V SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	HS	18HS51/52	M&E / IPR (title as per BOS decision)	Hu	2	2	--	03	50	50	100	3
2	PC	18CS51	Software Engineering	CSE	3	-	--	03	50	50	100	3
3	PC	18CS52	Core Java	CSE	4	-	--	04	50	50	100	4
4	PC	18CS53	Database Management System	CSE	3	--	--	03	50	50	100	3
5	PC	18CS54	Computer Networks & Internet Protocols	CSE	4	--	--	04	50	50	100	4
6	PE	18CS55X	Elective -1 (PENDING)	CSE	3	--	--	03	50	50	100	3
7	OE	18XXE01	Open Elective -A	CSE	3	--	--	03	50	50	100	3
8	PC	18CSL56	Database Application Laboratory	CSE	--	--	2	02	50	50	100	1
9	PC	18CSL57	Network Programming lab using java & NS	CSE	--	--	2	02	50	50	100	1
				TOTAL	22	2	4	27	450	450	900	25

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

Electives

Course code	Professional Electives -2
18CS551	Web Technologies
18CS552	Advanced Algorithms
18CS553	Artificial Intelligence
18CS554	TCS-Elective

Open Elective -A

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
OOPS with C++	18CSE011	3
Python programming	18CS E012	3
Unix Shell Programming	18CS E013	3

Open Elective -A

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.

Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

Third year scheme

VI SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week: Theory **Lecture** (L)	Tutorial (T)	Practical/ Drawing (P)	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	HS	18HS61/62	M&E/IPR	Hu	3	2	--	03	50	50	100	3
2	PC	18CS61	Internet of Things	CSE	4	--	--	04	50	50	100	4
3	PC	18CS62	Machine Learning	CSE	4	--	--	04	50	50	100	4
	PC	18CS63	Unix Programming	CSE	3	--	--	03	50	50	100	3
4	PE	18CS64X	Professional Elective -2	CSE	3	--	--	03	50	50	100	3
5	OE	**18XXE02**	**Open Elective -B**	CSE	3	--	--	03	50	50	100	3
6	PC	18CSL65	Internet of Things Lab	CSE	--	--	2	02	50	50	100	1
7	PC	18CSL66	Machine Learning Lab	CSE	--	--	2	02	50	50	100	1
8	MP	18CSP67	Mini-project	CSE				03	50	50	100	2
9	INT	18CSI68	Industry Internship	(To be carried out during the intervening vacations of VI and VII semesters)				--	--	--	--	--
				TOTAL	**20**	**2**	**4**	**24**	**400**	**400**	**800**	**24**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

Electives

Course code	Professional Electives -2
18CS641	Distributed Operating System
18CS642	Digital Image Processing
18CS643	Compiler Design
18CS644	Principles of Economics

Open Elective -B

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
Wireless Sensor Networks	18CSE021	3
Storage Area Network	18CS E022	3
Adhoc Wireless Networks	18CS E023	3

Open Elective -B

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.

Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

Fourth year scheme

VII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week: Theory Lecture	Tutorial	Practical/ Drawing	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
					L	T	P					
1	MC	18HS71/72	CMEP / OSHA	IM/CV	2	--	--	03	50	50	100	2
2	PC	18CS71	Android Programming	CSE	3	--	--	03	50	50	100	3
3	PC	18CS72	Cloud Computing	CSE	4	--	--	04	50	50	100	4
4	PC	18CS73	Introduction to Big Data Analytics	CSE	3	--	--	03	50	50	100	3
5	PE	18XX74X	Professional Elective -3	CSE	3	--	--	03	50	50	100	3
6	PE	18XX75X	Professional Elective -4	CSE	3	--	--	03	50	50	100	3
7	OE	18XXE03	Open Elective - C	CSE	3	--	--	03	50	50	100	3
8	PC	18CSL77	Android Programming Laboratory	CSE	--	--	2	02	50	50	100	1
9	PC	18CSL78	Cloud Computing Laboratory	CSE			2	02	50	50	100	1
10	Project	18CSP79	Project Work Phase - 1	CSE	--	--	-	-	-	-	-	-
11	INT	18CSI80	Internship	(If not completed after VI semester examinations, it has to be carried out during the intervening vacations of VII and VIII semesters)				--	--	--	--	--
				TOTAL	**21**	--	**4**	**26**	**350**	**350**	**900**	**23**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Internship: All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters. A SEE examination will be conducted during VIII semester and prescribed credits shall be added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent SEE examination after satisfy the internship requirements.

Electives

Course code	Professional Electives - 3	Course code	Professional Electives - 4
18CS741	Block Chain Technologies	18CS751	Computer Vision
18CS742	Cyber Forensics	18CS752	Introduction to Robotics
18CS743	Software Project Management	18CS753	Soft Computing

Open Elective -C
INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
Artificial Intelligence with Prolog programming	18CSE031	3
Machine Learning	18CS E032	3
Internet of Things	18CS E033	3

CMEP: Cost Management of Engg Projects, OSHA: Occupational Safety and Health Administration

VIII SEMESTER												
Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	MC	18XX81	CMEP / OSHA	IM /CV	4	--	--	04	50	50	100	2
2	Project	18CSP84	Project Work Phase - 2	CSE	--	--	3	03	50	50	100	10
3	Seminar	18CSS85	Technical Seminar	CSE	--	--	3	03	50	50	100	1
4	INT	18CSI86	Internship	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semesters.)				03	50	50	100	2
				TOTAL	**4**	**--**	**6**	**13**	**200**	**200**	**400**	**15**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Internship: Those, who have not pursued /completed the internship will be declared as failed and have to complete during subsequent SEE examination after they satisfy the internship requirements.

CMEP: Cost Management of Engg. Projects, OSHA: Occupational Safety and Health Administration

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

DR. AMBEDKAR INSTITUTE OF TECHNOLOGY

SCHEME AND SYLLABUS

Outcome Based Education (CBCS)

(As per NEP 2020)

Scheme of Teaching and Examinations
(Common to all B.E. Programmes)
For I Year B.E. (I & II Semester)

Academic Year 2021-2022

Dr. Ambedkar Institute of Technology

Approved by AICTE, New Delhi, Aided by Government of Karnataka,
Accreditated by NAAC, Accreditated by NBA, New Delhi

(An Autonomous Institution, Affiliated to VTU, Belagavi)

Outer Ring Road, Near Jnanabharathi Campus

Mallathahalli, Bengaluru - 560 056

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)
Scheme of Teaching and Examination for I Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Physics Cycle : I Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101	Calculus and Differential Equations	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21PHT102	Engineering Physics	Physics	3	0	0	0	3	3	50	50	100	3
3	ES	21EET103	Basic Electrical Engineering	Electrical	2	2	0	0	4	3	50	50	100	3
4	ES	21CVT104	Civil Engineering & Mechanics	Civil	3	0	0	0	3	3	50	50	100	3
5	ES	21MEL105	Engineering Graphics	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21PHL106	Engineering Physics Lab	Physics	0	0	2	0	2	3	50	50	100	1
7	ES	21EEL107	Basic Electrical Engineering Laboratory	Electrical	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108	Communicative English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21HST109	Health and Wellness	Humanities	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN110	Career Development skill-I	Humanities	1	0	1*	0	2	--	50	-	PP/NP	0
								Total	29		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)
Scheme of Teaching and Examination for I Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Chemistry Cycle: I Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101	Calculus and Differential Equations	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21CHT102	Engineering Chemistry	Chemistry	3	0	0	0	3	3	50	50	100	3
3	ES	21CST103	Problem solving through Programming	Computer Science	2	2	0	0	4	3	50	50	100	3
4	ES	21ECT104	Basic Electronics and Communication Engineering	Electronics	2	2	0	0	4	3	50	50	100	3
5	ES	21MET105	Elements of Mechanical Engineering	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21CHL106	Engineering Chemistry Laboratory	Chemistry	0	0	2	0	2	3	50	50	100	1
7	ES	21CSL107	Computer Programming Laboratory	Computer Science	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108	Communicative English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21CVT109	Rural Development Engineering	Civil	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN110	Career Development skill-I	Humanities	1	0	1*	0	2	----	50	--	PP/NP	0
								Total	30		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)

Scheme of Teaching and Examination for II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Physics Cycle: II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT201	Advanced Calculus and Numerical Methods	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21CHT202	Engineering Chemistry	Chemistry	3	0	0	0	3	3	50	50	100	3
3	ES	21CST203	Problem solving through Programming	Computer Science	2	2	0	0	4	3	50	50	100	3
4	ES	21ECT204	Basic Electronics and Communication Engineering	Electronics	2	2	0	0	4	3	50	50	100	3
5	ES	21MET205	Elements of Mechanical Engineering	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21CHL206	Engineering Chemistry Laboratory	Chemistry	0	0	2	0	2	3	50	50	100	1
7	ES	21CSL207	Computer Programming Laboratory	Computer Science	0	0	2	0	2	3	50	50	100	1
8	HS	21HST208	Professional writing skills in English		1	0	1*	0	2	2	50	50	100	1
9	AE	21CVT209	Rural Development Engineering	Civil	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN210	Career Development skill-II	Humanities	1	0	1*	0	2	----	50	--	PP/NP	0
								Total	30		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,

AE: Ability Enhancement Course, MC: Mandatory Course,   * No practical evaluation,

L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056

Outcome Based Education(OBE) and Choice Based Credit System (CBCS) (As per NEP2020)

Scheme of Teaching and Examination for II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Chemistry Cycle : II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT201	Advanced Calculus and Numerical Methods	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21PHT202	Engineering Physics	Physics	3	0	0	0	3	3	50	50	100	3
3	ES	21EET203	Basic Electrical Engineering	Electrical	2	2	0	0	4	3	50	50	100	3
4	ES	21CVT204	Civil Engineering & Mechanics	Civil	3	0	0	0	3	3	50	50	100	3
5	ES	21MEL205	Engineering Graphics	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21PHL206	Engineering Physics Laboratory	Physics	0	0	2	0	2	3	50	50	100	1
7	ES	21EEL207	Basic Electrical Laboratory	Electrical	0	0	2	0	2	3	50	50	100	1
8	HS	21HST208	Professional writing skills in English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21HST209	Health and Wellness	Humanities	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN210	Career Development skill-II	Humanities	1	0	1*	0	2	--	50	-	PP/NP	0
								Total	29		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**CALCULUS & DIFFERENTIAL EQUATIONS**						
Course Code	**21MAT101**						
Category	Basic Science Course (BS)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	02	00	00	05	65	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE: This course is intended to impart to the students the skills of employing the basic tools of differential and for solving basic and difficult engineering problems.

UNIT I **8+5 hours**

Differential Calculus-1: Recapitulation of differentiation, Taylor's and Maclaurin's series for single variable (no proof). Introduction to polar curves, expression for angle between radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature-Cartesian, parametric, polar and pedal forms.

Self-study: Indeterminate forms, center and circle of curvature.

UNIT II **8+5 hours**

Differential Calculus-2: Partial derivative of first and second order, total derivative, derivative of composite function. Euler's theorem for function of two variables. Jacobians and property $JJ' = 1$.Taylor's series for functions of two variables (no proof). Maxima and minima for function of two variables.

Self-Study: Errors and approximations, Extended Euler's theorem, Lagrange's undetermined multiplier method.

UNIT III **8+5 hours**

Ordinary differential equations (ODE's) of first order: Linear differential equations. Reducible to linear differential equation, Bernoulli's equations. Exact and reducible to exact differential equations. Orthogonal trajectories in Cartesian and polar form. Introduction to general and singular solutions; solvable for *p* only and Clairaut's equations.

Self-study: Reducible to Clairaut's equations. Application to Newton's law of cooling.

UNIT IV	**8+5 hours**
Ordinary differential equations (ODE's) of higher order: Higher order linear ODE's with constant coefficients, Inverse differential operator method (no product of functions). Method of variation of parameter. Cauchy's and Legendre's homogenous linear differential equations. Applications: L-C-R circuits. ***Self-study: Method of Undetermined co-efficients.***	
UNIT V	**8+5 hours**
Linear Algebra: Elementary row and column operations of a matrix**,** echelon form, Rank of matrix. Consistency of homogeneous and non-homogeneous equations. Gauss elimination, Gauss Jordan and Gauss-Seidel methods. ***Self-study: Solution of system of linear equations by Jacobi method, eigenvalues and eigenvectors.***	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Determine the rate of changes, extreme values, Taylor's series for the function of two variables and rank of a matrix.

CO2: Solve ordinary differential equations and system of linear equations.

CO3: Test for angle of polar curves, consistency of linear equations, the independency of two functions of two identical independent variables and orthogonally of two polar curves.

CO4: Describe Mathematical procedures to find integrating factors, orthogonal trajectories, complementary functions, particular integrals and consistency of system of equations.

CO5: Apply the terminologies of calculus and linear algebra for approximations.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint)2016.

REFERENCE BOOKS

1. V. Ramana : Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I& II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/ Cole, 2005.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3										
CO3	3	3										
CO4	3	3										
CO5	3	3	3									
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING PHYSICS</td></tr>
<tr><td>Course Code</td><td colspan="7">21PHT102/202</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>03</td><td>00</td><td>00</td><td>00</td><td>03</td><td>40</td><td>03</td></tr>
<tr><td>CIE
Marks: 50</td><td colspan="2">SEE
Marks: 50</td><td colspan="2">Total Max.
Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: To introduce the Engineering students to the basics of elasticity, vibrations, quantum mechanics, electrical and dielectric properties of materials,laser and fiber optics, crystal structure and nanomaterials with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I **8 hours**

Elasticity: Torsion: Expression for couple per unit twist of a solid cylinder (derivation). Torsional Pendulum: Expression for period of oscillation and Rigidity modulus (derivation). Bending of Beams: Definition of beam, neutral surface and neutral axis. Expression for bending moment of a beam (derivation). Expression for Young's modulus of the material of a single cantilever (derivation). Numerical problems.

Vibrations: Theory of free vibrations, theory of damped vibrations and discussion of three cases of damping. Theory of Forced vibrations. Resonance: Condition for resonance, sharpness of resonance. Numerical problems.

Self-study component: Types of beams and its engineering applications, application of damping in automobiles, LCR resonance.

UNIT II **8 hours** **Modern Physics:** de- Broglie hypothesis: de Broglie wavelength for free and accelerated electron. Concept of wave packet. Phase velocity, group velocity (no derivation), relation between phase velocity and group velocity, relation between group velocity and particle velocity, relation between phase velocity, group velocity and velocity of light. Numerical problems. **Quantum Mechanics:** Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle: Non-confinement of electron in the nucleus. Wave function. Properties and Physical significance of a wave function. Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrödinger's wave equation. Eigen values and Eigen functions. Application of Schrödinger wave equation to a particle in a box: Expression for energy Eigen values and Eigen functions for a particle in one-dimensional potential well of infinite height and finite width, discussion of wave functions and probability density for a particle in a box for ground and first excited state. Numerical problems. ***Self-study component: Davisson and Germer experiment, Matter waves and their properties. Discussion of wave functions and probability density for a particle in a box for n=3, Quantum tunneling.***	
UNITIII **8 hours** **Electrical properties:** Assumptions of quantum free electron theory, Fermi level, Fermi energy, Fermi velocity and Fermi temperature. Fermi factor f(E) and its dependence on temperature. Expression for density of states (qualitative), expression for Fermi energy at absolute temperature (derivation). Electrical conductivity using effective mass and Fermi velocity (derivation). Merits of quantum free electron theory. Numerical problems. **Dielectric properties:** Introduction to dielectrics: types of dielectrics, polarization, polarizability, dielectric constant, relation between dielectric constant and polarizability. Polarization mechanism and types of polarization. Derivation of equation for internal field in liquids and solids (1-Dimensional). Expression for Classius-Mossotti equation (Derivation). Numerical problems. ***Self-study component:Distinguish between CFET and QFET, applications of dielectric materials in engineering (Mica, glass, rubber, and porcelain), Piezo-electricity.***	

UNIT IV	8 hours
Lasers: Interaction of radiation with matter: Induced absorption, spontaneous emission and stimulated emission of radiation. Expression for energy density in terms of Einstein's coefficients (derivation). Requisites of a laser system. Condition for laser action. Principle, construction and working of He-Ne laser. Application of laser: Holography, principle, recording (wave front division technique) and reconstruction of 3-D images. Mention of applications of holography. Numerical problems. **Optical fibers:** Propagation mechanism in optical fibers. Expression for angle of acceptance and numerical aperture (derivation). Fractional index change, V- number and modes of propagation (N). Types of optical fibers. Attenuation: expression for attenuation coefficient (derivation). Application of optical fibers: Point to point communication with block diagram. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems. ***Self-study component: Applications of laser in medical and industry. Discuss the causes for attenuation in optical fibers.***	
UNIT V	**8 hours**
Crystal Structure: Seven crystal systems, Miller indices, Interplanar spacing in terms of miller indices. X-ray diffraction, Bragg's law (derivation), Bragg's X-ray spectrometer (construction and working) and determination of crystal structure by Bragg's X-ray spectrometer, Numerical Problems. **Nanomaterials:** Nano Scale, Surface to Volume Ratio, Quantum Confinement, types of nanomaterials, Synthesis of nanomaterials: Top-down approach: High energy Ball-milling method and Bottom-Up approach: Sol-Gel method. Characterization Technique: Scanning Electron Microscope (SEM), Properties of nanomaterials: Mechanical, electrical, magnetic and optical. ***Self-study component: Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.***	

TEACHING and LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:Apply the knowledge of elasticity and vibrations to engineering.

CO2:Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system.

CO3:Summarize the importance of free electrons in determining the properties of metals; understand the concept of Fermi energy. Gain the knowledge of the electrical and dielectric properties of a materials.

CO4:Describe the basics of laser Physics, working of lasers, holography and principle of propagation of light in optical fibers.

CO5:Recognize various planes in a crystal and describe the structure determination using X-rays.

TEXT BOOKS

1. P. S. Aithal, H. J. Ravindra, Textbook of Engineering Physics, Acme Learning Pvt. Limited, New Delhi, 1^{st} edition, (2017).
2. Dr. Amit Sarin, Anil Rewal, Engineering Physics Books, Wiley India Private Ltd., New Delhi 9^{th} Edition (2014).
3. Avadhanulu M. N. and P.G. Kshirsagar, A text Book of Engineering Physics, 10th Edition (2014).
4. Engineering Physics by Gaur and Gupta, DhanpatRai Publications (P) Ltd.
5. Dr. K. Vijayakumar, Dr. S. Chandralingum, Modern Engineering Physics, S. Chand and Company Limited, 1^{st} edition 2010
6. K. K. Chattopadhyay, Introduction to Nanoscience and Nanotechnology, PHI India, (2009).
7. Sulabha Kulkarni, Introduction to Nanoscience and Nanotechnology 2nd Edition (2012)

REFERENCE BOOKS

1. S. O. Pillai, Solid State Physics, New Age International. Sixth Edition.
2. A Marikani, Engineering Physics, PHI Learning Private Limited, Delhi - 2013
3. Prof. S. P. Basavaraju, Engineering Physics, Subhas Stores, Bangalore.
4. V. Rajendran , Engineering Physics, Tata McGraw Hill Company Ltd., New Delhi -2012
5. S. Mani Naidu, Engineering Physics, Pearson India Limited – 2014
6. AjoyGhatak, Optics, Tata McGraw Hill, 2005.
7. Arthur Beiser, Concepts of Modern Physics, McGraw Hill,7^{th} edition 2017.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://physicsworld.com/

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
CO5	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Chemistry

Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**ENGINEERING CHEMISTRY**						
Course Code	**21CHT102/202**						
Category	Basic Science Course (BS)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE: To expose first year engineering students to various physicochemical aspects of engineering materials such as metals, alloys, plastics, conducting polymers etc. with a view to highlight their significance and importance in application oriented systems.

UNIT I **8 hours**

Electrochemical energy sources:

Electrochemical cells

Introduction to electro chemical cells, origin of single electrode potential, sign convention and cell notation, standard electrode potential, derivation of Nernst equation for single electrode potential, numerical problems.

Types of electrodes- Classification of reference electrodes, calomel electrode – construction, working and applications, Measurement of single electrode potential using calomel electrode, Electrochemical series,Concentration cells-Derivation of Emf of a concentration cell - numerical Problems. Ion selective electrodes – Glass electrode – construction and working, Determination of pH of a solution using glass electrode.

Batteries and fuel cells

Basic concepts – principal components of a battery, operation of a battery during charging and discharging, Battery characteristics – voltage, capacity, energy efficiency, cycle life and shelf life. Classifications of batteries, Construction, working and applications of Lead acid, Ni-metal hydride and Li-ion battery, significance of Lithium.

Fuel cells – Construction, working and applications of CH3OH-O_2 fuel cell using H2SO4 electrolyte.

Self-study : Introduction to Refrence electrode, Ag-AgCl electrode, Introduction to fuel cells & battery, H2-O2 Fuel cell.

UNIT II **8 hours**

Corrosion and Metal finishing

Corrosion science

Corrosion – Introduction, electrochemical theory of corrosion, galvanic series: Types of corrosion – Differential metal corrosion –Differential aeration corrosion, Stress corrosion. Factors– Related to nature of metal: electrode potential, relative sizes of anode and cathode, nature of the corrosion product. Related to environment: pH of the medium, temperature, humidity and presence of impurities in the atmosphere.

Corrosion control: Inorganic coatings; Anodizing – anodized coating of aluminium. Phosphating. Metallic coatings – Anodic metallic coating ex : Galvanizing, Cathodic metallic coating ex : Tinning .Organic coatings – examples, Corrosion inhibitors – definition, anodic and cathodic inhibitors, Cathodic protection – definition, sacrificialanode method.

Metal finishing

Technological importance, Electroplating – pre-treatment, process.

Significance of Polarization, Decomposition potential and Overvoltage in electroplating and their applications. Effect of plating variables on the nature of electrodeposit – metal ion concentration, organic additives (Complexing agents, brighteners, levelers, structure modifiers and wetting agents), current density, pH, temperature and throwing power of the plating bath, Electroplating of chromium.

Electroless plating: difference between electroplating and electroless plating. Pre-treatment and activation of the surface, electroless plating of copper in the manufacture of PCBs.

Self-study : Metallic coating : Anodic metallic coating- Galvanization, Cathodic metallic coating- Tinning, Organic coating

UNIT III **8 hours**

Energy: Sources & Conversion

Chemical fuels: Hydrocarbon fuels, classification. Calorific value –GCV and NCV. Bomb calorimeter, numerical problems.

Petroleum cracking – Fluidized catalytic cracking process, Knocking – mechanism and harmful effects, Octane and Cetane numbers, Reforming of petrol. Unleaded petrol, power alcohol, Biodiesel, Catalytic converters – construction and working.

Solar energy: Photovoltaic cells – Introduction, definition, production of solar grade silicon, purification of silicon by zone refining process,construction and working of silicon-photovoltaic cell, advantages and disadvantages.

Self-study :Determination of GCV & NCV of gaseous fuel by Buoys calorimeter and numerical problems.

UNIT IV	8 hours
Polymer science and Environmental Pollution **Polymer science** Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of epoxy resins. Conducting polymers: mechanism of conduction in polyacetylene and its applications. **Environmental Pollution:** Introduction, Air pollutants: Sources and effects of primary& Secondary air Pollutants, Ozone depletion, greenhouse effect - global warming. Sources of water pollution, Determination of BOD and COD **Self-study :Characterization of nanomaterials- FT-IR, XRD, SEM, TGA, BET-surface area analysis.**	
UNIT V	**8 hours**
Instrumental methods of chemical analysis: theory, instrumentation and applications- Colorimetric estimation of Cu, Potentiometric estimation of FAS, Conductometric estimation of acid mixture. **Water technology** Impurities in water –water analysis: Hardness – types, determination by EDTA method, dissolved oxygen by Winkler's method. Potable water- desalination of water by electrodialysis method. **Green chemistry:** Introduction, Principles, green synthesis – Aspirin and ibuprofen Green catalyst – Zeolite and Silica. Microwave assisted reaction in water – Methyl benzoate to Benzoic acid, oxidation of toluene, Ultrasound assisted reaction – Sonochemicalsimmons-smith reaction **Self –study: Importance of green chemistry in industry, environment related issues.**	

TEACHING AND LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

Course Outcomes:

1. CO1: At the end of the first unit the student will be able to understand the basic concepts electrochemistry and its applications, in the construction of electrochemical energy sources.
2. CO2: At the end of the second unit the student will be able to understand concepts of corrosion and its control in the fabrication and design of structural materials and importance of metal finishing in

enhancing physicochemical properties.

3. CO3: At the end of the third unit the student will be able to understand concepts of renewable and non-renewable energy sources.
4. CO4: At the end of the fourth unit the student will be able to understand the application of polymeric materials for different applications.
5. CO5: At the end of the fifth unit the student will be able to understand the instrumental techniques and water quality parameters.

REFERENCE:

1. Principles of Physical Chemistry B.R.Puri, L.R.Sharma&M.S.Pathania, S.Nagin Chand &Co.
2. Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
3. Corrosion Engineering – by M.G.Fontana, Mc Graw Hill Publications.
4. Environmental Chemistry by Stanley E. Manahan, 7th Edition, lewis Publishers, 2000
5. Engineering Chemistry by DrRenubapna, Macmilan publisher India limited
6. Engineering Chemistry by Jayaprakash and VenugopalSubhash Publications.
7. Nano Metal Oxides For Environmental Remediation. United Publications Dr. Jahagirdar A.A and Dr. Nagaswarupa H P

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
CO5	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Scheme and Syllabus - CBCS –2021 -2022

Course Title	**BASIC ELECTRICAL ENGINEERING**						
Course Code	**21EET103/21EET203**						
Category	Engineering Science (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	02	00	00	04	52	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. Understand the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Analyze the series and parallel electrical circuits for voltage, current, power, and energy.
4. Describe the construction and working principles of electrical machines.
5. Explain electric power generation, transmission and distribution, wiring schemes and equipment and personal safety measures.

UNIT I **6+6 hours**

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel, and series-parallel circuitsexcited by independent voltage sources. Power and energy, maximum power transfer theorem appliedto the series circuit and its applications.

Electromagnetism and AC Fundamentals: Faraday's laws, Lenz's law. Fleming's rules & dynamically induced e.m.f. Statically induced e.m.f.s., the concept of self and mutual inductance & coefficient of coupling, force on the current-carrying conductor. Generation of sinusoidal voltage, average and RMS value, form factor, and peak factor.

Self-Study: Basics of lead acid batteries, nickel - iron batteries, lithium – ion batteries, advantages and disadvantages of batteries, rating of batteries in ampere - hour.

UNIT II	**5+5 hours**
Single-phase circuits: Voltage, current, and power waveforms with phasor diagram, in R, L, and C circuits. Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real, reactive and apparent powers, power triangle, and Power factor. **Three-phase circuits:** advantages of three-phase systems, generation of three-phase power, representation of the balanced star (3 wire and 4 wire system) and delta connected loads, phase and line relations of voltages and currents from phasor diagrams. Measurement of three-phase power by the two-wattmeter method. **Self-Study:** Electric Wiring : Casing and cap wiring, Open conduit and closed conduit systems. Advantages and disadvantages. Types of wires used for lighting and heating (power) circuits.	
UNIT III	**5+5 hours**
DC Machines: (**a)** Principle of operation, constructional details, induced emf equation, types of generators, and the relation between induced emf and terminal voltage. (**b**) Principle of operation, back emf and torque equations, types of motors, characteristics (shunt and series only), and applications. **Transformers**: Necessity of transformer, the principle of operation, Types, and construction of single-phase transformers, emf equation, losses, efficiency, and condition for maximum efficiency. **Self-Study:** DC compound generators, compound motors, three phase transformers **–** types and constructions.	
UNIT IV	**5+5 hours**
Three-phase induction Motors: Concept of rotating magnetic field, the principle of operation, constructional features of motor, types – squirrel cage and wound rotor and their applications., slip, the significance of slip, and problems on slip calculations. **Three-phase synchronous generators:** Principle of operation, constructional features of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation, with the concept of winding factor (excluding the derivation and calculation of winding factors) **Self-Study:** Single phase induction motors: Double field revolving theory. Types, Working principle and constructions.	

UNIT V **5+5 hours**

Power transmission and distribution- Concept of electric power transmission and distribution. Low voltage distribution system (400 V and 230 V) for domestic, commercial, and small scale industry through block diagram/single line diagrams only

Electricity bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two- part electricity tariff, calculation of electricity bill.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB)merits and demerits.

Personal safety measures: Electric Shock, Safety Precautions, Earthing, and its types.

Self-Study: Electrical Power Generation: Sources of energy – renewable and non-renewable, working principle of hydel, thermal, nuclear, wind and solar power plants through block diagrams, environmental effects and advantages and disadvantages.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the basic concepts in electrical engineering.

CO2: Analyze-dc circuits, single-phase, and three-phase ac circuits.

CO3: Explain the construction and operation principle of electrical machines.

CO4: Solve basic problems on electrical machines.

CO5: Explain the concept of electric power transmission, distribution, electricity billing, equipment, and personal safety measures.

TEXT BOOKS

1. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw-Hill Education, Revised first edition, 2019
2. Electrical and Electronic Technology, Edward Hughes, Pearson, 12th edition, 2016
3. Lecture Notes (for module 5), Dr. AIT.

REFERENCE BOOKS

1. Basic Electrical Engineering, D.P. Kothari I.J.Nagrath, McGraw-Hill Education, 4th Edition,2019.
2. Fundamentals of Electrical Engineering and Electronics, B.L. Theraja, S Chand and Company, Reprint Edition 2013.
3. Principles Electrical Engineering and Electronics, V.K Mehata, Rohit Mehta, S Chand and Company, 2nd edition, 2015.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://www.youtube.com/watch?v=IZA_bJiGiJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1
3. https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijj2Eub-UHs_y

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO2	PSO3
CO1	3	3						1		1		1	3	1	1
CO2	3	3						1		1		1	3	1	1
CO3	3	3						1		1		1	3	1	1
CO4	3	3						1		1		1	2	1	1
CO5	3	3				3	1	1		1		1	3	1	1
Strength of correlation: Low-1, Medium- 2, High-3															

<table>
<tr><td>Course Title</td><td colspan="7">PROBLEM SOLVING THROUGH PROGRAMMING</td></tr>
<tr><td>Course Code</td><td colspan="7">21CST103/203</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course(ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>02</td><td>00</td><td>00</td><td>03</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVES:

1. Elucidate the basic architecture and functionalities of a Computer.
2. Apply programming constructs of C language to solve the real-world problems.
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures.

<table>
<tr><td>UNIT I 8+3 hours
Fundamentals of Problem Solving:
Art of programming through Algorithm and Flowchart, Designing solutions to various problems.
Overview of C: Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions
Self Study Component:Introduction to Computer: Computer generations, computer types, CPU, Primary memory, Secondary memory, input devices, output devices.</td></tr>
<tr><td>UNIT II 8+3 hours
Managing Input and output operations:Conditional Branching and Loops: Example programs, finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascal’s triangle.
Self Study Component: Hardware and Software: Computers in a network, Network hardware, Software basics, software types.</td></tr>
<tr><td>UNIT III 8+2 hours
Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching and Sorting Algorithms(Linear search, Binary search, Bubble sort and Selection sort).
Self Study Component:Programming Examples</td></tr>
</table>

UNIT IV **8+2 hours**

User Defined Functions and Recursion.

Example programs: Finding Factorial of a positive integer, GCD of two numbers and Fibonacci sequence.

Self Study Component: Storage classes: auto, extern, static, register.

UNIT V **8+2 hours**

Structures, Unions and Pointers, Programs like Addition of two complex numbers using structures, compute the sum, mean and standard deviation of all elements stored in an array of N real numbers using pointers.

Self Study Component: Case Study related to Functions and Structures :

<u>Example:</u> Implement structures to read, write and compute average marks and the students scoring above and below average marks for a class of 'N' students with the structure definition as

```
struct student
{
        char name[20];
        introllno;
        int m1, m2, m3;
        intavg;
}
```

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to: At the end of the course the student will be able to:

CO1:Elucidate the basic architecture and functionalities of a computer and also recognize the hardwareparts.

CO2:Apply programming constructs of C language to solve the real worldproblem

CO3:Explore user-defined data structures like arrays in implementing solutions to problems like searching andsorting

CO4:Explore user-defined data structures like structures, unions and pointers in implementingsolutions

CO5: Design and Develop Solutions to problems using modular programmingconstruct Using functions

TEXT BOOKS

1. E. Balaguruswamy, "Programming in ANSI C", 7th Edition, TataMcGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Prentice Hall ofIndia.

REFERENCE BOOKS

1. "Programming in C"by ReemaThereja, , Cengage publication.
2. "C- Programming Techniques" by A.M. Padma Reddy, Sri Nandi Publications

ONLINE RESOURCES

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/

MOOC courses can be adopted for more clarity in understanding the topics and varieties ofproblem solving methods.

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2		2	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-
Strength of correlation: Low-1, Medium- 2, High-3												

<table>
<tr><td>Course Title</td><td colspan="7">Civil Engineering and Mechanics</td></tr>
<tr><td>Course Code</td><td colspan="7">21CVT104 / 204</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ESC)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Teaching Hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>0</td><td>3</td><td>40</td><td>3</td></tr>
<tr><td>CIE Marks:50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course Objectives: Students will be revealed to

1. Apply the various lawsand principles of mechanics in various fields of engineering curricula and develop analytical ability and powers of reasoning.
2. Become conversant with basics of force systems to analyze various conditions developed in supports, static, relative motions and surfaces of the bodies in various planes.
3. To understand the significance of the area concentrated at one point in the planes and bodies, determine itscoordinate'sfor simple and composite sections and its higher properties like Moment of Inertia.
4. To familiarize with laws of rectilinear motion, kinematics of motion and their inter relationships.

UNIT I: **7 Hours**

Basics of Civil Engineering: Introduction to Civil engineering: Scope of different fields of civil engineering – Surveying, Building materials, Construction technology, Geotechnical engineering, Structural engineering, Hydraulics, Water resource engineering and Irrigation engineering, Transportation engineering, Environmental engineering.

Infrastructure: Types of infrastructure, role of civil engineer in the infrastructure development, Effect of the infrastructure facilities on socio-economic development of a country.

Self-study: -Roads, Bridgesand Dams; Types of roads, bridges and Dams, components and their function with simple sketches.

UNIT II:	**10 Hours**

Fundamental principles of mechanics: Introduction**,** basic principles and concepts of mechanics, Laws of mechanics, Idealization of mechanics.
Basic principles of statics: Introduction to Force and its characteristics, equivalent system of forces, principles of transmissibility of a force, systems of forces, resultant of coplanar concurrent forces, component of a force, moment of a force with respect to a point, principles of moments (Varignon's theorem), Couples, effects of a force at another point, equations of static equilibrium, free body diagram.
Co-planar forces (forces in a plane): Resultant of co-planar concurrent forces, equilibrium of co-planar concurrent forces and Numerical problems.
Co-planar non concurrent force system: Resultant of co-planar non-concurrent forces, equilibrium of coplanar non concurrent forces and Numerical problems.

UNIT III:	**8 Hours**

Support Reactions: Introduction, Beam, Classification of beams, types of loads and supports, support reactions in statically determinate beams - Numerical problems.
Friction: Introduction, laws of dry friction, limiting friction, co-efficient of friction, angle of friction, angle of repose and cone of friction. Numerical problems on Blocks (horizontal and inclined plane), Ladder friction and Wedge friction.

UNIT IV:	**8 Hours**

Centroid: Introduction, centroid and center of gravity. Derivations of simple geometrical sections – rectangle, triangle, semicircle and quarter circle. Numerical problems on composite sections.
Moment of Inertia: Introduction, Moment of Inertia of an area, Parallel axis theorem, Perpendicular axis theorem, Radius of gyration, Polar moments of inertia. Derivations of simple geometrical sections – Rectangle, Triangle, Circle, Semicircle and Quarter circle. Numerical problems on composite sections.

UNIT V:	**7 Hours**

Basic Principles of Dynamics: Introduction, kinematics and kinetics, Definitions of Displacement, Speed, Velocity and Acceleration. D'Alembert's principlewith numerical problems.Newton's Laws of motion,Concept of Rectilinear motion: withsimple-numerical problems.Differential relationship between displacement, velocity and accelerations. Principles of projectile with numerical problems.

COURSE OUTCOMES: The students will be able to

CO1: Discuss the basics of Civil Engineering, Concept of Engineering Mechanics, Forces and ForceSystems to determine the resultant

CO2: Define the effect of forces on the bodies in respect of its contact surfaces and the reactions developed in the system

CO3: Identify the geometrical properties like, centroid and Moment of Inertia of regular, composite and built-up sections.

CO4: Illustrate the concept of rectilinear motion,kinetics and kinematics of bodies with numerical approach.

TEXT BOOKS:

1. Irving H Shames, Engineering Mechanics, Prentice Hall.
2. F P Beer and E R Johnson, Vector Mechanics for Engineers, Vol-II-Dynamics, Tata McGraw Hill.
3. Engineering Mechanics by Timoshenko-Young and J V Rao, Mc Graw-Hills Book Company, New, Delhi
4. Elements of Civil Engineering (IV Edition) by S S Bhavikatti, Vikas Publishing House Pvt. Ltd. New, Delhi.
5. Elements of Civil Engineering and Engineering Mechanics, by M N Shesha Prakash and G VMogaveer, PHI Learning 2009.

1 R C Hibler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
2 Endy Ruina and Rudraprathap, Introduction to Statics and Dynamics, Oxford University Press.
3 Shanes and Rao, Engineering Mechanics, Pearson Education.
4 Bansal R J, Text Book of Engineering Mechanics, Likshmi Publications.
5 Engineering Mechanics by M V S Rao and D R Durgaiah, University Press 2005.

REFERENCE BOOKS:

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATION

QUESTION PAPER PATTERN FOR SEE										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	01		02		03		04		05	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING OF Cos WITH POs

CO & PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓										✓
CO3	✓	✓										✓
CO4	✓	✓		✓								✓

<table>
<tr><td>Course Title</td><td colspan="7">BASIC ELECTRONICS AND COMMUNICATION ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21ECT104/204</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>02</td><td>00</td><td>00</td><td>03</td><td>52</td><td>03</td></tr>
<tr><td>CIE
Marks: 50</td><td colspan="2">SEE
Marks: 50</td><td colspan="2">Total Max.
Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVES:

1. Preparation:To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. Core Competence: To equip students with a basic foundation in electronic engineering fundamentals required for comprehending the operation and application of electronic circuits, logic design, embedded systems and communication systems.
3. Professionalism & Learning Environment: To inculcate in first year engineering students an ethical and a professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context and life- long learning needed for a successful professional career.

UNITI **8+3 hours**

Electronic Circuits: Rectifiers, Reservoir and smoothing circuits, Full-wave rectifiers, Bi-phase rectifier circuits, Bridge rectifier circuits, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers, Power Supplies–Block diagram, (No Derivations, Numericals on Rectifiers included).

Amplifiers: Types of amplifiers, Class of operation, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback.

Operational amplifiers: Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits, Multi-stage amplifiers.

Oscillators: Positive feedback, Conditions for oscillation, Ladder network oscillator, Wein bridge oscillator. (No Derivations, Numericals on Op-amp included). **Text 1**

Self-study component: BJT types, comparison of BJT, FET &FinFET.

UNITII **8+3 hours**

Logic Circuits: Boolean Algebra, Logic gates, Realization of Boolean Expressions using basic gates and their truth table.

Half Adder and Full Adder, Multiplexer and decoder. Shift registers and its types – operation and truth table, Counters and asynchronous counters. Bistables, R-S Bistables, D-type Bistables, J-K Bistables. **Text 4**

Data representation, Data types, Data storage, A microcontroller system.

Sensors and Interfacing: Instrumentation and control systems, Transducers, Sensors. **Text 1**

Actuators, LED, 7-Segment LED Display, Optocoupler, Stepper Motor, Relay, Piezo Buzzer, PushButton Switch, Keyboard. **Text 2**

Self-study component: Actuator types, LCD, Touch screen displays

UNITIII **8+2 hours**

Embedded Systems: Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvardvs Von-Neumann, Big-EndianvsLittle-Endian,Memory,Program storage memory (ROM),RAM, Embedded firm ware, other system components. **Text 2**

Communication Interface: UART, Parallel Interface, USB, Bluetooth, Wi-Fi, GPRS. **Text 2**

Self-study component: Block diagrams of the architectures of RISC, CISC, Harvard and Von-Neumann.

UNITIV **8+2 hours** **Analog and Digital Communication**: Modern communication system scheme, Information source and input transducer, Transmitter, Channel – Hardware and Software, Noise, Receiver, Multiplexing, Types of communication systems. **Text 3** Types of modulation (only concepts)– AM,FM,PhaseModulation,PulseModulation,PAM,PWM,PPM,PCM. Concept of Radio wave propagation. Concepts of Sampling theorem, Nyquist rate, Digital Modulation Schemes– ASK, FSK,PSK ***Self-study component: Evolution of Wireless Network Communication Technologies (1G, 2G, 3G and4G, 5G).***	
UNITV **8+2 hours** **Data Transmission:** Asynchronous Transmission, Synchronous Communication, Data Compression, Encryption. Radio Waves, Antennas, Satellite Communication, Microwave Communication, Optical Fiber Communication (OFC): Block diagram of OFC, Advantages of OFC, Applications of OFC. **Text 4** **Cellular Wireless Networks** - Introduction, cellular telephone system, cellular concept and frequency reuse. **Text 3** ***Self-study component:*** **Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.**	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the concepts of electronic circuits encompassing power supplies, amplifiers and oscillators.

CO2: Explain the concepts of digital logic circuits, sensors, actuators and I/O subsystems.

CO3: Discuss the characteristics of embedded systems and types of communication interface.

CO4: Describe the fundamental concepts of analog communication, digital communication and radio wave propagation.

CO5: discuss the techniques of data transmission, different modes of communication, wired and wireless communication systems.

TEXT BOOKS

1. MikeTooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015. DO Ihttps://doi.org/10.4324/9781315737980. eBook ISBN9781315737980
2. KVShibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016.
3. SLKakaniand Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017. https://elib4u.ipublishcentral.com/pdfreader/communication-systems
4. DPKothari, IJNagrath, 'BasicElectronics', 2ndedition, McGraw Hill Education (India), Private Limited, 2018.

REFERENCE BOOK

1. Mitchel E. Schultz, 'Grob's Basic Electronics', 11th Edition, McGraw-Hill, 2011.

ONLINE RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ee55/preview

MODERN TOOLS:

1. PSPICE

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		1			2	1	1		3
CO2	3	2	1					2	1	1		3
CO3	3							2	1	1		3
CO4	3							2	1	1		3
CO5	3							2	1	1		3
Strength ofcorrelation: Low-1, Medium-2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ELEMENTS OF MECHANICAL ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21MET105/205</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (EC)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>00</td><td>02</td><td>00</td><td>04</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE:

1. Acquire a basic understanding role of Mechanical Engineering in the industry and society, formation of steam and its industrial application, renewable energy resources and basic concepts of Hydraulic turbines.
2. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning.
3. Acquire knowledge of various engineering materials, and metal joining techniques.
4. Acquire essential experience on basic Power transmission systems and Robotics.
5. Acquire knowledge of basic concepts on manufacturing principles and machine tools and their advancement.

UNIT 1 **8+3 hours** **Introduction to Mechanical Engineering (Overview only):** Role of Mechanical Engineering in Industries and Society **Sources of energy:** Classification, renewable and non- renewable sources of energy and comparison. **Steam:** Steam formation at a constant pressure: properties of steam, simple numerical problems to understand the use of steam tables. Applications of steam in industries. **Power generating systems:** Introduction, construction and working of: Steam turbines – Impulse and reaction turbine, Gas turbines – Open and closed cycle, Hydraulic turbines – Pelton wheel, Francis and Kaplan turbine. **Power absorbing systems:** Introduction, classification of pumps and compressors. ***<u>Self-study:</u>*** ***Harnessing of renewable energy sources: Wind energy, Solar energy, Bio-mass and their applications*** ***Boilers- Introduction, classification of boilers, difference between fire tube and water tube boilers.*** ***Laboratory Components:*** *1. Study/Visit any one Conventional or Renewable Energy Power Plant and prepare a comprehensive report.* ***2.*** *Demonstration of Components of any one Turbo-machine.* ***3.*** *Study/Visit to an Industry using steam for their process and prepare a comprehensive report.*
UNIT 2 **8+3 hours** **Internal combustion engines:** Introduction, classification, parts and terminology of I C engines, working of 4-stroke petrol & diesel engines, simple numerical problems on four stroke engines. Applications of IC engines. **Hybrid and Electrical vehicles:** Introduction, basic working principle ofelectrical and hybrid vehicles. **Refrigeration and Air conditioning-** Introduction, definition and unit of refrigeration. Refrigerants and their properties. Types of refrigeration systems- Vapour absorption and Vapour compression refrigeration systems and their comparison. Principle & working of room air conditioner. Applications of Refrigerators and Air conditioning system. ***<u>Self-study:</u>*** ***Engines: Two stroke petrol and diesel engines, emission norms.*** ***Laboratory Components:*** *1. Study of Engine Components through Cut Sections* 2. *Demonstrate Components and Working principles of Domestic Refrigerator and prepare a comprehensive report* **OR** *Study/visit any commercial centralized Air-Conditioning unit, understand various components and operations, and prepare a comprehensive report.*

UNITIII **8+2 hours**

Engineering Materials: Types and applications of ferrous, nonferrous metals and alloys. Composite Materials: Introduction, classification and applications.

Heat treatment: Introduction to heat treatment, Types of Heat Treatment: Annealing, quenching, carburizing, and hardening.

Metal Joining Processes:

Soldering and brazing: Definition, types, advantages, limitations and applications of soldering and brazing. Working principle of soldering iron and torch brazing methods.

Welding: Introduction, classification and applications of welding. Working principle of electric arc welding and oxy-acetylene gas welding. Introduction to TIG and MIG welding.

Self-study:

Engineering materials: Polymers, Ceramics, Bio materials, Smart materials and its engineering applications.

Laboratory Components

1. One exercise each involving Welding, Soldering, and Brazing.

2. *Study oxy-acetylene gas flame structure and its application to gas welding*

3. Demonstration of ***anyone*** *Heat transfer application device and prepare a comprehensive report*

UNIT IV **8+2 hours**

Power transmission:

Belt drives – Introduction, types of belts and belt drive. Terminology - velocity ratio, creep and slip.

Gear drives - Introduction, classification; Gear trains – types of gear train. Simple numerical problems on gear drives.

Robotics: Robot anatomy, Joints & links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly, and Inspection.

Self-study:

Power transmission: Rope drives, Chain drives and Pulleys.

Laboratory Components:

1. *Demonstration of the machine consists of Gear Trains*
2. *Demonstration of various elementary mechanisms and their motion.*
3. *Demonstration of any one model of Robot*

UNIT V **8+2 hours**

Manufacturing process: Introduction and classification of manufacturing process.

Machine tools: Lathe -Working principle and specification of center lathe.Sketch and description of operations performed – turning, facing, knurling, thread cutting, drilling, taper turning. Construction and Working of Milling Machines and applications.

Introduction to Mechatronics: Concept of open-loop and closed-loop systems, Examples of Mechatronic systems and their working principle.

Rapid prototyping (3D printing) - Definition, Classifications, Advantages, Disadvantages, Applications, Brief introduction of 3D Printers-SLA, SLS, FDM.

Self-study:

Introduction to Modern Manufacturing Tools and Techniques:

CNC: Introduction, components of CNC, advantages and applications of CNC, CNC Machining centres and Turning Centers.

Laboratory Components:

1. Demonstration of developing one model involving Lathe, Milling and Drilling

2. Study/Visit an Industry using CNC/ modern techniques and submit a report

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:**Demonstrate** the working of various power generation devices such as steam, gas, hydraulic turbines and power absorbing devices like air compressors.

CO2: **Analyze** about the various IC engines, and power absorbing devices such as refrigerators and air conditioning.

CO3:**Describe** the engineering materials, heat treatment, joining processes for various applications.

CO4:**Describe** power transmission methods for various applications.

CO5:Demonstrate the principle, application of various basic and advanced manufacturing processes.

TEXT BOOKS

1. Elements of Mechanical Engineering - K.R. Gopalkrishna, Subhash publishers, Bangalore.
2. A Text Book of Elements of Mechanical Engineering – S. Trymbaka Murthy I. K. International Pvt Ltd, 2010 - Mechanical engineering
3. Elements of Mechanical Engineering – Dr. A.S. Ravindra, Best Publications, 7th edition, 2009.
4. Robotics, AppuKuttan KK K. International Pvt Ltd, volume 1.
5. Material Science, by Raghavan, Fifth Edition,PHI(P)LTD.

REFERENCE BOOKS

1. Elements of Workshop Technology. Vol 1 & 2, S.K.H. Chowdhary, A.K.H. Chowdhary and Nirjhar Roy, 11th edition 2001, Media Promoters and Publishers, Mumbai.
2. Hand books of Mechanical Engineering.
3. Material science, by Callister, Reprint 2008,Wiley India(P) LTD

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://mechanicalengineeringworld.com/

Assessment Details both (CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) and Semester End Exam (SEE) is 50% each. The students have to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Student has to score a minimum of 40% marks individual in thoery and laboratory test components to quality to take up SEE. Student has to score a minimum of 40% marks in SEE to pass.

<table>
<tr><th colspan="2">CONTINUOUS INTERNAL EVALUATION (CIE)</th><th colspan="2">Max Marks</th><th>Minimum Marks to be scored in CIE, to qualify to take SEE (40% individually)</th></tr>
<tr><td>Theory</td><td>Weightage of Tests (Test1, Test2)</td><td colspan="2">30</td><td>12</td></tr>
<tr><td rowspan="2">Laboratory components</td><td>Lab demonstration components: Rubrics for each lab component are added, then taken average (more emphasized on demonstrationtopics)</td><td>10</td><td rowspan="2">20</td><td rowspan="2">08</td></tr>
<tr><td>Lab Test</td><td>10</td></tr>
<tr><td colspan="2">TOTAL</td><td colspan="2">50</td><td>20</td></tr>
</table>

Note: Questions from Self-study component will not be asked for CIE and SEE.

<table>
<tr><th colspan="11">QUESTION PAPER PATTERN (SEE)</th></tr>
<tr><td>Q. No.</td><td>Q1</td><td>Q2</td><td>Q3</td><td>Q4</td><td>Q5</td><td>Q6</td><td>Q7</td><td>Q8</td><td>Q9</td><td>Q10</td></tr>
<tr><td>UNIT</td><td colspan="2">1</td><td colspan="2">2</td><td colspan="2">3</td><td colspan="2">4</td><td colspan="2">5</td></tr>
<tr><td colspan="11">1. Two full questions (each of 20 Marks) are to be set from each unit.</td></tr>
<tr><td colspan="11">2. Student shall answer five full questions selecting one full question from each unit.</td></tr>
</table>

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	2	2	1	1	1	1	3
CO2	3	2	2	1	1	2	2	1	1	1	1	3
CO3	2	1	1	1	2	2	2	1	1	1	1	3
CO4	3	1	2	1	2	2	2	1	1	1	1	3
CO5	3	1	1	1	1	2	2	1	1	1	1	3
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**ENGINEERING GRAPHICS**						
Course Code	**21MEL105/205**						
Category	Engineering Science Course (EC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	00	02	00	04	52	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**	**Duration of SEE: 03 Hours**			

Course Objectives:

1. To understand the basic principles and conventions of engineering drawing
2. To use drawing as a communication mode
3. To generate pictorial views using CAD software
4. To understand the development of surfaces
5. To visualise engineering components

Teaching-Learning (General Instructions):

- Students should be made to aware of powerful communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point Presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

UNIT I **12 hours** **Introduction:** ***(Not for SEE)*** Significance of Engineering drawing, Lettering, BIS Conventions of Engineering Drawing, Freehand sketching of engineering drawing, Introduction to Scales and its types. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet andcurves. **Orthographic Projections of Points, Lines and Planes:** Introduction to Orthographic projections, Orthographic projections of points in all the quadrants. Orthographic projections of lines placed in first quadrant only; Inclined to HP,toVP and to both the planes. Orthographic projections of planes placed in first quadrant only; resting on HP and on VP, inclined to HP,to VP and toboth the planes viz. triangle, square, rectangle, pentagon, hexagon and circular laminae. ***Application on projections of Lines & Planes (Not for SEE)***
UNIT II **12 hours** **Orthographic Projection of Solids:** Orthographic projection of right regular solids resting on HP, inclined to HP and to VP only. Prisms and Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, Tetrahedron. Applications problems on projections of Solids (Not for SEE) ***Projections of Frustum of cone, pyramid & truncated sphere (Not for SEE)***
UNIT III **10 hours** **Isometric Projections:** Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simplesolids. **Conversion of simple isometric drawings into orthographic views**. Problems on applications of Isometric projections of simple objects / engineering components***(Not for SEE)*** ***Introduction to drawing views using 3D environment (Not for SEE)***

UNIT IV	**10 hours**
Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with baseonHPonly. Development of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels, trays ***(Not for SEE)*** ***Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and* rectangular duct *(Not for SEE)***	
UNIT V	**08 hours**
Multidisciplinary Applications & Practice *(Not for SEE):* **Free hand Sketching;** True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc. **Drawing Simple Mechanisms;** Gear trains, Ratchets, two wheeler cart & Four wheeler carts to dimensions etc. **Electric Wiring and lighting diagrams;** Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software **Basic Building Drawing;** Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software, **Electronics Engineering Drawings**- Like, Simple Electronics Circuit Drawings. **Graphs & Charts**: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.	

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1. Understand and visualize the objects with definite shape and dimensions

CO2. Analyse the shape and size of objects through different views

CO3.Develop the lateral surfaces of the object

CO4.Create a 3D view using CAD software

CO5. Identify the interdisciplinary engineering components or systems through its graphical representation

TEXT BOOKS:

1. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited,2019.
2. K.R Gopalakrishna & Sudhir GopalakrishnaTextbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017.
3. S. N. Lal: Engineering Drawing with an Introduction to Auto CAD: First-angle Projection 1st Edition, Cengage, Publication, 2018.
4. S.N. Lal, & T Madhusudhan:, Engineering Visulisation, 1st Edition, Cengage, Publication.
5. LuzadderWarrenJ.,DuffJohnM., Fundamentals of Engineering Drawing: with an Introduction to Interactive Computer Graphics for Design and Production, Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition,2005.

REFERENCE BOOKS:

1. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press,2015.
2. Dhawan R. K., A Textbook of Engineering Drawing, 3/e, S. Chand Publishing,2019.
3. Venugopal K., Engineering Drawing and Graphics, New Age International publishers,2014.
4. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint2005.
5. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes,1997.
6. K S Sai Ram Design of steel structures, Third Edition by Pearson.
7. Nainan p kurianDesign of foundation systems, Narosa publications.
8. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgraw hill.

SCHEME FOR CIE		
	DETAILS	**MAX. MARKS**
Manual Sketching (25)	Classwork	**15**
	Assignment	**10**
Computer Printout (15)	Classwork	**15**
	Test Marks*	**10**
	TOTAL CIE MARKS	**50**

* Test marks is based on the average of two tests conducted in the mid-semester and end-semester.	

QUESTION PAPER PATTERN FOR SEMESTER END EXAMINAITON (SEE)								
UNIT	1		2		3		4	
Max. Marks	15		15		10		10	
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

NOTE:

1. Two Full Questions to be set from each Unit with internal choice.
2. Each Full question shall cover all the topics of the Unit.
3. Model question paper may be referred for distribution of topics in each Full Question.

SCHEME OF EVALUATION FOR SEE			
Unit	**Maximum Marks**	**Manual Sketching**	**Computer display and print out**
1	15	08	07
2	15	07	08
3	10	05	05
4	10	05	05
Total	**50**	**25**	**25**

NOTE: Evaluation shall be carried out jointly by both the examiners.

MAPPING OF COs WITH POs												
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	1	2	0	1	1	2	2	0	2
CO2	3	2	2	1	2	0	1	1	2	2	0	2
CO3	3	2	2	1	2	0	1	1	2	2	0	2
CO4	3	2	2	1	2	0	1	1	2	2	0	2
CO5	3	2	2	1	2	0	1	1	2	2	0	2

Strength of correlation: Strongly related-3, Moderately related-2, Weakly related-1, Not related-0

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING PHYSICS LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21PHL106/206</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course objective: To make Engineering students to understand basic concepts and principles of Physics. Gain the practical knowledge of elasticity, vibrations, Laser and optical fibers.

Sl. No.	Title of the Experiment	Compatibility with the theory course
1.	Determination of Young's Modulus of a material by single cantilever.	Unit I
2.	Determination of Rigidity modulus of a material by torsional pendulum.	Unit I
3.	Determination of acceleration due to gravity by using bar pendulum.	Unit I
4.	Determination of resonant frequency & quality factor in Series & Parallel LCR Circuits	Unit I
5.	Determination of Planck's constant using LED's	Unit II
6.	Determination of knee voltage and resistance from I-V characteristics of Zener Diode.	Unit III
7.	Measurement of dielectric constant.	Unit III
8.	Determination of Fermi energy of copper.	Unit III
9.	Determination of wavelength of Semiconductor Laser by diffraction method.	Unit IV
10.	Determination of Acceptance angle and numerical aperture of an optical fiber.	Unit IV
11.	Radius of curvature of Plano convex lens using Newton's rings	Unit IV
12.	Energy gap of a given semiconductor	Unit III

COURSE OUTCOMES: At the end of the course the students will be able to:

CO1: Apply the Physics concepts relevantly and appropriately where ever required.

CO2: The mechanical properties of solids will be understood by carrying out experiments of Young's Modulus, rigidity modulus and bar pendulum.

CO3: The optics experiments such as wavelength of laser by diffraction and numerical aperture of an Opticalfiber will help the students to understand the significance of Physics in various fields of Science and Technology.

CO4: Understand the importance of Physics in electronics.

REFERENCE BOOKS:

1. Laboratory Manual in Applied Physics -- H. Sathyaseelan. – New Age International.
2. An Advanced Course in Practical Physics -- D. Chattopadhyay and P.C. Rakshit, New Central Book Agency (p) Ltd, Kolkata .

Web link for Physics virtual lab: https://www.vlab.co.in/broad-area-physical-sciences

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING CHEMISTRY LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21CHL106/206</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>12</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: To expose first year engineering students to various experimental technique related to potentiometric, conductometric, colourimetric and PKa with a view to highlight their significance and importance in application oriented systems. Students will be able to analyze hardness of water, COD of waste water.

Sl. No.	Syllabus content
	PART-A
1	Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2	Colorimetric determination of Copper.
3	Conductometric estimation of acid mixture using standard NaOH solution.
4	Determination of pKa of a weak acid using pH meter.
5	Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6	Flame photometric estimation of Sodium and Potassium in the given sample of water. (Demonstration)
	PART-B
7	Determination of Total Hardness of water using disodium salt of EDTA.
8	Determination of Calcium Oxide in the given cement by Rapid EDTA method.
9	Determination of percentage of Copper in the given brass solution using standard Sodium thiosulphate solution.
10	Determination of Iron in Hematite ore solution using Potassium dichromate crystals by external indicator method.

11	Determination of Chemical Oxygen Demand of the given industrial waste water sample.
12	Determination of Total Alkalinity of given water sample using standard Hydrochloric acid.(Demonstration)

Course Outcomes:

1. Students will be able to apply the basic concepts electrochemistry in experiments such as potentiometry and determination of PKa of weak acid, conductometry experimentsetc
2. Students will be able to understand concepts of electromagnetic radiation and perform coulorimetric experiments.
3. Students will be able to analyze the total hardness of water sample and COD of the wastewater
4. Students will be able to analyze the hematite ore in the given sample.

References Books:

1. Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J.Bassett, J.Mendham and R.C Denney.

VIRTUAL LAB LINK DETAILS:

- https://www.labster.com/chemistry-virtual-labs/
- https://youtu.be/OwZbw6Mhrqc
- https://youtu.be/UOLOsKZxi6Y

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**BASIC ELECTRICAL ENGINEERING LABORATORY**						
Course Code	**21EEL107/207**						
Category	Engineering Science (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. To understand and measure electrical quantities and parameters.
2. To verify the relation between line and phase quantities, measure power and power factor in three-phase circuits.
3. To demonstrate fundamental laws of electrical engineering.
4. To determine the efficiency of single-phase transformers
5. To understand the significance of power, power factor, and control electrical Lamps from different places.

Expt No	Syllabus Contents	No.of Hours	Blooms Taxonomy level.
1	Measurement of Resistance using Voltmeter-Ammeter method and verification using Wheatstone bridge.	2	L1
2	Measurement of Inductance in single-phase circuit by the three-voltmeter method.	2	L2
3	Measurement of voltage, current, power, and power factor and verify line and phase relationship in the three-phase star-connected circuit.	2	L3
4	Verification of Kirchhoff's Laws in DC circuits	2	L2
5	Verification of maximum power theorem in DC circuits.	2	L2
6	Comparison of domestic lamps against their power consumption.	2	L3
7	Improvement of power factor in inductive circuits.	2	L3
8	Control of electrical Lamp from one, two and three points.	2	L2
9	Load test on a single-phase transformer.	2	L3

10	Demonstration of FUSE and MCB by creating overload and fault.	2	L1
	EXPERIMENTS BEYOND SYLLABUS		
1	Speed load characteristics of a three-phase induction motor.	2	L2
2	Voltage regulators to control electrical output.	2	L3

Course Outcomes:

CO1: Verify basic laws and theorem of electrical circuits.

CO2: Understand the power consumption of different types of lamps and control of lamps

from different points.

CO3: Determine the impedance of an electrical circuit and power consumption by a 3-phase

load.

CO4: Evaluate the performance of single-phase transformers.

CO5: Demonstrate the effects of fault and protection of electrical circuits.

References.

1. Dr. Eranna Dr. S. Vasudevamurthy, "Department manual.

Web Links.

1. http://vlab.amrita.edu/?sub=1&brch=75&sim=217&cnt=1/
2. http://vlab.amrita.edu/?sub=1&brch=75&sim=322&cnt=1

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				1		1	1	1		1	3		1
CO2	3	3				1		1	1	1		1	3		1
CO3	3	3				1		1	1	1		1	3		1
CO4	3	3				1		1	1	1		1	3		1
CO5	3	3				1		1	1	1		1	3		1
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Computer Science and Engineering

Scheme and Syllabus – OBE - CBCS – 2021 -2022

	COMPUTER PROGRAMMING LABORATORY						
Course Code	**21CSL107/207**						
Category	Engineering Science Course (ES)						
Scheme and Credits	No. of Hours/Week					Total Hrs./ semester	Credits
	L	T	P	SS	Total		
	0	0	2	0	2	26	1
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 03 Hours**		

Course objectives to:

- Explain problem statements and identify appropriate solutions
- Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
- Development of algorithms and programs using constructs of C programming language
- Reporting the observations

	Practice Programs
1.	To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) (SI = P*T*R/100).
2.	To print the ASCII value of the given input.
3.	To findlargest of three numbers.
4.	To perform simple calculator using switch case statement.
5.	To find factorial of a number.
6.	To print even and odd numbers using looping Construct.
7.	To find sum of N natural Numbers
8.	Write a C Program to search for the given key element with the help of Linear search technique.
9.	Develop a c program to implement selection sort technique.
10.	Develop a C program to swap two numbers using pointers (Call by Reference).

Lab Programs		
1	a	Write a C program to find the roots of a quadratic equation.
	b	Write a C program to print the numbers in triangular form 1 1 2 1 2 3 1 2 3 4
2	a	Write a C program to check whether the given four digit number is palindrome or not.
	b	Write a C program using function to sort the given array elements using bubble sort technique.
3	a	Develop a C program to Store age of n students and perform the following operations i. Find minimum age of student in the list ii. Find maximum age of a student in the list
	b	Develop a C Program to compute Sin(x) using Taylor series approximation.Compare your resultWith the built- in Library function. Print both the results with appropriate messages.
4	a	If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss and determine how much profit or loss incurred in percentage.
	b.	Write a C program to implement Recursive functions for Binary to Decimal Conversion.
5	a	Write a C program to generate N Fibonacci series.
	b	Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
6	a	Write a C program to check whether the given number is prime or not.
	b	Write a C program to i. read N Bank Employees name ii. Search for an employee in the list using Binary Search Technique. Note: Use 2-D character array to store Bank employees names

<table>
<tr><td>7</td><td>a</td><td>Develop a C program to calculate tax based on given yearly salary and tax percentages. Read monthly salary of an employee as an input from the user.
Conditions to calculate tax, if yearly salary is:
<table>
<tr><th>Income Range</th><th>Tax Charges</th></tr>
<tr><td><=1,50,000</td><td>No tax</td></tr>
<tr><td>1,50,001 to 3,00,000</td><td>10%</td></tr>
<tr><td>3,00,001 to 5,00,000</td><td>20%</td></tr>
<tr><td>5,00,001 and above</td><td>30%</td></tr>
</table>
</td></tr>
<tr><td></td><td>b</td><td>Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.</td></tr>
<tr><td>8</td><td></td><td>Write C functions to implement string operations such as Compare, Concatenate and String length. Convince the parameter passing techniques.</td></tr>
<tr><td>9</td><td></td><td>Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. Which shop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:
Demanded quantity of foodstuff:
<table>
<tr><th></th><th>roll</th><th>bun</th><th>cake</th><th>bread</th></tr>
<tr><td>P_1</td><td>6</td><td>5</td><td>3</td><td>1</td></tr>
<tr><td>P_2</td><td>3</td><td>6</td><td>2</td><td>2</td></tr>
<tr><td>P_3</td><td>3</td><td>4</td><td>3</td><td>1</td></tr>
</table>
Prices in shops S_1 and S_2:
<table>
<tr><th></th><th>S_1</th><th>S_2</th></tr>
<tr><td>roll</td><td>1.50</td><td>1.00</td></tr>
<tr><td>bun</td><td>2.00</td><td>2.50</td></tr>
<tr><td>cake</td><td>5.00</td><td>4.50</td></tr>
<tr><td>bread</td><td>16.00</td><td>17.00</td></tr>
</table>
MATRIX MULTIPLICATION
Write a C program by considering 2 matrices A (M x N) and B (P x Q) that uses functions to perform the following: i. Reading data to p1, p2, p3 (Matrix A) ii. Reading data to s1, s2 (Matrix B) iii. Multiplication of Two Matrices(C=AXB)</td></tr>
<tr><td>10</td><td></td><td>Write a C Program To maintain a record of bank customer's with four fields (Customer ID, Customer Name, Address and ACC-Num). Read and display the bank customer details.
Note: Using array of structures.</td></tr>
</table>

Note: In the practical examination the student need to select one question and both a, b (if present) should beexecuted. All the questions listed in the syllabus have to be included in the lots. The change ofquestion has to be considered by deducting marks(20% of execution), provided the request is made for the same,within half an hour from the start of the examination.

Course Outcomes:

At the end of the course the student will be able to:

CO1: Define the problem statement and identify the need for computer programming

CO2: Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming

CO3: Develop algorithm, flowchart and write programs to solve the given problem

CO4: Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.

Suggested Learning Resources:

1. Yashavanth Kanetkar, Let us C, Authentic Guide to C Programming Langauge, bpb publisher, 17th Edition, 2020.

2. Herbert Schildt, C: The complete reference, Mc Graw Hill, 4th Edition, 2017 Programming in C, Reema Theraja, Cengage publication.

Weblinks and Video Lectures (e-Resources):

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2		3	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-
CO	3	3	3	2	3	-	-	-	-	-	-	-

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">COMMUNICATIVE ENGLISH</td></tr>
<tr><td>Course Code</td><td colspan="7">21HST108</td></tr>
<tr><td>Category</td><td colspan="7">Humanities & Social Sciences (HS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./ semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>1</td><td>0</td><td>1*</td><td>-</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 02 Hours</td></tr>
</table>

COURSE OBJECTIVE: To enable the students to assimilate the correct patterns of the language, & to develop students insight into the structure of English language. To enrich vocabulary bank, to communicate more effectively in English, to express opinions including facts & ideas & maintain conversation in everyday situations. To use digital literacy tools their LSRW skills can be enhanced and to master good speaking skills with different strategies.

UNIT I	**4 hours**
Introduction to Communicative English, Fundamentals of Communicative English, Barriers to Effective Communicative English, Different styles in Communicative English, Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills. Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Articles, Conjunctions.	
UNIT II	**6 hours**
Grammar: Preposition, kinds of Preposition and Prepositions often confused / used in different situations. Word Accent – Rules for Word Accent, Stress Shift, Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags and Exercises, Vocabulary: One Word Substitutes and Exercises, Synonyms and Antonyms, Exercises on it. Idioms & Phrases, Words often confused, Homophones, homonyms	

UNIT III **6 hours** Grammar: Articles – Definite & Indefinite articles, Spelling Rules and Words often Misspelt, Word Pairs (Minimal Pairs), Sequence of Tenses (Rules in use of Tenses), Situational dialogues: Self-introduction, greeting, thanking, accepting thanks, apologizing, invitations, making complaints, Wh-questions/ yes-no questions, Vocabulary: Contractions/Abbreviations, strong and Weak forms of verbs, Words Formation-Prefixes and Suffixes.	
UNIT IV **5 hours** Communication Skills: LSRW Skills	
UNIT V **5 hours** Speaking Skills**:** Extempore / Public Speaking, Difference between Extempore / Public Speaking, and Guidelines for Practice. Listening Comprehension. Oral Presentation, Role Plays Just a minute (JAM), Group Discussion, Persuasion Speech, Description.	
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Learn basic grammar rules, developed the mastery of language.

CO2: Enhance vocabulary and fluency will be increased.

CO3: Gain the ability to communicate confidently in various situations.

CO4: improve listening, speaking, reading and writing skills.

CO5: Overcome their stage freight and express their views freely without hesitation.

TEXT BOOKS

1. Workbook
2. English Grammar and composition by WREN AND MARTIN
3. Contemporary English Grammar by JAYANTHI DAKSHINAMURTHY
4. English for Technical Communication by LAKSHMINARAYANA K.R
5. Effective English for Technical Communication by FARATULLAH T.M

REFERENCE BOOKS

1. Objective English (Multiple choice questions with answers for competitive examinations) by Dr.B.James
2. The English Errors of Indian Students by T.L.H Smith Pearse.

3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018.
4. A Textbook of English Language Communication Skills, Infinite Learning Solutions – (Revised Edition) 2020.
5. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press 2018.
6. Technical Communication by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
7. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – 2019.
8. Practical English Usage by Michael Swan, Oxford University Press – 2016.
9. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
10. Effective Technical Communication – Second Edition by M. Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

Ss	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2										3		
CO3										3		
CO4										3		
CO5										3		
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2021 -2022

Course Title	**HEALTH & WELLNESS**						
Course Code	**21HST109**						
Category	**Ability Enhancement Course (AE)**						
Scheme and Credits	No. of Hours/Week					Total Hrs./ semester	Credits
	L	T	P	SS	Total		
	1	0	1*	0	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

Course objective:
The definition of Health and quality of life will teach the learner the necessity for a balanced strength and well-being. The Determinants of Health and Wellness topics like Diet, Food & Nutrition, life style, bring the points of understanding. Physical health, mental health, Social Health, Spiritual health, etc is a point to learn. The adolescent chooses the food as per the taste rather than the usefulness. Warming up exercises, physical exercises, yogasanas, pranayama and certain aspects of personality development may help in going a long way to improve the health and personality of the youth.

UNIT I	**5 hours**
Fundamentals of Balanced Health: Health and quality of life, Definition of Health (WHO), Five Pillars of Balanced Health, Body and Mind concepts, Disease and Healing, Genetics & Environment.	
UNIT II	**4 hours**
Determinants of Health and Wellness: Lifestyle and Health, Sleep and health, Relaxation and Meditation, Physical Fitness and Stamina, Reproductive health and hygiene.	
UNIT III	**7 hours**
Seven dimensions of Health & Wellness: Physical health, Mental health, Social Health, Spiritual health, Cultural health, Moral health, Economical health.	
UNIT IV	**5 hours**
Healthy Eating- Diet and Nutrition: Food and Diet – Difference, Concept of DIET, Nutrition.	

UNIT V	5 hours
Physical activity and personality Development: Warming up exercise, Physical exercise, Yogasanas, Pranayama etc. Special training for the challenged students A few words on personality development (personal quality).	
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Understand the necessity for a balanced health and well-being.

CO2: Know one's life style, physical fitness and stamina.

CO3: Differentiate types of health.

CO4: understand 'Food is medicine' or 'Medicine is food' concept.

CO5: Have the knowledge of yogasanas & pranayama for an overall personality.

TEXT BOOKS

1. Dixit Suresh (2006) Swasthya Shiksha Sports Publications, Delhi.
2. Pinto John and Ramachandra K (2021) Kannada version " Daihika Shikshanada Parichaya", Louis Publications, Mangalore.

REFERENCE BOOKS

1. Simplified Physical Exercises, Thathvagnani, The World Community Service Center, Vethathiri Maharshi, Vethathiri Publications, Erode, SKY Yoga.
2. Puri K. & Chandra S.S (2005) "Health & Physical Education', Surjeet Publication, New Delhi.
3. Shanti K.Y (1987) "The Science of Yogic Breathier" Pranayama D B Bombay.S.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3						
CO3						3						
CO4						3						
CO5						3						
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Civil Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">RURAL DEVELOPMENT ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21CVT109/209</td></tr>
<tr><td>Category</td><td colspan="7">Ability Enhancement Course (AE)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Teaching Hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>1</td><td>0</td><td>1*</td><td>0</td><td>2</td><td>26</td><td>1</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 02 Hours</td></tr>
</table>

Course Objectives:

1. Describe the scope of Rural Development Planning and Concept of Appropriate Technology and implementation of various national policies.
2. Understand the need and concept of low-cost construction materials for individual and group housing;
3. Illustrate the concept of Water Supply and Rural Sanitation.
4. Interpret the concept of rural transport system and issues related to it.
5. Summarize the need of effective Watershed and catchments area development methods and problems relating to watershed management, watershed structures.

UNIT I	**3 Hours**
Rural Development Planning and Concept of Appropriate Technology: Scope; development plans; various approaches to rural development planning; concept of appropriate technology. Rural development program / projects.	
UNIT II	**3 Hours**
Rural Housing: Low-cost construction materials for housing; Composite material - ferro-cement & fly ash, soil-stabilized un-burnt brick; Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry; rat-trap bond for walls; Panels for roof, ferro-cement flooring / roofing units.	

UNIT III	**3 Hours**
Rural Water Supply and Sanitation: Sources of water. BIS & WHO water standards. Quality, Storage and distribution for rural water supply works; low-cost water treatment technologies; conservation of water; rainwater harvesting; drainage in rural areas, septic tank; low-cost community & individual Garbage disposal systems	
UNIT IV	**3 Hours**
Rural Transportation System: Categories of Pavement Layers, Types of roads, Surface Treatments for roads in rural areas. Soil Stabilization, Lime, Lime Fly ash and Cement Treated Course.	
UNIT V	**3 Hours**
Irrigation Techniques: Consideration of low-cost irrigation techniques, drip & sprinkler irrigation systems. Watershed and catchments area development - problems and features of watershed management, watershed structures	

COURSE OUTCOMES: The students will be able to,

CO1: Understand the concepts and relative Technology for implementation of various National Policies relating to Rural Development in the Country

CO2: Apply the knowledge for Designing and selection of the Construction Materials for Rural Housing

CO3: Analyze and Conceptualize Rural Water Supply and Rural Sanitation.

CO4: Evaluate and interpret the aspects of Rural Transport System

CO5: Appraise and Evaluate the effectiveness of Watershed and Catchment Management for Modern Irrigation System

TEXT BOOKS:

1. Rural Development by Katar Singh, SAGE Publication
2. A.G.Madhov Rao, D.S.Ramachandra Murthy, Appropriate Technologies for low cost Housing Oxfordand IBH Publishing Co. Pvt .Ltd.

REFERENCE BOOK(S):

1 Rural Infrastructure by P.Nair, SBS Publication

2 Rural Infrastructure by Samalia Bihari Verma, Gyaneshwar Prasad & Sahib Kumari Singh, Sarup & Sons.

3 C. Satyanarayana Murthy, Design of Minor Irrigation and Canal Structures. Wiley Eastern Ltd.,

4 Document on Rural Road Development in India Volume1& 2; Central Road Research Institute, New Delhi.

ONLINE RESOURCE:

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√				√	√					
CO2							√					
CO3			√				√					√
CO4							√					
CO5					√		√					√

Dr Ambedkar Institute of Technology, Bengaluru-56

Career Guidance and Placement Cell

Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">Career Development Skills - I</td></tr>
<tr><td>Course Code</td><td colspan="7">21HSN110</td></tr>
<tr><td>Category</td><td colspan="7">HSS (Humanities)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>01</td><td>00</td><td>01*</td><td>00</td><td>02</td><td>26</td><td>00</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: -</td><td colspan="2">Total Max. Marks=50</td><td colspan="3">Duration of SEE: NIL</td></tr>
</table>

COURSE OBJECTIVE:

1. The lessons under this unit are designed to enable the students to plan their career on correct measures and motivate them to set their goals on prior basis.
2. This unit aims to develop the personality skills of the students and teach them to lead a corporate discipline nurture. It also helps them to get groomed with professional ethics.
3. This unit is designed to give the awareness to the students about the job market to prepare themselves at their own pace and potential. It also teaches them about the self-developing attitude through their emotions and intelligence.
4. This unit complies with the overcoming ability of students dealt in stress and it also teaches the punctuality and time managing.
5. This lesson will help students make inferences and predictions about spoken, writing & listening discourse. And by utilizing digital literacy tools, their LCRW skills can be enhanced.

Unit no	Syllabus content	Hours/COs
1	1. Career Planning 2. Goal Settings	5 CO1
2	1. Personality Effectiveness 2. Building Personality and Discipline 3. Grooming, hygiene and Cleanliness	6 CO2

3	1. Self- Awareness & Self Confidence 2. Attitudes 3. Emotional & Intelligent Quotient	6 CO3
4	1. Time Management 2. Stress Management	4 CO4
5	1. LICRW Skills (Listening, Interpersonal, Conversation, Reading & Writing skills)	5 CO5

COURSE OUTCOME:

1. The students will be able to learn about the overview of their goals and also gets to know diversities in the field of their career planning.
2. The student will develop and improve their personal and professional effectiveness. At the end of this unit, students will have deploy themselves about the corporate culture.
3. At the completion of this unit, students will develop the self-confidence and emerge as the confident person.
4. After the completion of this unit students will understand the stress, time and emotional management. Also they will learn about the overcoming the fear and uncomfortable situations such as Public speaking.
5. After the completion of this unit, students will gain knowledge about the assertiveness of Listening, Reading, Writing& Interpersonal segments.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing

- The Pattern of question paper for test is MCQ (1 mark each).

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ADVANCED CALCULUS AND NUMERICAL METHODS</td></tr>
<tr><td>Course Code</td><td colspan="7">21MAT201</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>03</td><td>02</td><td>00</td><td>00</td><td>05</td><td>65</td><td>04</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: This course is intended to impart to the students the skills of employing the basic tools of Calculus and Numerical methods for solving basic and difficult engineering problems.

UNIT I **8+5 hours**

Multiple Integrals: Evaluation of double and triple Integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find area as double integral and volume as triple integral.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.

Self- Study: Centre of gravity, Moment of inertia.

UNIT II **8+5 hours**

Vector Differentiation: Scalar and vector point functions, gradient, directional derivative, divergence, curl and Laplacian of a vector field. Solenoidal and irrotational vector fields. Vector identities (without proof).

Vector Integration: Line integrals, Applications to work done by a force. Green's theorem in a plane and Gauss Divergence theorem (without proof) involving cubes and rectangular parallelepiped.

Self- Study: Surface integrals and Stoke's theorem.

UNIT III **8+5 hours**

Partial Differential Equations (PDE's): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDE's involving derivative with respect to the one independent variable only. Solution of one- dimensional heat equation and wave equation by the method of separation of variables.

Self- Study: Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.

UNIT IV	**8+5 hours**
Numerical Methods-1: Solution of polynomials and transcendental equations: Regula–Falsi and Newton–Raphson method (without proof). Interpolation-Newton's forward and backward difference formulae, Newton's divided difference formula, Lagrange's interpolation formula and its inverse interpolation formula(without proof). **Numerical differentiation and Integration**: Approximation of derivatives using Newton's forward and backward interpolation polynomials. Numerical integration using Simpson's $(1/3)^{rd}$ and Simpson's $(3/8)^{th}$ rules (without proof). ***Self- Study: Newton–Raphson method for repeated roots, Weddle's rule.***	
UNIT V	**8+5 hours**
Numerical Methods-2: Numerical solutions of Ordinary Differential Equations of first order and first degree: Taylor's series method, Modified Euler's method, Fourth order Rungekutta method (without proof). Multi steps methods-Milne's predictor- corrector formula (No derivation). ***Self- Study: Euler's method, Picard's method, Adam- Bashforth method.***	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: At the end of the course the students are able to:

CO1: Show the equivalences of mathematical expressions involving differentiation and integration.

CO2: Find divergence, directional derivatives, area bounded, flux and work done.

CO3: Illustrate mathematical procedures to change the order of integration, method of separation, predictor and corrector.

CO4: Identify the mathematical tool for solving flow models, improper integrals, interpolation and quadrature.

CO5: Apply the integral operator and vector differential operator for mensuration and measurements in complex engineering field.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44^{th} Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10^{th} Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana : Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I& II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/ Cole, 2005.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3										
CO3	3	3										
CO4	3	3										
CO5	3	3	3									
Strength of correlation: Low-1, Medium- 2, High-3												

<table>
<tr><td>Course Title</td><td colspan="7">PROFESSIONAL WRITING SKILLS IN ENGLISH</td></tr>
<tr><td>Course Code</td><td colspan="7">21HST208</td></tr>
<tr><td>Category</td><td colspan="7">Humanities & Social Sciences (HS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./ semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>-</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 02 Hours</td></tr>
</table>

Course objective:

To implement English vocabulary at command and ensure language proficiency, to achieve better Technical writing and Presentation skills, identify the common errors in speaking and writing English. Learn better sentence structures, acquire Employment and Workplace communication skills, to learn about Techniques of Information Transfer through presentation in different levels.

UNIT I	**4 hours**
Identifying Common Errors in Writing and Speaking English, Subject Verb Agreement (Concord Rules with Exercises), Common errors in Subject-verb agreement, Noun-pronoun agreement, Adjective, Adverb, Verb, Sequence of Tenses, Misplaced modifiers, Common errors in Conjunctions, Common errors in the use of Idioms and phrases.	
UNIT II	**6 hours**
Nature and Style of sensible writing, organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Redundancies & Clichés.	
UNIT III	**6 hours**
Technical Reading and Writing Practices, Effective Technical Reading and Writing Practices, technical Reports writing and Technical Proposals Writing, Grammar – Voice (Active and Passive Voices), Reported Speech, Vocabulary – Analogies, Words Confused/Misused, Collocations	

UNIT IV	5 hours
Communication for Employment, Components of a formal letter, Formats and types of business letters, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing and other recent communication types, Reading Skills and Reading Comprehension.	
UNIT V	**5 hours**
Communication at Workplace, Interpersonal Communication Skills, Non-Verbal Communication Skills (Body Language), Group Discussion and Employment Interviews, Presentation skills and Formal Presentations by Students, Dialogues in Various Situations (Practical Sessions by Students).	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Identify common errors in spoken and written communication.

CO2: Get familiarized with English vocabulary and language proficiency.

CO3: Improve nature and style of sensible writing & acquire employment and workplace skills.

CO4: Improve their Technical Communication Skills through Technical Reading and Writing practices.

CO5: Perform well in campus recruitment, engineering and all other general competitive examinations.

TEXT BOOKS:

1. Workbook
2. Functional English, Cengage learning India Pvt Limited [Latest Revised Edition] - 2020.
3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. Refer it's workbook for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018.
4. A Course in Technical English, Cambridge University Press – 2020.

REFERENCE BOOKS

1. Professional Writing Skills in English, Infinite Learning Solutions – (Revised Edition) 2021.
2. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
3. High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
4. Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.
5. Intermediate Grammar, Usage and Composition by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan – 2016.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Career Guidance and Placement Cell
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">Career Development Skills - II</td></tr>
<tr><td>Course Code</td><td colspan="7">21HSN210</td></tr>
<tr><td>Category</td><td colspan="7">HSS (Humanities)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>01</td><td>00</td><td>01*</td><td>00</td><td>02</td><td>26</td><td>00</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: -</td><td colspan="2">Total Max. Marks=50</td><td colspan="3">Duration of SEE: NIL</td></tr>
</table>

COURSE OBJECTIVE:

1. The main goal of this unit is to help students to overcome the fear of speaking in both personal and professional culture and it also focuses on the presenting the topics with confidence. This unit also teaches the students about the team building activities
2. This unit depicts the easier decision making and problem solving techniques for overcoming the hardships of interview process. It also teaches on behavior & mannerism that should be maintained during the interview.
3. The lessons under this unit help students' to learn to business communication activities which sought to help them to become an entrepreneur.
4. This unit deals with the preparation of Interview skill and also teaches the students about the various interview structures like Resume Building, GD etc..
5. This unit is completely an activity session, constructed to overcome the stage presence or fear.

Unit no	Syllabus content	Hours/COs
1	1. Presentation Speaking skills 2. Public Speaking skills 3. Team Building	**5** **CO1**

2	1. Decision Making & Problem Solving 2. Mannerism & Behavior 3. Reaching your potential	**5** **CO2**
3	1. Business Communication 2. Sales & Negotiations 3. Customer Service	**5** **CO3**
4	1. Interview Skills 2. Resume Building 3. Group Discussion (Each student will be assessed based on their body language, voice modulation, content & Creativity	**6** **CO4**
5	1. Activity Sessions > Debate > Picture Connector 2. Mock Interview	**5** **CO5**

COURSE OUTCOME:

1. The students will have learnt about the way of quality communication with the co-workers and it will also help to build a strong social relationship with outside society. And students will also learn to deliver the presentation in a more powerful and persuasive way.
2. At the end of this unit, students will have deploy themselves in the active thinking and also learns about the effective usage of words. And students will learn about the synchronization with the workmate and also gives them an opportunity to unlock their individual potentials.
3. After the completion of this unit, student will have learnt how to undergo business etiquettes with proper negotiations and customization.
4. After the completion of this unit student have learnt about the interview standards that being asked during the recruitment process. It also improves the clarity and confidence of the students.
5. At the end of this sessions, students will be confident on their speech and will be exposed to interview standards that being asked during the recruitment process.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing
7. Enhancing English and Employability Skills by State Board of Technical.
8. Soft skills an integrated approach to maximize personality by SANGEETHA SHARMA, GAJENDRA SINGH CHAUHAN, and Wiley Publishing.

- The Pattern of question paper for test is MCQ (1 mark each).

	Course Title: PYTHON PROGRAMMING		
	Course Code: 18CS34	**No. of Credits: 3: 0: 0 (L-T-P)**	**No. of lecture hours/week: 3**
	Exam Duration: 3 hours	**CIE + Assignment + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	**Description**
	1. Describe the core syntax and semantics of Python programming language. 2. Discover the need for working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions to navigate the file system. 5. Infer the Object-oriented Programming concepts in Python.

Unit No	**Syllabus Content**	**No of Hours**
1	**Parts of Python Programming Language,** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements,** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, **Functions**, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	**09**
2	**Strings,** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	**08**
3	**SELF-STUDY** **Dictionaries,** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	**08**
4	**Files,** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression**	**08**

	Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.	
5	**Object-Oriented Programming,** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.	**09**

Course Outcomes	**Description**	**RBT Levels**
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	**L2**
CO2	Express proficiency in the handling of strings and functions.	**L2**
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	**L3**
CO4	Identify the commonly used operations involving file systems and regular expressions.	**L2**
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	1	3	-	-	-	-	-	-	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS:

1) Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data",** 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2) Aurelien Geron, **"Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 2nd Edition, O'Reilly Media, 2019. ISBN – 13: 978-9352139057.
3) Wesley J Chun, **"Core Python Applications Programming",** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

<table>
<tr><td colspan="2">4) Miguel Grinberg, "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.</td></tr>
<tr><td colspan="2">SELF-STUDY REFERENCES/WEBLINKS:</td></tr>
<tr><td colspan="2">1. Dictionaries
https://www.youtube.com/watch?v=daefaLgNkw0
2. Tuples and Sets
https://www.youtube.com/watch?v=W8KRzm-HUcc</td></tr>
<tr><td>COURSE COORDINATOR:</td><td>Dr.Gowrishankar S.</td></tr>
</table>

Professor & Head
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	SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN		
	Sub Code:18CS31	**No. of Credits:4=4:0:0 (L-T-P)**	**No.of.lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1 Understand the basic digital principles and working of various logic gates, and different techniques for simplification of Boolean function.

2. Design combinational logic circuits and describe their applications.

3. Analyze working of Flip Flops and sequential circuits.

4. Study the basic organization and architecture of digital computers such as CPU, memory, I/O, and software

5. Discussions of digital logic and microprogramming to understand the design and application of computer systems and can be used as foundation for more advanced computer-related studies

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Combinational Logic Circuits:** Binary Logic, Integrated Circuits, Boolean Functions, Canonical And Standard Forms, The Map Method Two, Three, Four -Variable Maps, Map Manipulation, Essential Prime Implicants, Product-Of-Sums Optimization, Don't-Care Conditions ,minimal sum and minimal product. The Tabulation Method, Determination Of Prime Implicants.	11
2	**Data processing circuits:** Combinational Logic Design Procedure, Adders, Subtractors, Code Converter, Magnitude Comparator, Multiplexers, De multiplexers, Decoder, Encoders.	10
3	**Sequential Logic:** Introduction, FLIP-Flops, Triggering Of Flip Flops, Excitation Tables, Design Procedure. Registers, Shift Registers, Ripple Counter, Synchronous Counter.	10

4	**Processor Logic Design:** Introduction, Processor Organization, Arithmetic Logic Unit, Design Of Logic Circuit, Design Of Arithmetic Circuit, **Control logic design**: Introduction, Control Organization, Hard Wired Control, Hard Wired control –example.	10
5	**Computer Design**: Introduction, System of Configuration, Computer Instructions, Timing and Control, Execution of Instructions, **Microcomputer System Design**: Introduction, Microcomputer Organization, Microprocessor Organization, Instructions and Addressing Modes	11

Text Book:

1. M Morris Mano: Digital Logic and Computer Design, 14th Impression, Pearson, 2012.
ISBN 978-81-7758-409-7.

Reference Books:

1. M. Morris Mano and Charles Kime: Logic & Computer Design, Fundamentals, Pearson, 2014
ISBN 978-93-325-1872-8

2. Andrew S Tenenbaum: Structured Computer Organization, Pearson, 2006,
ISBN 81-7808-692-1

Course Outcomes:

Course Outcomes	**Statements**	**Blooms Level**
CO1	Demonstrate the various techniques like K-map, Quine-McCluskey method for minimization of combinational functions.	**L3**
CO2	Develop and Analyze different combinational and sequential circuits using Logic gates, Multiplexers Decoders, PLA, Flip flops.	**L3**
CO3	Describe the structure of CPU, memory and I/O unit	**L2**
CO4	Discuss the design of logic circuits for arithmetic operation in computer system	**L2**

CO5	Illustrate the use of timing and control signal in the execution of machine instructions of computer system	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	2	3	-	-	-	-	-	-	-	3	3	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-	2	3	-
CO3	2	1	2	2	3	-	-	-	-	-	-	-	1	2	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-	1	2	-
CO5	3	2	2	2	3	-	-	-	-	-	-	-	2	3	-

FACULTY NAME:

SREENIVASA A.H — **Associate Professor**

ARATHI P — **Assistant Professor**

Professor & Head
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Bangalore-560 056.

	SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN LAB		
	SUBJECT CODE: 18CSL37	**No. of Credits:0:0:1**	**No. of Lecture hours per week:3**
	Exam Duration :3 hours	**Exam Marks:50**	

Course Objectives:

This course will help students to achieve the ability to:

1. Implement different logic design circuits using components like logic gates, multiplexer, decoder, flip-flops.

2. Understand the various computer operations using simulation

Detailed Syllabus

Expt No.	Experiment List
	PART-A
1	Given a 4-variable logic expression, simplify it using K-Map and realize using logic gates.
2	Design and implement arithmetic combinational circuit.
3	Design and implement various flip flops.(SR,JK,D,T)
4	Design and implement synchronous counter using flip flops.
5	Design and implement asynchronous counter.
6	Design and implement shift registers.(ring ,switched tail)
	PART-B
1	Design and implementation of combinational circuits.
2	Design and implementation sequential circuits.
3	Design of memory units.(RAM and ROM)
4	Designing a logic circuit to perform various functions.
5	Designing an ALU to perform various operations.
6	Demonstrating the assembly language instruction execution.

Course Outcomes	Statements	Blooms Level
CO1	Implement different combinational and sequential logic circuits.	**L3**
CO2	Develop the different sequential circuits	**L3**
CO3	Demonstrate the various operations of computer using appropriate simulator (Logisim, Marie Sim, CPUos)	**L3**
CO4	Illustrate the working of computer components by analyzing their operation using simulator	**L3**
CO5	Describe the assembly language instruction execution using simulator	**L2**

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	3								3	3	-
CO2	3	3	3	3	3								3	3	-
CO3	3	3	3	2	3								2	3	-
CO4	3	3	3	2	3								2	3	-
CO5	3	3	3	2	3								3	3	-

FACULTY NAME:

SRINIVASA A.H
Associate Professor

ARATHI P
Assistant Professor

Professor & Head
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Bangalore-560 056.

Sub Title : Operating System		
Sub Code:18CS33	No. of Credits:3=3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours : 42

Course objectives:

- Introduce concepts and terminology used in OS
- Explain threading and multithreaded systems
- Illustrate process synchronization and concept of Deadlock
- Introduce Memory and Virtual memory management, File system and storage techniques

UNIT No	Syllabus Content	No of Hours
1	Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot. Process Management Process concept; Process scheduling; Operations on processes; Inter process communication.	08
2	Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. Process Synchronization: Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.	09
3	Deadlocks : Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.	09
4	Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. File System, Implementation of File System: File system: File concept; Access methods; Directory structure; File system mounting; File sharing.	08
5	Secondary Storage Structures, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.	08

Course Outcomes	Statements	Blooms Level
CO1	Illustrate the role of resource management, interfaces and system calls as handled by the operating system.	**L2**
CO2	Apply the process scheduling algorithms to select the processes for execution and compare their performances.	**L3**
CO3	Interpret the requirements for process synchronization and coordination handled by operating system.	**L2**
CO4	Describe and analyze the memory management and its allocation methods.	**L2**
CO5	Identify the storage management methods with respect to different storage management techniques.	**L2**

Course Outcomes	POs												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO1 2**	**PS O1**	**PS O2**	**PS O3**
CO1	2	3	2	1	-	-	-	-	-	-	-	-	1	2	-
CO2	3	3	2	2		-	-	-	-	-	-	-	2	2	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	2	1	-
CO4	2	3	2	1	-	-	-	-	-	-	-	-	2	1	-
CO5	2	3	1	1		-	-	-	-	-	-	-	1	2	-

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Concepts, 8th edition, Wiley India, 2011. **ISBN: 9781118063330**

REFERENCE BOOKS/WEBLINKS:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012. **ISBN13: 9781259005589**
2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010. **ISBN-10: 9788120348363**
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011. **ISBN**: **9788131712894**

Professor & Head
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Bangalore-560 056.

Sub Title: Python Programming Laboratory		
Sub Code: 18CSL38	No. of Credits: 1 = 0: 0: 1 (L: T: P)	No. of lecture hours/week : 2
Exam Duration: 3 hours	CIE + SEE = 50 + 50 = 100	

Course objectives:

1. Interpret the use of procedural statements like assignments, conditional statements, loops and function calls.
2. Infer the supported data structures like lists, dictionaries and tuples in Python.
3. Illustrate the application of matrices and regular expressions in building the Python programs.
4. Discover the use of external modules in creating excel files and navigating the file systems.
5. Describe the need for Object-oriented programming concepts in Python.

PART – A

Sl. No.	Programs
1.	Write a Python program to print all Disarium numbers between 1 and 100.
2.	Write a Python program to encrypt the text using Caesar Cipher technique. Display the encrypted text. Prompt the user for input and the shift pattern.
3.	Write a Python program to simulate ATM transactions by including the following operations: a) Check for correctness of the ATM pin. b) Perform Balance, Withdraw and Deposit Operations. The above operations should be menu-driven and display appropriate messages after performing each of these operations.
4.	The celebrity problem is the problem of finding the celebrity among n people. A celebrity is someone who does not know anyone (including themselves) but is known by everyone. Write a Python program to solve the celebrity problem.
5.	Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
6.	Perform the following file operations using Python a) Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories. b) Read a file content and copy only the contents at odd lines into a new file.

PART – B

Sl. No.	Programs
1.	Devise a Python program to implement the Rock-Paper-Scissor game.
2.	Create a menu drive Python program with a dictionary for words and their meanings. Write functions to add a new entry (word: meaning), search for a particular word and retrieve meaning, given meaning find words with the same meaning, remove an entry, display all words sorted alphabetically.
3.	Write a Python program to perform Jump Search for a given key and report success or failure. Prompt the user to enter the key and a list of numbers.
4.	Using Regular Expressions, develop a Python program to

	a) Identify a word with a sequence of one upper case letter followed by lower case letters. b) Find all the patterns of "1(0+)1" in a given string. c) Match a word containing 'z' followed by one or more o's.
5.	Write a Python program to plot the Line chart in MS Excel Sheet using XlsxWriter module to display the annual net income of the companies mentioned below.

Year	Company	Profit
2010	Microsoft	18.76
2011	Microsoft	23.15
2012	Microsoft	16.98
2013	Microsoft	21.86
2014	Microsoft	22.07
2015	Microsoft	12.19
2016	Microsoft	16.8
2017	Microsoft	21.2
2010	Alphabet	8.372
2011	Alphabet	9.706
2012	Alphabet	10.179
2013	Alphabet	12.733
2014	Alphabet	14.136
2015	Alphabet	16.348
2016	Alphabet	19.478
2017	Alphabet	12.662
2010	Amazon	1.152
2011	Amazon	0.631
2012	Amazon	0.139
2013	Amazon	0.274
2014	Amazon	0.241
2015	Amazon	0.596
2016	Amazon	2.371
2017	Amazon	3.033

6.	Devise a Python program to implement the Hangman Game.

COs	**Statements**	**Bloom's Level**
CO1	Describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics, science, and games.	**L2**
CO2	Examine the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.	**L3**
CO3	Interpret the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance.	**L3**
CO4	Discover the capabilities of Python regular expression for data verification and utilize matrices for building performance efficient Python programs.	**L2**
CO5	Identify the external modules for creating and writing data to excel files and inspect the file operations to navigate the file systems.	**L2**

Conduct of Practical Examination

- All laboratory programs are to be included for practical examination.
- The breakup of marks and instructions printed on the cover page of the answer script are to be strictly adhered by the examiners.
- Students should pick one program from Part A and one program from part B.
- Change of program is allowed only once (either Part A or Part B) and marks will be deducted as per the Dr.AIT Autonomous/Examination rules and regulations.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	-	-	-	-	-	-	-	1	3	-
CO2	3	2	2	3	3	-	-	-	-	-	-	-	2	3	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-	2	3	-
CO4	2	1	2	2	3	-	-	-	-	-	-	-	1	2	-
CO5	2	1	2	1	3	-	-	-	-	-	-	-	1	1	-

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Sub Title : DATA STRUCTURES AND ALGORITHMS		
Sub Code:18CS33	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:
The objectives of this course are to:

1. Understand the concept of pointers, arrays, structures and unions, dynamic memory allocation.
2. To analyse and implement some examples that comes under linear data structures.
3. Compare and implement different kinds of linked list by studying its pros and cons.
4. Understand and implement trees and graphs, its types and comparison with other data structures and implement searching techniques BFS & DFS.

UNIT No	Syllabus Content	No of Hours
1	**BASIC CONCEPTS:** Pointers and Dynamic Memory Allocation, **ARRAYS and STRUCTURES:** Arrays, Dynamically Allocated Arrays, Structures and Unions, Sparse Matrices, Representation of Multidimensional Arrays, Recursion.	**10**
2	**STACKS AND QUEUES:** Stacks, Stacks Using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions-Evaluation of Postfix Expression, and Conversion from infix to postfix.	**10**
3	**LINKED LISTS:** Singly Linked list, Linked Stacks and Queues, Circular Linked List.Polynomials-Adding Polynomials, Circular List representation of polynomials with header node, Doubly Linked Lists with header node.	**11**
4	**TREES:** Introduction, Binary Trees-Properties, representation, Binary Tree Traversals-Inorder, Preorder, Postorder, Level order, Heaps-Max heap, Min heap. Binary Search Trees-Insertion, Deletion, Searching. **Application of Trees-**Evaluation of Expression.	**10**
5	**Self Study:** **Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. **Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.	**11**

Course Outcomes	Statements	Blooms Level
CO1	Interpret advance C programming techniques such as pointers, dynamic memory allocation, structures & unions to develop solutions for problems such as polynomials, sparse matrix etc.	**L2**
CO2	Analyse problem and propose solution by selecting appropriate data structures like stacks, Queues, Linked List, Trees, Graphs, Hash Tables.	**L3**
CO3	Implement linked list data structure and handle operations like searching, insertion, deletion, traversing mechanism.	**L4**
CO4	Interpret trees and graphs representations, tree traversal, Searching using BFS and DFS.	**L2**

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO4	1	2	2	2	-	-	-	-	-	-	-	-	2	2	-

TEXT BOOK:

1. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures in C, 2ndEdition, Universities Press, 2014. **ISBN-13:** 9780929306407 / **ISBN-10:** 0929306406
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

REFERENCE BOOKS:

1. Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Delmar Learning India Pvt 2013.
2. Robert Kruse & Bruce Leung: Data Structures & Program Design in C, Pearson Education, 2014.

SELF STUDY REFERENCES/WEBLINKS:

http://cgm.cs.mcgill.ca/~godfried/teaching/algorithms-web.html#graphs

https://www.hackerearth.com/practice/data-structures/hash-tables/basics-of-hash-tables/tutorial/

FACULTY INCHARGE:

1. Asha Rani K P
2. Vinod Kumar K P
3. Shalini N

Professor & Head
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	SUBJECT TITLE: **DATA STRUCTURES AND ALGORITHMS LAB**		
	SUBJECT CODE:18CSL36	**No. of Credits:0:0:1:0**	**No. of Lecture hours per week:2**
	Exam Duration :3 hours	**Exam Marks: 50**	

Course objectives:

The objectives of this course are:

1. To Strengthen the ability to identify and apply the suitable data structure for the given real world problem by developing algorithms for manipulating stacks, queues, linked lists, trees.
2. To understand recursion concept.
3. To explore different searching techniques BFS & DFS.

1.	**(SEARCH IN SPARSE MATRIX)→**Design, develop, and execute a program in C to read a sparse matrix of integer values and to search the sparse matrix for an element specified by the user. Print the result of the search appropriately. Use the triple <row, column, value> to represent an element in the sparse matrix
2.	**(STACKS)→**Write a C Program to construct a stack of integers and to perform the following operations on it: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow, stack underflow, and stack empty.
3.	**(INFIX TO POSTFIX)→**Design, develop, and execute a program in C to convert a given valid parenthesized infix arithmetic expression to postfix expression and then to print both the expressions. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).
4.	**(EVALUATE A POSTFIX EXPRESSION)→**Design, develop, and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).
5.	**(QUEUE)→**Design, develop, and execute a program in C to simulate the working of a queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display
6.	**(CIRCULAR QUEUE)→**Write a C Program to simulate the working of a circular queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display
7.	**(STACKS USING SINGLY LINKED LIST)→**Write a C Program using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow and stack empty.
8.	**(QUEUES USING SINGLY LINKED LIST)→**Write a C program using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations: a. Insert b. Delete c. Display The program should print appropriate messages for queue full and queue empty.

9.	**(POLYNOMIAL ADDITION USING LINLKED LIST)→**Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
10.	**(DOUBLY LINKED LIST)→**Design, develop, and execute a program in C to implement a doubly linked list where each node consists of integers. The program should support the following operations: i. Create a doubly linked list by adding each node at the front. ii. Insert a new node to the left of the node whose key value is read as an input. iii. Delete the node of a given data if it is found, otherwise display appropriate message. iv. Display the contents of the list. (Note: Only either (a,b and d) or (a, c and d) may be asked in the examination)
11.	**(TREES)→**Write a C Program a. To construct a binary search tree of integers. b. To traverse the tree using all the methods ▪ Inorder, Preorder, Postorder. c. To display the elements in the tree.
12.	**(MAX HEAP CREATION)→**Design, develop, and execute a program in C to create a max heap of integers by accepting one element at a time and by inserting it immediately in to the heap. Use the array representation for the heap. Display the array at the end of insertion phase.
13.	**(RECURSION)→**Write recursive C Programs for a. Searching an element on a given list of integers using the Binary Search method. b. Solving the Towers of Hanoi problem.
14.	**(BFS & DFS)→** Write a C Program to a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.

Course Outcomes	Statements	Bloom's Level
CO1	Analyse problem and propose solution by selecting appropriate data structures.	**L3**
CO2	Solve a problem using Recursion.	**L3**
CO3	Be able to compare different searching BFS & DFS techniques.	**L3**

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-

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Course Title: WEB TECHNOLOGIES		
Course Code: 18CS35	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To familiarize with terminologies, tools, protocols used in web. 2. Identify a valid conformed XHTML document involving a variety of Elements. 3. Apply JavaScript to design interactive web pages. 4. Design well-formed XML documents.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals**: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. **Introduction to XHTML:** Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links**.**	**8 Hours**
2	**XHTML (continued):** Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.	**8 Hours**
3	**The Basics of JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.	**8 Hours**
4	**JavaScript and XHTML**: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification. **Dynamic Document with JavaScript**: Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.	**10 Hours**
5	***Self-Study*: Introduction to XML**: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Understand terminologies, tools and protocols used in web.	L2
CO2	Design, understand and analyze static web pages.	L4
CO3	Design, understand and analyze interactive, Dynamic web pages.	L4
CO4	Design, understand and analyze data Representation , management and display.	L4

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**3**	**3**	**2**								
CO2			**3**									
CO3			**3**									
CO4			**3**	**3**	**1**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Programming the World Wide Web – Robert W. Sebesta, 4thEdition, 2011, Pearson Education.

REFERENCE BOOKS:

1. Web Programming Building Internet Applications – Chris Bates, 3rd Edition, 2006, Wiley India,ISBN : 978-81-265-1290-4

2.Internet & World Wide Web How to H program – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, 2004, Pearson Education / PHI, ISBN-10: 0-130-89550-4

SELF STUDY REFERENCES/WEBLINKS:

http://www.w3schools.com

COURSE COORDINATOR:	**Harish Kumar H C** **Veena .A**

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SUBJECT TITLE: **OOP Principles and Practices using C++ Lab**		
SUBJECT CODE:18CSL47	**No. of Credits:1:0:0**	**No. of Lecture hours per week:3**
Exam Duration :3 hours	**Exam Marks: 50**	

Course Objectives:

This course will help students to achieve the following objectives:

1. Design and develop programs based on the principles of object-oriented programming concepts.
2. Apply the concepts of data encapsulation, inheritance, operator overloading and polymorphism.
3. Understand and illustrate the concepts of exception handling and STL.

1	a) Implement the following requirement: An electricity board charges the following rates to domestic users to discourage large conceptions of energy. 0 - 100 units : Rs 1.50 per unit 101 - 200 units : Rs 1.80 per unit Beyond 200 units: Rs 2.50 per unit All users are charged a minimum of Rs 50. If the total amount is more than Rs 300 then an additional surcharge of 15% is added. The program must read the names of users; number of units consumed and displays the calculated charges. b) Write a program to find mean of two numbers belonging to two different classes using friend function.
2	a) Design and implement a class STUDENT with attributes like: roll number, name, three test marks. Implement member functions a) to read student data like name and test marks, b) to compute average marks (considering best two out of three test marks) and c) to display the student information. Declare an array of STUDENT objects in the main function, use static data member to generate unique student roll number. b) Design a program to illustrate the use of objects as function arguments by performing the addition of TIME in the hour and minutes format.
3	a) Write a program to create a class called COMPLEX and implement the following overloading functions ADD that return a COMPLEX number. i. s2 = s1. add (a) – where a is an integer (real part) and s1, s2 are complex numbers. ii. s3 = s1.add (s2) – where s1 ,s2 and s3 are complex numbers b) Create a class called Account. Write a program to deposit or withdraw money in a bank account. (Assume appropriate attributes and use constructor)
4	a) Create a class called STRING using dynamic memory allocation technique and implement the following operations. Display the results after every operation by overloading the operator <<. i. STRING s1 = “Dr AIT” ii. STRING s2 = “Bangalore”

	iii. STIRNG s3 = s1 + s2. (Overload + operator and Use overloaded constructors) b) Write a program that allows class LCD_TV to inherit two classes – Product and Manufacturer. Display the complete information of LCD TV by assuming appropriate attributes for each class using multiple inheritance.
5	Create a class called Customer (doubly linked list) with member functions to insert a customer at the front of the list as well as to delete a customer from a particular position in the list. Demonstrate all the functions after creating a pointer to a customer list. (Use Destructor)
6	Create a template class called QUEUE with member functions to add an element and to delete an element from the queue. Implement a queue of integers and doubles.
7	Implement the concept of operator overloading: Create a class called DATE. Accept two valid dates in the form dd/mm/yyyy. Implement the following by overloading +, - and << operators. i. no_of_days = d1 – d2; where d1 and d2 are DATE objects, d1 >=d2 and no_of_days is an integer. ii. d2 = d1 + no_of_days; where d1 is a DATE object and no_of_days is an integer.
8	Create a class called Number which has the characteristics of a decimal number. Derive a class OCTAL, which has the characteristics of an octal number inheriting the decimal value from the Number class. Derive a class HEX, which has the characteristics of a hexadecimal number inheriting the decimal value from the Number class. Implement the following operations (using operator overloading): i. int i = j + k where I is decimal , j is hexadecimal , k is OCTAL ii. int y = h + k ; where h is an OCTAL object and k is an integer. Display the result by overloading the operator <<.
9	Design and implement a program to create an abstract class - SHAPE to represent any shape in general. The class should have two pure-virtual functions to read dimensions and to compute the area. Create three derived classes - CIRCLE, RECTANGLE, and SQUARE by inheriting the features of class SHAPE. Implement the functions to read and compute the area. Add method to display the results as required. (Assume appropriate attributes).
10	Create two files named questions and answers. Design a program that reads Questions from questions file and their matched answers from answers file. Use an appropriate exception handling mechanisms to manage file exceptions and to display the output.
11	Write a program for custom exception handling. i. Implement a function to compute factorial of a given number. ii. Create a class "InvalidDataException" that contains the details about the exception – "Invalid data: negative number entered" iii. In the main function, accept a number from the user and throw an exception of type "InvalidDataException" if entered number is a negative number, else call the factorial function to compute the result. iv. Handle the exception.
12	Write a program to create a vector of integers. Copy the vector contents into a list, sort the contents, and then copy selected items into another vector.

Note: In the examination *each* student picks one question from a lot of *all the* 12 Questions.

Course Outcomes:

On successful completion of the course, students are able to:

Course Outcomes	Statements	Blooms Level
CO1	Construct classes incorporating the object-oriented techniques to solve engineering problems.	**L2**
CO2	Identify the dynamic memory management techniques using pointers, constructors and destructors.	**L2**
CO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.	**L2**
CO4	Illustrate and implement STL class of containers and need for exceptions to handle errors for object oriented programs.	**L3**

Course Outcomes	POs												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO1 2**	**PS O1**	**PS O2**	**PS O3**
CO1	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO2	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO3	2	2	1	2	3	-	-	-	-	-	-	-	1	2	-
CO4	2	3	1	3	3								1	2	

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Sub Title : Algorithm Design Techniques Laboratory		
Sub Code:18CSL48	**No. of Credits:1= 0 :0 : 1 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

1. To study about various designing paradigms of algorithms for solving problems

2. To analyze run time of algorithms and understand fundamental algorithmic problems

3. Make the students imbibe the art of writing elegant and efficient programs as well as debugging skills.

Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX / Windows environment.

1	Sort a given set of elements using **Bubble Sort/Selection Sort** and determine the time required to sort the elements. Plot a graph of number of elements versus time taken. Specify the time efficiency class of this algorithm.The elements can be read from a file or can be generated using the random number generator.
2	Implement **Merge Sort** algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3	Sort a given set of elements using the **Quicksort** method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
4	From a given vertex in a weighted connected graph, find shortest paths to other vertices using **Dijkstra's algorithm.**
5	Find Minimum Cost Spanning Tree of a given undirected graph using **Kruskal's algorithm**.
6	Find Minimum Cost Spanning Tree of a given undirected graph using **Prim's algorithm.**
7	Obtain the **Topological ordering** of vertices in a given digraph.
8	a. Implement All-Pairs Shortest Paths Problem using **Floyd's algorithm**. b. Compute the transitive closure of a given directed graph using **Warshall's algorithm**.
9	Implement **0/1 Knapsack** problem using Dynamic Programming.
10	Implement **Traveling Salesperson problem** using Dynamic programming.
11	Implement **Horspool's algorithm** for String Matching using space & time tradeoff concept
12	Implement **N Queen's** problem using Back Tracking.
13	Find a **subset** of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two

	solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

Note :In the examination *each* student picks one question from the lot of *all* 13 questions.

Course Outcomes	Statements	Blooms Level
CO1	Design an algorithms using appropriate design techniques.	**3**
CO2	Apply and implement learned algorithm design techniques and data structures to solve real world problems	**3**
CO3	Analyze and compare the performance of algorithms.	**3**

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PSO 3
CO1	2	3	3	3	-	-	-	-	-	-	-	-	3	3	-
CO2	2	3	3	3	-	-	-	-	-	-	-	-	3	3	-
CO3	2	3	2	2	-	-	-	-	-	-	-	-	3	2	-

TEXT BOOK:

1. AnanyLevitin: Introduction to Design & Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran: Fundamentals of Computer Algorithms, 2nd Edition, University press, 2008. ISBN 10: 8173716129
ISBN 13: 9788173716126

REFERENCE BOOKS/WEBLINKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2010.
2. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

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	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY		
	SUBJECT CODE: 18CSL46	**No. of Credits:0:0:1**	**No. of Lecture hours per week:2**
	Exam Duration :3 hours	**Exam Marks:50**	

Course Objectives:

This course will help students to achieve the ability to:

1. Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator
2. Conduct the experiments on an ARM7TDMI/LPC2148 or any other evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/ python compiler.

Detailed Syllabus

Expt No.	Experiment List
	PART-A
1	Write an ALP to evaluate the following expressions i) C= A+B ii)P=Q+(R*S) Assume A, B, C, P, Q, R, S as data memory locations.
2	Write an ALP to perform a simple Boolean operation to calculate the bitwise calculation of the following functions. i)F1 = A·B + C·D ii)F2=(A+B).(C+D) Assume A, B, C, D as data memory locations.
3	Assume array of 16 bit number of size N and write the program to find sum of square of numbers and store the result in internal RAM memory
4	Write an ALP to find factorial of a non-negative number.
5	Write an ALP to multiply two signed numbers which are stored in internal RAM and store the result in
6	Write an ALP to add an array of 16 bit numbers of size N and store the result in internal RAM
7	Write an ALP to count the positive and negative numbers in an array of 16 bit numbers of size N
8	Write an ALP to find the largest and smallest number in an array of 32 numbers of size N
9	Write an ALP to arrange a series of 32 bit numbers in ascending/descending order of size N.
10	Write an assembly language program to search an element in an array of 16 bit number of size N using linear search.
	PART B
1	Interface two LEDs to Raspberry Pi and Write a Python code to input a number and switch ON the LEDs depending on the following conditions

Number		LED1	LED2
Negative	Odd	OFF	OFF
Negative	Even	OFF	ON
Positive	Odd	ON	OFF
Positive	Even	ON	ON

2	Interface a Stepper motor to Raspberry Pi and Write a Python code to rotate it in clockwise and anti-clockwise direction.
3	Interface a PIR Motion Sensor to Raspberry Pi and write a Python code to detect the movement of an object.
4	Interface a temperature sensor to Raspberry Pi and write a Python code to Read and calculate the temperature in Celsius.
5	Interface a button and a speaker to Raspberry Pi and write a Python code to play .wav sound file on press of the button.

Course Outcomes	Statements	Blooms Level
CO1	Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator	**L3**
CO2	Describe the ARM7TDMI/LPC2148/Raspberry Pi Evaluation board	**L2**
CO3	Demonstrate the working of Raspberry Pi device by connecting it with different components.	**L3**
CO4	Develop the python code for the interfacing components to Raspberry Pi	**L3**
CO5	Illustrate the working of stepper motor, temperature sensor, and PIR sensor	**L3**

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO3
CO1	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
CO2	1	1	2	1	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-

FACULTY NAME:

Dr. SIDDARAJU **SRINIVASA A.H**

Professor & Head **Associate Professor**

Professor & Head
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	SUBJECT TITLE: Computer Organization and Architecture		
	Sub Code:18CS45	**No. of Credits:3:0:0 (L-T-P)**	**No.of.lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:

1. Understand an overview of computer hardware and software which includes the basic functional units, interconnection, addressing techniques and instruction sequencing
2. Understand different integer and floating point arithmetic operation.
3. Understand various cache memory and I/O concepts.
4. Understand the concepts of parallel processing

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Basic concepts and computer evolution**: Organization and Architecture- Structure and Function, A Brief History of Computers, Designing for Performance, Multicore, MICs, and GPGPUs , The Evolution of the Intel x86 Architecture Embedded Systems and the ARM , Performance Assessment . **A Top-Level View of Computer Function and Interconnection:** Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, Point-To-Point Interconnect.	11
2	**Cache Memory:** Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design. **Internal Memory:** Semiconductor Main Memory, Error Correction, Advanced DRAM Organization, **External Memory:** Magnetic Disk, RAID , Solid State Drives , Optical Memory. **Input/output :** External Devices, I/O Modules Programmed I/O, Interrupt-Driven I/O, Direct Memory Access	10
3	**Computer Arithmetic :** The Arithmetic and Logic Unit, Integer Representation , Integer Arithmetic , Floating-Point Representation , Floating-Point Arithmetic **The Central Processing Unit:** Machine Instruction Characteristics , Types of Operands , Intel x86 and ARM Data Types ,Types of Operations , Addressing Modes	10
4	**Processor Structure and Function:** Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining **Reduced Instruction Set Computers:** Instruction Execution Characteristics, The Use of a Large Register File **Compiler**-Based Register Optimization **Reduced** Instruction Set Architecture **RISC** Pipelining. RISC vs CISC Controversy	10

5	**Self-Study:** **PARALLEL ORGANIZATION: Instruction-Level Parallelism and Superscalar Processors :**Overview, Design Issues, **Parallel Processing,** Multiple Processor Organizations ,Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors, Clusters , Non-uniform Memory Access	11

Text Books:

1. William Stallings, "Computer Organization and Architecture, Designing for Performance", 10^{th} Edition, Pearson, 2019

Reference Books:

1. C Hamacher, Z Vranesic, S Zaky: Computer Organization, Tata McGraw Hill, 5th Edition, 2011.
2. John L Hennessy, David A Patterson: Computer Architecture A Quantitative Approach, Elsevier, 5th Edition 2012.
3. Anrew S. Tanenbaum, Structured Computer Organization, Pearson Education Inc, 5^{th} Edition, 2006.
4. John P. Hayes, Computer Architecture and Organization, Tata McGrawHill, 3^{rd} Edition,1998

SELF STUDY REFERENCES/WEBLINKS:

1. William Stallings, "Computer Organization and Architecture, Designing for Performance", 10^{th} Edition, Pearson, 2019.

2. https://www.youtube.com/watch?v=ZGUP5nUdIyc

3. https://www.youtube.com/watch?v=-p9tfMMu1PE

Course Outcomes:

Course Outcomes	Statements	Blooms Level
CO1	Describe the architecture and functionality of central processing unit.	**L2**
CO2	Exemplify in a better way the I/O and memory organization	**L3**
CO3	Use different number systems, binary addition, subtraction, 2's complement representation, floating point representation and its operations.	**L3**
CO4	Demonstrate the execution of instruction and compare the architecture of RISC and CISC.	**L3**

	.	
CO5	Outline the concepts of parallel processing, pipelining and interprocessor communication	**L2**

CO-PO Mapping

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	1	2	-	-	-	-	-	-	-	3	2	-
CO2	3	2	2	1	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	2	1	2	-	-	-	-	-	-	-	2	2	-
CO4	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO5	3	3	2	2	2	-	-	-	-	-	-	-	3	2	-

3- Strong 2-Medium 1-Weak

FACULTY NAME:

SRNIVASA A H — **Associate Professor**

ARATHI P — **Assistant Professor**

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	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEM		
	Sub Code:18CS43	**No. of Credits:4=4:0:0 (L-T-P)**	**No.of.lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1. Differentiate between microprocessors and microcontrollers.
2. Explain the architecture of ARM processor with its instruction set.
3. Identify the applicability of the embedded system

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**The History of ARM and Microcontrollers:** Introduction to Microcontrollers, the ARM Family History, **ARM Architecture and Assembly Language Programming:** The General Purpose Registers in the ARM, The ARM Memory Map, Load and Store Instructions in ARM, ARM CPSR (Current Program Status Register), ARM Data Format and Directives, Introduction to ARM Assembly Programming, Assembling an ARM Program, The Program Counter and Program ROM Space in the ARM, Some ARM Addressing Modes, RISC Architecture in ARM, Viewing Registers and Memory with ARM Keil IDE	11
2	**Arithmetic and Logic Instructions and Programs:** Arithmetic Instructions, Logic Instructions, Rotate and Barrel Shifter, Shift and Rotate Instructions in ARM Cortex, BCD and ASCII Conversion, **Branch, Call, and Looping in ARM:** Looping and Branch Instructions, Calling Subroutine with BL, ARM Time Delay and Instruction Pipeline, Conditional Execution	11
3	**Self-Study:** **Signed Numbers and IEEE 754 Floating Point:** Signed Numbers Concept, Signed Number Instructions and Operations, IEEE 754 Floating-Point Standards, **ARM Memory Map, Memory Access, and Stack:** ARM Memory Map and Memory Access, Stack and Stack Usage in ARM, ARM Bit-Addressable Memory Region, Advanced Indexed Addressing Mode, ADR, LDR, and PC Relative Addressing, **ARM Pipeline and CPU Evolution:** ARM Pipeline Evolution, Other CPU Enhancements	10

4	**Introduction to Embedded Systems:** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Embedded firmware design and development: Embedded firmware design approaches, embedded firmware development languages.	10
5	**Typical Embedded System: Core of the Embedded System:** General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On board and External Communication Interfaces.	10

Text Books:

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, "ARM assembly language Programming and Architecture", MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906

2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition, 2009. ISBN 978-0070678798

Reference Books:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008
5. Ragunandan, An Introduction to ARM System Design, Cengage Publication

SELF STUDY REFERENCES/WEBLINKS

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, "ARM assembly language Programming and Architecture", MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906
2. https://www.youtube.com/watch?v=qBHUGy1xteg
3. https://www.youtube.com/watch?v=e3YvT3WkhRs
4. https://www.youtube.com/watch?v=q4fwx3h3mdg

Course Outcomes:

Course Outcomes	Statements	Blooms Level
CO1	Describe the architecture of ARM microcontroller.	**L2**
CO2	Write the assembly language program using ARM microcontroller instructions	**L3**
CO3	Illustrate the memory concepts and data representation in ARM microcontroller	**L3**
CO4	Identify and Analyze the applications of embedded systems	**L2**
CO5	Select the best components for the design of embedded systems.	**L2**

CO-PO Mapping

Course Outcomes	POs												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	2	2								3	3	-
CO2	3	3	3	2	3								3	3	-
CO3	2	2	2	3	2								3	3	-
CO4	2	3	2	2	2								2	3	-
CO5	2	3	2	2	2								1	2	-

FACULTY NAME:

Dr. SIDDARAJU
Professor & Head

SRINIVASA A.H
Associate Professor

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Aided By Govt. of Karnataka	**Sub Title: Theoretical Foundation of Computer Science**		
	Sub Code: 18CS44	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives

The objective of the course is to

1. Present fundamental concepts and techniques for designing Automata.
2. Provide necessary background for formulating real-world problems to Finite state machines, construct regular expressions and conversion between themselves.
3. Use the pumping lemma to demonstrate the non-regularity of languages.
4. Learn CFGs, Design Pushdown Automata for various context-free Grammars.
5. Know various Normal forms with Simplification of Grammar and Design Turing Machines and know its various types.

Unit No	Syllabus Content	No. of Hours
1	**Introduction to Finite Automata:** Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata An application of finite automata. **Finite Automata, Regular Expressions:** Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions.	11
2	**Regular Languages, Properties of Regular Languages:** Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata	10
3	**Context-Free Grammars And Languages :** Context–free grammars; Parse trees; Applications; Ambiguity in grammars and Languages.	10
4	**Pushdown Automata:** Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata	10
5	**Properties of Context-Free Languages:** Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs **Introduction To Turing Machine:** Problems that Computers cannot solve; The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines; Turing Machine and Computers.	11

Course Outcomes	Statements	Bloom's Level
CO1	Design different finite state machines for regular languages, make conversion between them, construct the regular expression and study its applications.	**6**
CO2	Obtain a minimized DFA, convert the given automata to regular expressions and vice-versa and prove languages not to be regular using pumping lemma.	**4**
CO3	Know basic definitions in Grammar, Write CFGs, Construct parse trees, find and remove ambiguity in grammars.	**3**
CO4	Study Pushdown Automata, Design NPDA and DPDA after the CFG conversion and convert PDAs to grammar.	**2**
CO5	Convert grammar to Various Normal Forms, and simplify the Grammar, Prove that languages are not context free using pumping lemma. Design Turing machines and understand the working of various types of Turing machines.	**3**

Course Outcomes	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	2	-	-	-	-	-	-	2	2	-
CO2	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO3	2	-	2	-	2	-	-	-	-	-	-	-	2	1	-
CO4	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO5	2	2	2	-	2	2	-	-	-	-	-	-	2	1	-

Text Book:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, Publisher: Pearson Education; Third edition (2011)
(Chapters: 1.1, 1.5, 2.2 to 2.5, 3.1 to 3.3, 4, 5, 6, 7, 8.1 to 8.4, 8.6)
ISBN-10: 8131762688 & ISBN-13: 978-8131762684

Reference Books:

1. K.L.P. Mishra: Theory of Computer Science, Automata, Languages and Computation, 3rd Edition, PHI, 2007. ISBN-978-81-203-2968-3
2. Raymond Greenlaw, H.James Hoover: Fundamentals of the Theory of Computation, Principles and Practice, Morgan Kaufmann, 1998. ISBN 9781558605473, 9780080948355
3. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007. ISBN 10: 0070660484 / ISBN 13: 9780070660489
4. Kavi Mahesh: Theory of Computation, A Problem solving approach, Wiley-India. ISBN: 9788126533114

FACULTY NAME: Dr. Harish G & Veena Potdar

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	SUBJECT TITLE: **OOP Principles and Practices using C++**		
	SUBJECT CODE:18CS42	**No. of Credits:3:0:0**	**No. of Lecture hours per week:3**
	Exam Duration :3 hours	**Exam Marks: 100**	**Total No. of Lecture hours:42**

Course Objectives

The objectives of this course are to:

1. Understand the philosophy of object-oriented programming and the concepts of encapsulation, abstraction, inheritance, and polymorphism.
2. Implement the concept of constructors and destructors.
3. Design and test the implementation among objects using a class hierarchy and inheritance.
4. Identify the relationship between the run time polymorphism and compile time polymorphism.
5. Implement file I/O operations, exception handling mechanisms and STL.

Unit No	Syllabus Content	No. of Lecturer hours
1	**Introduction:** Overview of C++, Basic concepts of OOP, Sample C++ program, operators in C++, Function basics, inline functions, function overloading. **Classes and Objects:** Class Specification, Defining member functions, Static members, Friend functions and classes, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors, Templates: Generic functions and classes.	10
2	**Operator overloading:** Rules, Overloading +, - , pre-increment, post-increment, [ ], <<, >> using friend functions. **Inheritance:** Types, Inheritance and protected members, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.	08
3	**Virtual functions and Polymorphism:** Virtual functions, Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.	08
4	**I/O System Basics and File I/O:** C++ stream classes, Formatted I/O, Manipulators, fstream and the File classes, Opening and closing a File, Reading and Writing Text Files, Unformatted and Binary I/O, Random Access **Namespaces :** Fundamentals, using, options, the std namespace	08
5	**SELF-STUDY –** **Exception Handling:** Exception handling fundamentals, Handling Derived-Class Exceptions, Exception handling options **STL**: An overview, The container classes, vectors, lists, maps.	08

Course Outcomes

At the end of the course students should be able to:

Course Outcomes	Statements	Blooms Level
CO1	Identify the classes, objects, members of a class and the relationships among them to solve a specific problem.	**L2**
CO2	Illustrate the concept of constructors and destructors and describe the mechanism of overloading the operators.	**L2**
CO3	Examine the concept of data encapsulation, inheritance and function templates as used in C++ programming language.	**L3**
CO4	Discover the commonly used operations involving the file operations and manipulators.	**L3**
CO5	Interpret the concepts of exception handling and the built-in standard template library.	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2	2	1	-	-	-	-	-	-	-	1	2	-
CO2	2	3	2	2	1	-	-	-	-	-	-	-	1	2	-
CO3	2	2	3	2	1	-	-	-	-	-	-	-	2	3	-
CO4	2	2	3	2	1	-	-	-	-	-	-	-	1	2	-
CO5	2	3	3	2	1	-	-	-	-	-	-	-	2	2	-

Text Book(s)

1. Herbert Schildt, "*The Complete Reference C++, 5th Edition*", Tata McGraw Hill, 2013. **ISBN - 978-0071634809**

Reference Book(s)

1. Stanley B.Lippmann, JoseeLajore, "*C++ Primer*, *5th Edition*", Addison Wesley, 2013. **ISBN - 978-0321714114**
2. E Balagurusamy, "*Object Oriented Programming with C++"*, 6th Edition, Tata McGraw Hill, 2013. **ISBN - 9781259029936**
3. Paul J Deitel, Harvey M Deitel, "*C++ for Programmers*", Pearson Education, 2009. **ISBN - 9780137018475**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Course Title: ALGORITHM DESIGN TECHNIQUES		
Course Code:18CS41	**No. of Credits: 3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week: 3**
Exam Duration: 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course objectives:	**Description**
	1. Present fundamental concepts for algorithm design and provide necessary background for writing algorithms in a formal way. 2. Identify for a problem adequate algorithm design strategies. 3. Present fundamental concepts and techniques for complexity analysis of algorithms. 4. Implement appropriate algorithm for different application problems.

UNIT No	Syllabus Content	No of Hours
1	Introduction: what is an algorithm? Algorithm Specification, Analysis Framework, Performance Analysis: Space complexity, Time complexity. Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω),Theta notation (Q), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples	**8**
2	Divide and Conquer: General Method, Binary Search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge Sort, Quick Sort, Strassen's matrix multiplication, Advantages and Disadvantages of divide and conquer.	**9**
3	The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm; Single Source Shortest Path problem, Optimal Tree problem: Huffman Trees and Codes.	**8**
4	Dynamic Programming: The General Method, Warshall's Algorithm, Floyd's Algorithm for All-Pairs Shortest Paths Problem, Optimal 0/1 Knapsack problem, Bellman-Ford Algorithm, Traveling Salesperson problem. Space-Time Tradeoffs: Introduction, Sorting by Counting, Sorting by Distribution method, Input Enhancement in String Matching.	**9**
5	**SELF-STUDY** Backtracking: General method, N-Queens problem, Sum of subsets problem. Branch and Bound: Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem. Approximation Algorithms for NP-Hard Problems – Traveling Salesperson Problem, Knapsack Problem.	**8**

Course Outcomes	Description	Blooms Level
CO1	Ability to analyze the performance of algorithms using different asymptotic notations.	**L2**
CO2	Identify the design techniques for engineering problems based on Divide & conquer and Greedy methods.	**L2**
CO3	Apply the ideas of dynamic programming and backtracking to solve the engineering problems and analyze their performance.	**L3**
CO4	Determine how space and time trade off technique is used to improve the performance of algorithm.	**L3**
CO5	Estimate the approximation algorithm and analyze the benefit of using them.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-

TEXT BOOKS:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3rdEdition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2ndEdition, University press, 2008.ISBN 10: 8173716129 , ISBN 13: 9788173716126

REFERENCE BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2010.
2. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

SELF-STUDY REFERENCES/WEBLINKS:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3ndEdition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. https://jeffe.cs.illinois.edu/teaching/algorithms/book/02-backtracking
3. https://www.codesdope.com/blog/article/backtracking-explanation-and-n-queens-problem/
4. https://www.geeksforgeeks.org/job-assignment-problem-using-branch-and-bound/

COURSE COORDINATOR:	**ASHA**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

Aided By Govt. of Karnataka	**Course Title: PYTHON PROGRAMMING**		
	Course Code: **18CSE012**	**No. of Credits: 3: 0: 0** **(L-T-P)**	**No. of lecture hours/week:** **3**
	Exam Duration: **3 hours**	**CIE + Assignment + SEE =** **45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	**Description**
	1. Describe the core syntax and semantics of Python programming language. 2. Discover the need for working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions to navigate the file system. 5. Infer the Object-oriented Programming concepts in Python.

Unit No	Syllabus Content	No of Hours
1	**Parts of Python Programming Language,** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements,** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, **Functions**, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	**09**
2	**Strings,** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	**08**
3	**SELF-STUDY** **Dictionaries,** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	**08**
4	**Files,** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression**	**08**

	Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.	
5	**Object-Oriented Programming,** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.	**09**

Course Outcomes	**Description**	**RBT Levels**
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	**L2**
CO2	Express proficiency in the handling of strings and functions.	**L2**
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	**L3**
CO4	Identify the commonly used operations involving file systems and regular expressions.	**L2**
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	1	3	-	-	-	-	-	-	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Gowrishankar S, Veena A, **“Introduction to Python Programming”,** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS:

1) Jake VanderPlas, **“Python Data Science Handbook: Essential Tools for Working with Data”,** 1st Edition, O’Reilly Media, 2016. ISBN-13: 978-1491912058
2) Aurelien Geron, **“Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems”,** 2nd Edition, O’Reilly Media, 2019. ISBN – 13: 978-9352139057.
3) Wesley J Chun, **“Core Python Applications Programming”,** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

4) Miguel Grinberg, **"Flask Web Development: Developing Web Applications with Python",** 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.	
SELF-STUDY REFERENCES/WEBLINKS:	
1. Dictionaries https://www.youtube.com/watch?v=daefaLgNkw0 **2. Tuples and Sets** https://www.youtube.com/watch?v=W8KRzm-HUcc	
COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Subject title: UNIX AND SHELL PROGRAMMING		
	Subject code: 18CS653	**No. of Credits: 3:0:0:0**	**No. of Lecture hours per week: 3**
	Exam Duration : 3hrs	**Exam Marks: 100**	**Total No. of Lecture hours: 39**

Course Objectives:
This course will help students to achieve the following objectives:

1. **Understand the role of the shell as a command interpeter**
2. **Navigate the file system to perform different operations**
3. **Understand the behavioral pattern of the shell and its essential programming constructs using the vi editor**
4. **Understand the concept of filters**
5. **Realize the mechanism of process creation**

Unit No.	Syllabus Content	No. of hours
1.	**The UNIX operating system, architecture and command usage**-- The Operating System, The UNIX operating system, Architecture , Features of UNIX, POSIX and the Single UNIX pecification, Locating Commands, Internal and External Commands, Command structure, Understanding the man documentation, Flexibility of command usage, ***man, man –k, apropos and whatis*** **General – Purpose Utilities** – ***cal, date, echo, printf, bc, script, passwd, who, uname, tty, sty ,*** Basics of electronic mail and handling mail with ***mailx*** program	8
2.	**The File System –** Categorization of files into ***ordinary, device*** and ***directory,*** the hierarchical structure between files and directories - The Parent-Child Relationship, The home directory, HOME variable, file system navigation with ***cd*** and ***pwd*** commands, directory commands ***mkdir*** and ***rmdir*** , absolute and relative Pathnames, use of ***ls*** in different formats. **Handling Ordinary Files** – ***cat, cp, rm, mv, more, lp file, wc, cd cmp, comm, diff, dos2unix, unix2dos,*** compress and archive -- ***gzip*** and ***gunzip, tar, zip*** and ***unzip*** **The Shell**: The Shell's Interpretive Cycle, Pattern Matching – The wild-cards , Escaping and Quoting, Redirection: The Three Standard Files (streams) for redirection and pipelines, filters, Two Special Files ***/dev/null*** and ***/dev/tty***, Pipes, **tee**: Creating a Tee, Command Substitution, Shell Variables, Effects of quoting and escaping	8
3.	**Essential Shell Programming** --Shell Scripts, **read** and **readonly** commands, using command line arguments, **exit** and Exit Status of command, The logical Operators && and || -conditional execution, The **if** Conditional, Using **test** and **[ ]** to Evaluate Expressions, The **case** Conditional, **expr**: Computation and String Handling, $0: Calling a Script by Different names, the use of **while** and **for l**oops**, set** and **shift** statements and **trap**. **Customizing the environment** -- Environment Variables. **Basic File Attributes**: **ls – l**: Listing File Attributes, The **–d** Option: Listing Directory Attributes, File Ownership, File Permissions **,** chmod: Changing File Permissions, Directory Permissions, Changing File Ownership**.** **More file attributes** : More File Attributes : File Systems and Inodes, Hard Links,	9

	Symbolic Links and ln, The Directory, Umask.	
4.	-***Simple filters** : **pr**: Paginating Files, **head**: Displaying the Beginning of a File , **tail**: Displaying the End of a File, **cut**: Slitting a File Vertically, **paste**: Pasting Files, **sort**: Ordering a File, **uniq**: Locate Repeated and Non repeated Lines, **tr**: Translating Characters, An Example: Displaying a Word-count List, **Filters using Regular Expressions** -- grep	7
5. **Self-Study Component**	**The Process** : Process Basics, **ps**: Process Status, System Processes (-e or –a), Mechanism of Process Creation, Internal and External Commands , Running Jobs in Background, Killing Processes with Signals, Job Control, **at** and **batch**: Execute Later, **cron**: Running Jobs Periodically, **time**: Timing Processes. **Vi Editor**,: **vi** Basics, Input Mode-Entering and Replacing Text, Saving Text and Quitting – The ex Mode, Navigation, Editing Text, Undoing Last Editing Instructions(**u** and **U**), Repeating the Last Command (**.**) , Editing Text, Undoing Last Editing Instructions(**u** and **U**), Repeating the Last Command (**.**),Searching for a Pattern (**/** and **?**), Substitution – Search and Replace	7

Text Books

1. **Sumitabha Das: UNIX – Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.**

Reference Books

1. **Behrouz A. Forouzan and Richard F. Gilberg, UNIX and Shell Programming, Thomson, 2005.**
2. **M.G. Venkateshmurthy, UNIX & Shell Programming, Pearson Education, 2005.**

Course Outcomes

CO1. Analyze the role of the shell for programming in the UNIX environment

CO2. Analyze and use the different ways in which the tasks can be executed using the wide set of commands the system offers.

CO3. Develop small shell scripts using vi editor.

CO4. Analyze and Apply the use of appropriate filters in problem solving.

CO5. Analyze and Apply the mechanism of process creation

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Leena Giri G.

Professor & Head
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Bangalore-560 056.

	Course Title: DATABASE MANAGEMENT SYSTEM		
	Course Code: 18CS53	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

	Description
Course Objectives:	1. To understand the different issues involved in the design and implementation of a database system. 2. To study the physical and logical database designs, database modeling, relational model. 3. To understand and use data manipulation language to query, update and manage a database 4. To develop an understanding of essential DBMS concepts such as: database security, integrity and concurrency.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** Introduction, An example, Characteristics of Database approach; Advantages of using DBMS approach; Data models, schemas and instances; three schema architecture and data independence; Database languages and interfaces; Classification of Database management systems. Entity-Relationship model; using High- Level conceptual Data Models for database Design; An example Database Application; Entity types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and structural Constraints; Weak Entity types; Refining the ER Design, ER to relational schema diagram mapping	9
2	**Relational Model and Relational Algebra:** Relational Model Concepts; relational Model constraints and Relational Database Schemas; update operations, Transactions and dealing with constraint violations; Unary Relational Operations; SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.	8
3	**SQL:** Specifying basic constraints in SQL; schema change statements in SQL; Basic queries in SQL; More complex SQL queries-Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL.	9
4	**Database Design:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Cod Normal form, Properties of Relational Decompositions; Algorithms for relational Database Schema Design; Multi-valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form	8
5	**Self study: Transaction Management:** Transaction and System Concepts, Desirable Properties of Transactions, characterizing schedules based on Recoverability, Characterizing schedules based on Serializability. Two-Phase Locking Techniques for Concurrency Control, Concurrency Control based on Timestamp ordering.	8

Course Outcomes	Description	RBT Levels
CO1	Understand the basic concepts and architecture associated with DBMS so as to employ the conceptual and relational models to design large database systems.	**L4**
CO2	Create, maintain and manipulate a relational database using SQL.	**L4**
CO3	Analyze the database design & normalize it so that the data conforms to design principles.	**L4**
CO4	Apply the characteristics of database transactions and assess how they affect database integrity and consistency.	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2								
CO2	3	3	3	3	2							
CO3	3	3	2	2								
CO4	2	2	2									

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015, **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education,2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

SELF STUDY REFERENCES / WEBLINKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015, **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

Chapter -18

COURSE COORDINATOR:	Asha Veena Potdar

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Advance Algorithm		
	Course Code: **18CS552**	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 04**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. To enable students to acquire knowledge on how to design and analyze iterative and recursive algorithms for complex applications. 2. To design optimal solutions with respect to time and space for real time problems. 3. To understand and analyze graph based algorithms and give optimal solutions. 4. To understand the significance of Modular arithmetic in designing secured applications.

Unit No	**Syllabus Content**	**No of Hours**
1	Review of Analysis Techniques: Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method.	11
2	Graph Algorithms: Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method.	11
3	Number-Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem.	10
4	**Self-Study Component**: String-Matching Algorithms: Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata.	10
5	Data structures: Hash Tables, direct address tables, red-black trees: properties of red-black trees, rotations and insertion.	10

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand the significance and concepts of time and space complexity analysis for designing optimal algorithms	**R2**
CO2	Analyze and solve the time complexity of iterative , recursive and graph based algorithms	**R3,R4**
CO3	Apply mathematical models to implement secured and optimal algorithms	**R4**

CO4	Familiarize with operations, suitability and optimality of data structures in a given application	**R5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**										
CO3	**3**	**3**	**2**									
CO4	**3**	**3**	**3**	**3**	**3**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010. ISBN:9780262033848

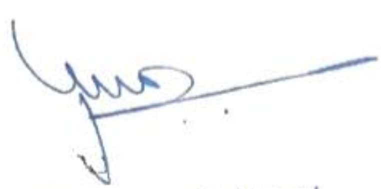
REFERENCE BOOKS:

1. Ellis Horowitz, SartajSahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007, ISBN 8173716129, 9788173716126
2. Horowitz, Sahani, Dinesh Mehata, ―Fundamentals of Data Structures in C++‖, Galgotia Publisher, ISBN: 8175152788, 9788175152786.
3. M Folk, B Zoellick, G. Riccardi, ―File Structures‖, Pearson Education, ISBN:81-7758-37-5
4. Peter Brass, ―Advanced Data Structures‖, Cambridge University Press, ISBN: 978-1-107-43982-5
5. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.

WEBLINKS:

1. **Introduction to algorithms and analysis By Prof. Sourav Mukhopadhyay | IIT Kharagpur** https://swayam.gov.in/nd1_noc20_cs93/preview
2. **Khan Academy course on advanced algorithms and data structure**

COURSE COORDINATOR:	**Dr. K R Shylaja**



Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

<table>
<tr><td rowspan="3"></td><td colspan="3">Sub Title : Artificial Intelligence</td></tr>
<tr><td>Sub Code:18CS553</td><td>No. of Credits:3=3 : 0 : 0 (L-T-P)</td><td>No. of lecture hours/week : 3</td></tr>
<tr><td>Exam Duration : 3 hours</td><td>CIE +Assignment + SEE =
45 + 5 + 50 =100</td><td>Total No. of Contact Hours :42</td></tr>
</table>

<table>
<tr><td rowspan="2">Course Objectives:</td><td>Description</td></tr>
<tr><td>Course objectives:
The objective of the course is to:
1. To understand agent programming for different applications.
2. To learn different problem solving methods for artificial agents.
3. To learn knowledge representation using predicate logic and propositional logic.
4. To learn implementing planning in agents.</td></tr>
</table>

Unit No	Syllabus Content	No of Hours
1	**Introduction:** what is AI**,** the foundations of AI,history of AI,the state of the art, **Intelligent agents:** Agents and environments, good behavior, concept of rationality, nature of environments, structure of agents.	8
2	**Problem-solving by Searching:** Problem solving agents, searching for solutions, uninformed search strategies, informed search strategies, heuristic functions, games, optimal decision in games ,alpha-beta pruning.	9
3	**Logical agents:** knowledge based agents, the wumpus world, logic, propositional logic, reasoning patterns in propositional logic, effective propositional inference ,agents based on propositional logic first order logic, syntax and semantics of first order logic, Propositional vs. Fist order inference.	8
4	**Self_study:Knowledge representation**: ontological engineering, categories and objects, actions, situations and events, mental events and mental objects .Planning: the planning problem, planning with state space search, partial order planning, planning graph.	8
5	**Making simple decisions:** combining beliefs and desires under uncertainty, the basics of utility theory, utility functions, multi attribute utility functions, decision networks, the value information ,decision theoretic expert system **,Learning from examples**: forms of learning, inductive learning, learning decision trees,	9

NOTE:

1. Include Self study component in any one of the Unit.

2. Total number of COs is decided by concerned Course Coordinator

COURSE OUTCOMES:

Course Outcomes	Description	RBT Levels
CO1	Describe and implement different types of agents for real time applications with proper understanding of agent programming	**L3**
CO2	Analyze and apply search methods of problem solving techniques in real time applications.	**L4**
CO3	Understand and derive agent's behavior and environment by applying predicate logic and propositional logic.	**L3**
CO4	Design and apply different planning methods and learning algorithms for improving agents performance	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3	3	2								2
CO3	3	3	3									2
CO4	2	3	3	2								2

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, by Stuart Russell and Peter Norvig, 2nd Edition, Publisher: Pearson education ltd-2013 ISBN: 978-81-7758-367-0

REFERENCE BOOKS:

1. Luger, G. F., & Stubblefield, W. A., Artificial Intelligence - Structures and Strategies for Complex Problem Solving. New York, NY: Addison Wesley, 5th edition (2005).
2. Nilsson, N. J. Artificial Intelligence - A Modern Synthesis. Palo Alto: Morgan Kaufmann. (1998).
3. Nilsson, N. J., Principles of Artificial Intelligence. Palo Alto, CA: Tioga (1981).
4. Rich, E., & Knight, K., Artificial Intelligence. New York: McGraw-Hill (1991).

SELF STUDY REFERENCES/WEBLINKS:

1. http://Nptel.ac.in/courses/106/106/106140
2. http://Nptel.ac.in/courses/106/102/102220

COURSE COORDINATOR:	**ARATHI .P**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: **Core JAVA**		
	SubjectCode: **18CS52**	**No. of Credits: 4 : 0 : 0 : (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours :52**

	Description
Course Objectives	**CO1:** Understand the fundamental features of Object-Oriented paradigm of the Java programming language. **CO2:** To learn the usage of Inheritance, Packages,Interfaces and Exception Handling. **CO3:** To create multiple threads and understand the basic Networking concepts and RMI in Java. **CO4:** Able to design Event Handling, GUI applications with advanced Java concepts.

Unit No	Syllabus Content	No of Hours
1	**Introduction to Java**: History of Java; Java Programming Environment; Fundamental Programming Structures in Java; Data Types,Variables and Constants,Operators,Strings,Input and Output;Control Flows;Arrays. **Object and Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize() Method, A Stack Class; Introducing Access Control, Understanding static, Introducing final. **Package and Interface:** Packages,Access Protection, Importing Packages, Interfaces; **Applet Fundamentals**.	11
2	**Inheritance:**Inheritance Basics;Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance; **Exception Handling**: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try statements, throw, throws, finally, Chained Exceptions.	10
3	**MultiThreaded Programming:** Thread model; The Main Thread; Creating a Threads;Using isAlive() and join();Thread priorities; Synchronization;	10

	Inter-thread communication; Deadlock. **Networking:** Networking Basics; The Networking Classes and Interfaces;TCP/IP Client Sockets;TCP/IP Server Sockets. **Java Remote Method Invocation(RMI):**Remote Method Invocation concept and technology.	
4	**<u>Self study component</u>** **Event Handling:** History of user interface toolkit; Displaying the Frames; Event Handling Mechanisms; The Delegation Event Model(DEM); Sources of events; Adapter classes; Inner classes. **Introducing GUI Programming with Swing:**Introducing Swing; **JDBC:**The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Statement Objects; ResultSet; Transaction Processing.	**11**
5	**Servlet:** The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API;Packages; Handling HTTP Requests and Responses; Handling Cookies; Session Tracking. **Java Server page (JSP)**: Overview of JSP; JSP tags; Invoking java code with Scripting Elements.	**10**

Course Outcomes	Description	RBT Levels
CO1	Design Classes and establish relationship among Classes for various applications from problem definition.	**L4**
CO2	Analyze and implement reliable object-oriented applications using Java features such as Inheritance and Exception Handling.	**L4**
CO3	Write Java programs to implement Event Handling mechanisms, Multithreaded Programming, Networking concepts, and GUI Programming.	**L3**
CO4	Demonstrate the advanced Java concepts such as Servlets, JDBC and Java Server Pages.	**L4**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2	-	-	-	-	-	-	-
CO2	3	3	2	1	2	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	3	3	3	2	2	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. **The Complete Reference - Java , Herbert Schildt 9th Edition, 2016, TMH Publications, ISBN :978-93-392-1209-4.**
(Chapters: 1, 2, 3, 4, 5, 6, 7,8,9,10,11,13,16,20,22,23,24,31,38)

2.The Complete Reference -J2EE , Jim Keogh, 3rd Edition, 2015, TataMcGRAW Hill Publications, ISBN : 9780070529120. (Chapters: 6,10,11,15)

REFERENCE BOOKS:

1. Cay S.Horstmann :Core Java volume I-Fundamental ,11th Edition, Pearson Education, 2019.

SELF STUDY REFERENCES/WEBLINKS:

1. https://www.youtube.com/watch?v=mQj34vUhpts&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44&t=0s
2. https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44

COURSE COORDINATOR:	**Dr.SMITHA SHEKAR B** **Prof.PUSHPAVENI H P** **Prof.VEENA A**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: OOPS with C++ (IDE)		
	Course Code: 18CSE011	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Understand the philosophy of object-oriented programming and the concepts of encapsulation, abstraction, inheritance, and polymorphism. 2. Implement the concept of constructors and destructors. 3. Design and test the implementation among objects using a class hierarchy and inheritance. 4. Identify the relationship between the run time polymorphism and compile time polymorphism. 5. Implement file I/O operations, exception handling mechanisms and STL.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Overview of C++, Basic concepts of OOP, Sample C++ program, operators in C++, Function basics, inline functions, function overloading. **Classes and Objects:** Class Specification, Defining member functions, Static members, Friend functions and classes, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors.	**10**
2	**Operator overloading:** Rules, Overloading +, - , pre-increment, post-increment, [ ], <<, >> using friend functions. **Inheritance:** Types, Inheritance and protected members, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.	**8**
3	**Virtual functions and Polymorphism:** Virtual functions, Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.	**8**
4	**I/O System Basics and File I/O:** C++ stream classes, Formatted I/O, Manipulators, fstream and the File classes, Opening and closing a File, Reading and Writing Text Files, Unformatted and Binary I/O, Random Access **Namespaces :** Fundamentals, using, options, the std namespace.	**8**
5	**SELF-STUDY –** **Exception Handling:** Exception handling fundamentals, Handling Derived-Class Exceptions, Exception handling options **STL**: An overview, The container classes, vectors, lists.	**8**

Course Outcomes	Description	RBT Levels
CO1	Identify the classes, objects, members of a class and the relationships among them to solve a specific problem.	**L2**
CO2	Illustrate the concept of constructors and destructors and describe the mechanism of overloading the operators.	**L2**
CO3	Examine the concept of data encapsulation, inheritance and polymorphism as used in C++ programming language.	**L3**
CO4	Discover the commonly used operations involving the file operations and manipulators.	**L3**
CO5	Interpret the concepts of exception handling and the built-in standard template library.	**L3**

CO-PO Mapping	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	2	3	2	2	1							
CO3	2	2	3	2	2			2				
CO4	2	2	3	2	1			1				
CO5	2	3	3	2	1							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Herbert Schildt, "*The Complete Reference C++, 5th Edition*", Tata McGraw Hill, 2013. **ISBN - 978-0071634809**

REFERENCE BOOKS:

1. Stanley B.Lippmann, JoseeLajore, "*C++ Primer, 5th Edition*", Addison Wesley, 2013. **ISBN - 978-0321714114**
2. E Balagurusamy, "*Object Oriented Programming with C++*", 6th Edition, Tata McGraw Hill, 2013. **ISBN - 9781259029936**

SELF STUDY REFERENCES/WEBLINKS:

1. https://en.wikibooks.org/wiki/C%2B%2B_Programming/Weblinks

2. https://github.com/EbookFoundation/free-programming-books/blob/master/free-programming-books.md

COURSE COORDINATOR:	**Praveena M V**

	Course Title: WEB TECHNOLOGIES		
	Course Code: 18CS551	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To familiarize with terminologies, tools, protocols used in web. 2. Identify a valid conformed XHTML document involving a variety of Elements. 3. Apply JavaScript to design interactive web pages. 4. Design well-formed XML documents.

Unit No	Syllabus Content	No of Hours
1	**Fundamentals**: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. **Introduction to XHTML:** Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links**.**	**8 Hours**
2	**XHTML (continued):** Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.	**8 Hours**
3	**The Basics of JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.	**8 Hours**
4	**JavaScript and XHTML**: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification. **Dynamic Document with JavaScript**: Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.	**10 Hours**
5	***Self-Study*: Introduction to XML**: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Understand terminologies, tools and protocols used in web.	L2
CO2	Design, understand and analyze static web pages.	L4
CO3	Design, understand and analyze interactive, Dynamic web pages.	L4
CO4	Design, understand and analyze data Representation , management and display.	L4

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**3**	**3**	**2**								
CO2			**3**									
CO3			**3**									
CO4			**3**	**3**	**1**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Programming the World Wide Web – Robert W. Sebesta, 4thEdition, 2011, Pearson Education.

REFERENCE BOOKS:

1. Web Programming Building Internet Applications – Chris Bates, 3rd Edition, 2006, Wiley India,ISBN : 978-81-265-1290-4

2.Internet & World Wide Web How to H program – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, 2004, Pearson Education / PHI, ISBN-10: 0-130-89550-4

SELF STUDY REFERENCES/WEBLINKS:

http://www.w3schools.com

COURSE COORDINATOR:	**Harish Kumar H C** **Veena .A**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Computer networks and internet protocols		
	Course Code: **18CS54**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand the fundamental and advanced concepts of communication networks OSI,TCP/IP model , and simulation of computer networks in depth 2. To understand and analyze the data link layer protocols 3. To understand and analyze packet switching networks and congestion control. 4. To understand and analyze the IP protocols. 5. To create the awareness of internet routing protocols, transport layer protocols, and application layer protocols.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction to networking:** Data Communications, Networks, Layered Tasks, The OSI model, Layers in OSI model, TCP/IP Protocol suite, simulation of computer networks	9
2	**(self study)** **Medium access:** Framing, Stop and wait ARQ, Go-back-N ARQ, Random access, Channelization,connecting devices(hubs, repeaters, bridges, switches)	9
3	**Packet-Switching Networks:** Datagram Networks, Virtual Circuit Networks, Shortest-path routing, congestion and congestion control(open loop, closed loop), techniques to improve QoS (scheduling, traffic shaping, token bucket, leaky bucket)	8
4	**IP protocols**: IPV4–addressing, header format, subnet addressing, fragmentation and reassembly; IPV6-addressing, header format.	8
5	**TCP,UDP and Internet Protocols** : User datagram protocol; Transmission control protocol; TCP congestion control; Internet routing protocols (RIP,OSPF) **Application layer :** DNS, Telnet, Electronic mail ,World wide web	8

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand the concepts of communication networks, OSI, and TCP/IP model and Identify the different types of network topologies and protocol models	**L2**

CO2	Differentiate between different access control methods to the shared transmission media	**L3**
CO3	Examine routing and congestion control protocols and analyze the concepts of packet switching networks	**L4**
CO4	Investigate the functionalities and services provided by layer 3 and above and analyze application layer protocols, internet routing protocols, transport layer protocols and different protocols used to implement internetworking	**L4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**1**								
CO2	**3**	**3**	**2**	**1**								**1**
CO3	**3**	**3**	**2**	**1**								**1**
CO4	**3**	**3**	**2**	**1**								**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, *ISBN*-13, 9780073250328,2014.- units,1,2,3

2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014. Shortest-path routing, units 4, 5

REFERENCE BOOKS:

1. William Stallings: Data and Computer Communication, 10th Edition, Pearson Education, ISBN-13: 978-0133506488, 2013.
2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 5th Edition, The Morgan Kaufmann Series, ISBN-9780123850591, 2011.
3. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th edition, Pearson, ISBN 13: 9780132126953, 2011.
4. Nader F. Mir: Computer and Communication Networks, 2nd Edition, ISBN-13: 978-0133814743, 2014.

SELF STUDY REFERENCES/WEBLINKS:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, *ISBN*-13, 9780073250328,2014.

2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014.

COURSE COORDINATOR:	**Dr. Mary Cherian**

	Course Title: Network programming lab using JAVA and NS		
	CourseCode: **18CSL57**	**No. of Credits: 0 : 0 :1** **(L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE+ SEE = 50+50=100**	

Course Objectives:	**Description**
	1. To understand and apply the basics of Java Programming. 2. To demonstrate some concepts of Networking using Java Programming. 3. To introduce network topologies using NS2 and check the performance of TCP and UDP protocols 4. To understand the creation of an Ethernet LAN by changing error rate and data rate to verify the throughput. 4. To understand and design wireless and wired network using NS2.

Unit No	**Syllabus Content**
	PART-A
1.	Write a Java program using synchronized threads to demonstrate producer-consumer concepts.
2.	Write a Java Swing program that consists of three tabs named Select Semester, Select Course and Select Electives. The “Select Semester” tab must contain four Buttons. The “Select Course” should contain a list of check boxes named with the courses such as Java, Compiler Design, and Machine Learning. “The Select Electives” tab should contain a drop down list of elective names of subjects. Hint: Swing application which uses, **i)** JTabbed Pane **ii)** Each tab should Jpanel which include any one component given below in each JPanel **iii)**CheckBox/List/RadioButton
3.	Design and implement a simple Client Server Application using RMI.
4.	Design and implement Client Server communication using TCP socket programming. (Client requests a file, Server responds to client with contents of that file which is then displayed on the screen by Client).
5.	Implement a JAVA Servlet Program to create a dynamic HTML web page. (user name and password should be accepted using HTML and displayed using a Servlet).
6.	Using Java JDBC and MySQL, develop a program to accept book information such as accession number, title, authors, edition and publisher from JSP web page from the stored table in the database. Perform the following: 1.Search for a book with the title specified by the user 2.Display the search results with proper headings.

PART-B	
1	Simulate a three nodes point-to-point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2	Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
3	Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP. 3 Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
4	To create scenario and study the performance of Stop and Wait ARQ Protocol through simulation.
5	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

Course Outcomes	Description	RBT Levels
CO1	Design solutions using programming constructs in Java to create User interface.	**L4**
CO2	To Demonstrate the usage of Java networking concepts and creation of dynamic web pages.	**L5**
CO3	Apply and compare the performance of transport layer protocols.	**L4**
CO4	Analyze the working of LAN by inducing error model.	**L4**
CO5	Evaluate the parameters to be configured for wired and wireless communication.	**L5**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2							
CO2	3	3	3	1	2							
CO3	3	3	3	1	1							
CO4	3	3	3	1	2							
CO5	3	3	3	1	2							

Strong -3 Medium -2 Weak -1

Instructions to Students:

Part-A: The programs formulated should be executed using Java Programming Language using eclipse IDE.

Part-B: The programs formulated should be executed using NS2 Simulation Software.

COURSE COORDINATOR:	1.Dr.Mary Cherian 2.Dr.Smitha Shekar B 3.Prof Madhu B 4.Prof.Pushpaveni H P 5.Prof.Veena A

Professor & Head
Department of Computer Science &
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Bangalore-560 056.

	Course Title: Software Engineering		
	Course Code: 18CS51	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To provide the idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases. 2. To provide an idea of using various process models in the software industry according to given circumstances. 3. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

Unit No	Syllabus Content	No of Hours
1	**SOFTWARE AND SOFTWARE ENGINEERING:** The Nature of Software, Software Engineering, The Software Process, Software Engineering Practice. **THE SOFTWARE PROCESS and PROCESS MODELS:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Final Word on Evolutionary Processes, Specialized Process Models: Component-Based Development, The Formal Methods Model, The Unified Process, Phases of the Unified Process, Personal and Team Process Models. **AGILE DEVELOPMENT:** What Is Agility? Agility and the Cost of Change, What Is an Agile Process? , Extreme Programming, Other Agile Process Models: Scrum, Dynamic Systems Development Method, Agile Modeling, Agile Unified Process.	**10**
2	**UNDERSTANDING REQUIREMENTS:** Definition of Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements and Validating Requirements. **REQUIREMENTS MODELING: SCENARIO-BASED METHODS:** Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case.	**8**
3	**DESIGN CONCEPTS:** Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model. **ARCHITECTURAL DESIGN:** Software Architecture, Definition of software architecture, Architectural Genres, Architectural Styles, Architectural Design. **COMPONENT-LEVEL DESIGN:** What Is a Component? Designing Class-Based Components, Conducting Component-Level Design, Designing Traditional Components and Component-Based Development.	**8**

4	**SOFTWARE TESTING STRATEGIES:** A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging. **TESTING CONVENTIONAL APPLICATIONS:** Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing.	**8**
5	**SELF-STUDY –** **PROJECT MANAGEMENT CONCEPTS:** The management spectrum, People, Product, Process, Project, W^5HH principle. **PROCESS AND PROJECT METRICS:** Metrics in the process and project domains, Software measurement, metrics for Software quality, Integrating metrics within the software process, Metrics for small organizations, Establishing a software metrics program. **ESTIMATION FOR SOFTWARE PROJECTS:** Observations on estimation, The project planning process, Software scope and feasibility, Resources, Software project estimation, Decomposition techniques, Empirical estimation models.	**8**

Course Outcomes	**Description**	**RBT Levels**
CO1	Decompose the given project in various phases of a lifecycle.	Knowledge, Understand (Level1, Level2)
CO2	Choose appropriate process model depending on the user requirements.	Apply, Create (Level 2)
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	Evaluate(Level 3)
CO4	Analyze various processes used in all the phases of the product.	Analyze(Level 3)
CO5	Apply the knowledge, techniques, and skills in the development of a software product.	Apply (Level 3)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**2**									
CO2	**3**	**2**	**1**									
CO3	**2**	**2**	**1**		**3**			**1**				
CO4	**2**	**2**		**2**		**1**		**1**			**2**	**2**
CO5	**1**	**2**										**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:	
1. Software Engineering - A Practitioner’s approach, Roger S. Pressman and Bruce R. Maxim, 8th Edition, Tata McGraw-Hill, 2019.	
REFERENCE BOOKS:	
1. Software Engineering, 10th Edition, Ian Sommerville, Pearson Education Ltd., 2017. **2. Software Engineering - A Precise Approach,** Pankaj Jalote, Wiley, 2010.	
SELF STUDY REFERENCES/WEBLINKS:	
1. http://www.site.uottawa.ca/school/research/lloseng/weblinks.html 2. https://www.ece.rutgers.edu/~marsic/books/SE/links/	
COURSE COORDINATOR:	**Praveena M V**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: DATABASE APPLICATIONS LABORATORY		
	Course Code: 18CSL56	**No. of Credits: 0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE + SEE = 50+50=100**	

Course Objectives:	**Description**
	1. Provide a strong formal foundation in database concepts and technology and techniques relating to query processing by SQL. 2. Design and implement a real time database application for a given problem-domain. 3. Demonstrate the use of relational data model and systematic database design approaches covering conceptual design, logical design through the mini project. 4. Introduce MongoDB, CRUD Operations & its usage in Enterprise Applications.

COURSE CONTENTS:

Part A	1. Execution of given 3 exercises. 2. Introduction to MongoDB and CRUD Operations. 3. MongoDB Usage in Enterprise Applications.
Part B	Implementation of mini project.

PART – A

INSTRUCTIONS:

1. The exercises are to be solved in an RDBMS environment like Oracle or DB2.
2. Suitable tuples have to be entered so that queries are executed correctly.
3. Relevant queries other than the ones listed along with the exercises may also be asked in the examinations.
4. Questions must be asked based on lots.

1	**Consider the schema for Movie Database:** ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by ‘Hitchcock’. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by ‘Steven Spielberg’ to 5.
2	**Consider the following schema for Order Database:** SALESMAN(Salesman_id, Name, City, Commission) CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id) Write SQL queries to

	1. Count the customers with grades above Bangalore's average. 2. Find the name and numbers of all salesmen who had more than one customer. 3. List all the salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order of a day. 5. Demonstrate the DELETE operation by removing salesman with id 12345. All his orders must also be deleted.
3	**Consider the schema for College Database:** STUDENT(USN, SName, Address, Phone, Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN, SSID) SUBJECT(Subcode, Title, Sem, Credits) CIEMARKS(USN, Subcode, SSID, CIE1, CIE2, CIE3, FinalCIE) Write SQL queries to 1. List all the student details studying in fourth semester 'C' section. 2. Compute the total number of male and female students in each semester and in each section. 3. Create a view of Test1 marks of student USN '1DA15CS101' in all subjects. 4. Calculate the FinalCIE (average of best two test marks) and update the corresponding table for all students. 5. Categorize students based on the following criterion: If FinalCIE = 17 to 20 then CAT = 'Outstanding' If FinalCIE = 12 to 16 then CAT = 'Average' If FinalCIE< 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.

PART – B

A mini project should be implemented by the students in teams. The maximum size of a team can be 3 from the same batch. The students have to finalize a project topic by discussing with the faculty. The mini project must be carried out in the college only.

Design a Database application for a particular case study using Visual Basic/Java Script in visual studio /Eclipse Tool.

The tasks when implementing mini project would be:

1. Understand the complete domain knowledge of the application and derive the complete data requirement specification for the mini project.
2. Design the ER diagram for the application.
3. Design Relational Schema diagram for the application.
4. Normalization of the relational design.
5. Implement minimum 5 queries for the application.
6. Documentation & submission of report.

General guidelines:

- Database for the project - Oracle / MySQL/ DB2 / SQL Server / MongoDB etc.

Sample Mini Projects.

Inventory Control System.	Placement management system
Material Requirement Processing.	Library management system
Hospital Management System.	Web Based User Identification System.

Railway Reservation System.	Timetable Management System
Hotel Management System	Personal Information System

Note: In the examination, the marks will be evaluated based on database execution from Part A and project demonstration, project report and viva-voce from Part B.

Course Outcomes	Description	RBT Levels
CO1	Understand, analyze, and effectively explain the underlying concepts of database technologies.	**L4**
CO2	Use SQL to create, secure, populate, maintain and query a database.	**L4**
CO3	Design and implement real time applications according to design principles that balance data retrieval performance with data consistency.	**L5**
CO4	Identify the Core MongoDB Operations.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3	3									
CO3	3	3	3	3	3				3			
CO4	3				2							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015 **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education, 2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

SELF STUDY REFERENCES/WEBLINKS:

1. https://www.mongodb.com/
2. https://docs.mongodb.com/manual/crud/

COURSE COORDINATOR:	Asha Veena Potdar

	Course Title: Digital Image Processing		
	Course Code: **18CS642**	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	Description
	1. To understand the image fundamentals. 2. To understand the mathematical transforms necessary for image processing and to study the image enhancement techniques. 3. To understand the image degradation/restoration model and different noise models. 4. To understand the uses of pseudo colors and to study the image compression models. **5.** To understand Morphological Image Processing and the image segmentation.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** Basic concepts, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System. **Digital Image Fundamentals:** Elements of visual perception, Image sensing and acquisition, Image sampling and quantization, Some basic relationships between pixels.	**9**
2	**Image Enhancement in Spatial domain:** Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing and Sharpening Spatial Filtering. **Self Study:** **Image Enhancement In Frequency Domain:** Introduction to Fourier Transform, Smoothing and Sharpening frequency domain filters	**9**
3	**Image Restoration:** Model of image degradation/restoration process, noise models, Restoration in the Presence of Noise, Only– Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position– Invariant Degradations, inverse filtering.	**8**
4	**Color Image Processing**: Color fundamentals, color models, pseudo color Image processing, basics of full color image processing, color transformations. **Image Compression:** Fundamentals, Image compression models, Elements of Information Theory	**8**
5	**Image Segmentation** Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region Based Segmentation. **Morphological image processing:** Dilation and Erosion, Opening and Closing, Some Basic Morphological Algorithms	**8**

Course Outcomes	Description	RBT Levels

CO1	**Acquire** fundamental concepts and applications of digital image processing.	**L1, L3**
CO2	**Interpret and Apply** the two categories of image enhancement techniques.	**L2, L3**
CO3	**Explain** image restoration by applying filters and analyze the use of color images.	**L1, L2**
CO4	**Apply** suitable morphological operations for the given image and understand different techniques of Image compression.	**L3**
CO5	**Develop** algorithms for segmenting the given image and explain different methods of object recognition.	**L4,L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**2**			**2**				**1**			**1**
CO2	**2**	**2**	**2**	**2**	**2**				**1**			**1**
CO3	**2**	**2**	**2**	**2**	**2**				**1**			**1**
CO4	**2**	**2**	**2**	**2**	**2**				**1**			**1**
CO5	**2**	**2**	**2**	**2**	**2**				**1**			**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Third Edition, Prentice Hall, 2007

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing – Anil K Jain, Pearson Education/Prentice- Hall of India Pvt. Ltd., 1997.
2. S Jayaraman, S Esakkirajan, T Veerakumar; "Digital Image Processing"; Tata McGraw Hill; 2009;
3. Chris Solomon and Tony Breckon, Fundamentals of Digital Image Processing- A Practical Approach with examples in MATLAB, John Wiley & Sons Ltd., 2011

SELF STUDY REFERENCES/WEBLINKS:

1. Dr. G. Harit - Digital Image Processing (NPTEL course) – https://nptel.ac.in/courses/106105032/

Professor & Head
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Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

<table>
<tr><td rowspan="3"></td><td colspan="3">Course Title: DISTRIBUTED OPERATING SYSTEM</td></tr>
<tr><td>Course Code: 18CS641</td><td>No. of Credits: 3 : 0 : 0 (L-T-P)</td><td>No. of lecture hours/week : 3</td></tr>
<tr><td>Exam Duration : 3 hours</td><td>CIE+ Assignment + SEE = 45+5+50=100</td><td>Total No. of Contact Hours : 42</td></tr>
</table>

Course Objectives:	**Description**
	1. Identify the issues involved in designing distributed systems. 2. Describe various communication mechanism involved distributed systems. 3. Analyze process migration approach and distributed deadlock management 4. Describe features distributed shared memory and file system 5. List and describe load balancing mechanisms in distributed systems.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals:** What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE). **Message Passing:** Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication	**9 Hours**
2	**Remote Procedure Calls:** Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance	**9 Hours**
3	**Distributed Shared Memory:** Introduction, General Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. **Synchronization:** Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms.	**8 Hours**
4	**Resource Management:** Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach. **Process Management:** Introduction, Process Migration, Threads.	**8 Hours**
5	***Self-study*: Distributed File Systems:** Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File–Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Identify the issues involved in designing distributed systems, and their internal communication mechanism.	L2
CO2	Demonstrate message passing mechanism of distributed methods	L3
CO3	Compare various process migration approaches and distributed deadlock management approaches.	L3
CO4	Apply features distributed shared memory and file system.	L3
CO5	Examine the various resource management techniques for distributed systems.	L1

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO8	PO9	PO10	PO11	PO12
CO1			**3**							**1**		
CO2			**3**									
CO3		**2**	**3**									
CO4		**2**	**3**		**1**							
CO5					**3**			**1**			**2**	

Strong -3 **Medium -2** **Weak -1**

TEXT BOOKS:

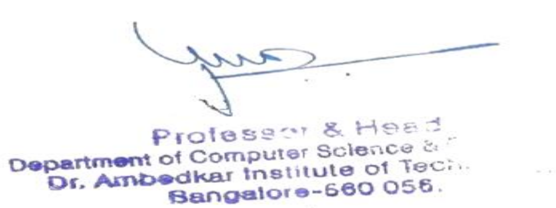
1. Pradeep. K. Sinha: Distributed Operating Systems: Concepts and Design, PHI, 2007.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum: Distributed Operating Systems, Pearson Education, 2013.
2. George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair: Distributed System Concepts and Design. Pearson Education, 5th Edition, Pearson Education, 2012.

SELF STUDY REFERENCES/WEBLINKS:

COURSE COORDINATOR:	**Harish Kumar H C**



Sub Title : UNIX PROGRAMMING		
Sub Code:18CS63	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of ContactHours :42**

Course objectives:

1. To familiarize with Unix standards and basic commands
2. To understand standard UNIX utilities to implement shell programs.
3. To illustrate the manipulation of system resources such as files, processes and signals.
4. To Explain IPC using different methodologies.

UNIT No	Syllabus Content	No of Hours
1	**Introduction To UNIX:** The UNIX Architecture, features of UNIX, command structure, Command arguments and options, Introduction to vi editor. Basic Unix commands such as echo, printf, ln, who, date, passwd, cal, Combining commands. The root login. Becoming the super user: su command. **Unix Files:** Basic file types, Organization of files. Parent child relationship. The home directory and the HOME variable. Relative and absolute pathnames. **Directory commands** – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. **File handling commands:** cat, cp, rm, mv, cmp. **File Attributes and Permissions:** The ls command with options. Changing file permissions: the relative and absolute permissions changing methods. Directory permissions. Networking and other detailed command sets to be covered are ping, telnet, ftp, ps, du,df, mount, unmount, find and tar.	8
2	**Working with the Shell**: Shell, The shells interpretive cycle, types of shell, Wild cards, pipes and i/o redirection, simple Filters: head, tail, cut, and sort. Filters using Regular Expression: The grep and egrep Typical examples involving different regular expressions **Shell programming**: shell syntax, Ordinary and environment variables, read command, Command line arguments, Logical operators for conditional execution, The if, while and for statements. Handling positional parameters, here (<<) document, Simple shell program examples.	8
3	**UNIX File APIs:** General File APIs, File and Record Locking, Directory	8

	File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. **Signals:** Signals, The UNIX Kernel Support for Signals, signal sets, Signal Mask, sigaction, The SIGCHLD Signal, Kill, and Alarm function.	
4	<u>**Self-Study Component**</u> **UNIX Processes and Process Control:** **The Environment of a UNIX Process:** Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. **Process Control:** Introduction, Process Identifiers, fork, vfork, exit, Zombie process, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, system Function.	9
5	**Interprocess Communication:** Overview of IPC Methods, Pipes, popen, pclose functions, FIFOs, Message Queues. **Introduction To Sockets:** Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.	9

<u>Note 1</u>: All 5 Units will have internal choice.
<u>Note 2</u>: Three assignments are evaluated for 5 marks. Assignment-1 from units 1and 2. Assignment-2 from units 3 and 4. Assignment-3 from unit 5.

Course Outcomes:

1. Apply UNIX commands to create Shell Scripts.

2. Analyze and apply the knowledge of different UNIX system calls to manipulate system resources like files and processes to create new applications.

3. Create Networking, Client-Server or Distributed Applications using any IPC techniques.

TEXT BOOK:

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999. (Chapters 7, 8.1, 9)

2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005.(Chapters 7, 8, 14)

3. Sumitabha Das: UNIX Concepts and Applications, 4th Edition McGraw Hill Education (India)

Private Limited

REFERENCE BOOKS/WEBLINKS:

1. Marc J. Rochkind: Advanced UNIX Programming, 2nd Edition, Pearson Education, 2005.

2. UreshVahalia: UNIX Internals: The New Frontiers, Pearson Education, 2001.

3. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, (2002) UNIX Network Programming - The Sockets Networking API, 3rd edition, Volume 1, PHI Learning Private Limited India, New Delhi.
4. Yashavant Kanetkar- UNIX Shell Programming

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	Course Title: Machine Learning		
	Course Code:18CS62	**No. of Credits: 4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. Understand some basic machine learning algorithms and techniques and their applications. **2.** Able to analyze the underlying mathematical relationships among Machine Learning algorithms. **3.** Able to identify, formulate and solve machine learning problems that arise in practical applications.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias. Text Book1, Sections: 1.1 – 1.3, 2.1-2.5, 2.7	**10 hours**
2	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. Text Book1, Sections: 3.1-3.7	**10 hours**
3	**Artificial Neural Networks:** Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, important terminologies of ANN, McCulloch-Pitts Neuron, Linear Separabality, Hebb Network, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network, Radial Basis function network. Text book 2, Sections: 2.1 – 2.7,3.1-3.3,3.5,3.6	**12 hours**
4	**Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS	**10 hours**

	error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm Text book 1, Sections: 6.1 – 6.6, 6.9, 6.11, 6.12	
5	**Self Study** **Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. **Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, Text book 1, Sections: 5.1-5.6, 8.1-8.5	**10 hours**

Course Outcomes	**Description**	**RBT Levels**
At the End of the Course, the students should be able to		
CO1	Acquire knowledge about basic concepts of Machine Learning.	**L2**
CO2	Identify and apply machine learning techniques suitable for a given problem	**L3**
CO3	Design and implement machine learning solutions to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**			**2**							
CO2	**3**	**3**	**2**		**2**							
CO3	**3**	**3**	**3**	**3**	**3**							
CO4	**3**	**3**		**3**	**3**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2. S N Sivanandam, S N Deepa, Principles of Soft Computing,3rd Edition, Wiley Publication,2019.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.
3. Samir Madhavan ,Mastering python for data science, 2015, Packt Publishing, ISBN: 9781784390150
4. Sebastian Raschka, Vahid Mirjalili,Python Machine Learning - Second Edition: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow Kindle Edition.

WEBLINKS:

1. https://towardsdatascience.com/real-world-implementation-of-logistic-regression-5136cefb8125
2. https://towardsdatascience.com/linear-regression-python-implementation-ae0d95348ac4
3. https://towardsdatascience.com/decision-tree-in-machine-learning-e380942a4c96
4. https://towardsdatascience.com/basics-of-bayesian-network-79435e11ae7b
5. https://towardsdatascience.com/introduction-to-artificial-neural-networks-ann-1aea15775ef9

COURSE COORDINATOR:	**Dr. K R Shylaja** **Mrs. Asha K N**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : INTERNET OF THINGS (IOT) LAB		
Sub Code:18CSL65	**No. of Credits:1=0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

The objectives of this course are:

1. Provide Comprehend knowledge about the core concepts of IoT and operating systems used to build IoT applications
2. Develop hands-on IoT programming knowledge for real-world applications.
3. Implement the network and communication protocols that helps in wireless communication
4. Understand the data transfer between IoT device and cloud Platform.

List of Programs

1.	Write a program that Uses different components like Led, switch, ADC, PWM & serial communication on TM4C123 Launchpad using Energia software
2.	Write a program to connect the Launchpad with Wi-Fi network & print the dynamic IP and static IP Addresses on the Serial Monitor
3.	Write a program to connect the Launchpad with Wi-Fi & print the local IP, Subnet Mask, Gateway IP on the Serial Monitor
4.	Illustrate TCP based Client Server Communication Model.
5.	Illustrate UDP based Client Server Communication Model
6.	Write a program for HTTP based webserver to manipulate the GPIO's of WiFi Module and monitor the Sensor data connected with WiFi Module.
7.	Write a program that Uses Blynk API's and to control the Launchpad with Blynk Application
8.	Devise a program to control the Launchpad with IFTTT Application
9.	Design a Simple MQTT Based communication model to retrieve the sensor data from a cloud Storage

Course Outcomes:

At the end of this lab session, the student will

CO1: Examine the features and process of integration of Launchpad with IoT applications.
CO2: Discover the role of TCP/UDP protocols in serving as communication models for IoT.
CO3: Interpret the Sensor data collected by interfacing the sensors to the Wi-Fi module on an embedded platform.
CO4: Determine the IoT devices to work with Cloud Computing infrastructure and enable the transfer of data between IoT devices and the cloud providers

Reference:

1. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh and Priyanka Tyagi, “Getting Started for Internet of Things with Launch Pad and ESP8266”, River publisher
2. “http://www.ti.com/tool/MSP-EXP430G2”
3. “https://www.udemy.com/course/internet-of-things-iot-for-beginners-getting-started/”

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	2	2	-	-	-	-	-	-	-
CO2	2	3	2	3	-	-	-	-	-	-	-	-
CO3	2	2	3	3	-	-	-	-	-	-	-	-
CO4	3	2	-	3	3	-	-	-	-	-	-	-
Strong -3 Medium -2 Weak -1												

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Machine Learning Laboratory		
	Course Code: 18CSL66	**No. of Credits: 0: 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

	Description
Course Objectives:	This course will enable students to 1. Implement the machine learning algorithms using the Data Set. 2. Learn to use Various python tools for Machine Learning 3. Analyze and interpret the outcomes of the machine learning algorithms.

Lab Experiments:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

NOTE:

1. The programs should be implemented in Python.

2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in APIs of Python.

3.Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or (https://www.kaggle.com/datasets) or constructed by the students.

Conduction of Practical Examination:

1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Marks distribution: Procedure + Conduction + Viva:**10 + 30 +10 (50)**
4. **Change of experiment is allowed only once and marks allotted to the procedure part tobe made zero.**

Course Outcomes	**Description**	**RBT Levels**
The students should be able to:		
CO1	Understand and interpret the implementation procedures and python Libraries for the machine learning algorithms.	**L2**
CO2	Analyse the correctness of the data sets to apply appropriate Machine Learning algorithms.	**L3**
CO3	Design and implement Machine Learning algorithms to solve real world problems.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**		**3**							
CO2	**3**	**3**	**3**	**3**	**3**							
CO3	**3**	**3**	**3**	**3**	**3**	**2**						**2**
CO4	**3**	**3**		**3**	**3**							

Strong -3 Medium -2 Weak -1

COURSE COORDINATORS:	**Dr. Shylaja K R** **Mrs. Asha K N**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Wireless Sensor Networks

	Course Code: 18CSE021	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours :42**

Course Objectives:	**Description**
	The student should be made to 1. Learn Sensor Network fundamentals. 2. Understand the different routing protocols. 3. Have an in-depth knowledge on sensor network architecture and design issues. 4. Understand the transport layer and security issues possible in Sensor networks.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction and Overview of Wireless Sensor Networks**: Introduction- Background of Sensor Network Technology, Applications of Sensor Networks, Basic Overview of the Technology- Basic Sensor Network Architectural Elements, Brief Historical Survey of Sensor Networks, Challenges and Hurdles **Applications of Wireless Sensor Networks**: Introduction, Background, Range of Applications, Examples of Category 2 WSN Applications- Home Control, Building Automation, Industrial Automation, Medical Applications, Examples of Category 1 WSN Applications- Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology	**09**
2	**Basic Wireless Sensor Technology**: Introduction, Sensor Node Technology- Overview, Hardware and Software, Sensor Taxonomy, WN Operating Environment, WN Trends Wireless Transmission Technology and Systems: Introduction, Radio Technology Primer- Propagation and Propagation Impairments, Modulation, Available Wireless Technologies- Campus Applications, MAN/WAN Applications	**09**
3	**Medium Access Control Protocols for Wireless Sensor Networks**: Introduction, Background, Fundamentals of MAC Protocols- Performance Requirements, Common Protocols, MAC Protocols for WSNs- Schedule-Based Protocols, Random Access-Based Protocols, Sensor-MAC Case Study- Protocol Overview, Periodic Listen and Sleep Operations, Schedule	**09**

	Selection and Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange, Message Passing.	
4	**Routing Protocols for Wireless Sensor Networks**: Introduction, Background, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks- Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks- WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing .	**08**
5	**Self study :** **Transport control protocols for wireless sensor networks**: traditional transport control protocols, transport protocol design issues, examples of existing transport control protocols. **Operating Systems for Wireless Sensor Networks**: Introduction, Operating System Design Issues, Examples of Operating Systems- TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS, SenOS, EMERALDS, PicOS.	**07**

Course Outcomes	Description	RBT Levels
CO1	**Describe the Wireless Sensor Network architecture and applications**	**L1**
CO2	**Identify the suitable routing and transport layer algorithm based on the network and user requirement**	**L2**
CO3	**Apply the knowledge to select appropriate physical and MAC layer protocols**	**L3**
CO4	**Summarize the operating system used in Wireless Sensor Networks**	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2								
CO2	2	3	3	2								

CO3	**2**	**3**	**3**	**2**								
CO4	**2**	**3**	**2**	**2**								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. KazemSohraby, Daniel Minoli and TaiebZnati, " Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley & Sons, 2007.

REFERENCE BOOKS:

1. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, Ltd, 2005.
1.K. Akkaya and M. Younis, "A survey of routing protocols in wireless sensor networks", Elsevier Ad Hoc Network Journal, Vol. 3, no. 3, pp. 325--349
2.Philip Levis, " TinyOS Programming"
3.Anna Ha´c, "Wireless Sensor Network Designs", John Wiley & Sons Ltd,

SELF STUDY REFERENCES/WEBLINKS:

1. KazemSohraby, Daniel Minoli and TaiebZnati, " Wireless Sensor Networks Technology, Protocols, and Applications", John Wiley & Sons, 2007.

COURSE COORDINATOR:	**Prof. Srinivasa A H**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Internet of Things		
	Course Code: 18CS61	**No. of Credits: 4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. Understand the building blocks of IOT and its characteristics and its application Area. 2. Realize the difference between M2M and IOT 3. Explore the architecture, components and working of IOT with the help of Microcontroller. 4. Comprehend the evolution of IOT in Mobile Devices, Cloud & Sensor Networks. 5. Elaborate the need for Data Analytics mechanism & tools in IoT.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction & Concepts:** Introduction to Internet of Things, Definitions and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT levels and Development Templates.	11
2	**IoT and M2M Communication** Introduction, M2M, Difference between IoT and M2M, SDN & NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF- YANG. **IoT Platform Design Methodology:** Introduction, IoT Design Methodology, Case Study: Weather Monitoring.	10
3	**Domain Specific IOTs** Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. **IoT Physical Devices and Endpoints** Basic Building blocks - The Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Controlling led.	10
4	**IoT Physical servers & Cloud Offerings** **Cloud:** introduction to cloud storage models and communication Networks, WAMP – AutoBahn for IoT, Xively cloud for IoT. **Python web application** frame work - django, Designing a RESTful web API, amazon web services for IoT, SkyNetIoT messaging platforms.	11
5	**Self Study:** **Data Analytics for IoT:** Introduction AppacheHadoop, using Hadoop MapReduce for Batch Data Analysis, Apache oozie, Apache Spark, Apache Storm, using Apache Storm for Real-time Data Analysis. **Ethics** - Characterizing the Internet of Things, Privacy, Control,	10

	Environment, Solutions	

Course Outcomes	Description	RBT Levels
CO1	**Apply** the knowledge of the internet and computer network on to IoT paradigm.	L1, L3
CO2	**Adequately** learn and **demonstrate** the IoT communication.	L3
CO3	**Apply** the knowledge of python in Raspberry PI programming.	L2
CO4	**Analyze** different configuration setups for connecting different types of sensors and upload the code on the board and communicate to the cloud.	L4
CO5	**Apply** the knowledge of data analytics and ethics behind a IoT development	L4, L5

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3				1							1
CO2	3	2	3	1	2							1
CO3	3	2	2	1	2					1		1
CO4	3	3	1	2	2					1		1
CO5	3	2	1	2	3				1	1		1

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, First Edition, VPT, 2014.

REFERENCE BOOKS:

1. Raj Kamal, “Internet of Things: Architecture and Design Principles”, 1st Edition, McGraw Hill Education, 2017
2. Ovidiu Vermesan, PeterFriess, “Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems”. River Publishers Series in Communication.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, 1st Edition, Pearson Education

SELF STUDY REFERENCES/WEBLINKS:

1. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861

COURSE COORDINATOR:	

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Adhoc Wireless Networks		
	Course Code: **18CSE023**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	Course objectives: 1. To understand the fundamental concepts of Ad hoc Networks. 2. To understand the concepts of MAC layer protocols of Ad hoc Networks 3. To understand and analyze routing protocols of Ad hoc Networks. 4. To understand the Transport layer and security of Ad hoc Networks. 5. To create the awareness of QoS in Ad hoc Networks.

Unit No	**Syllabus Content**	**No of Hours**
1	**Ad hoc wireless Networks**: Introduction, Cellular and Ad Hoc Wireless Networks, Applications. Issues in Ad hoc wireless networks- Medium access, routing, multicasting, transport layer, pricing, Quality of service, self-organization, security, addressing, energy management, scalability, deployment. Ad hoc wireless internet.	9
2.	(self study) **MAC:** MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad-hoc wireless Networks, Classification of MAC protocols, Contention based protocols(MACAW,MACA-BI,MARCH)	8
3	**Routing- Routing protocols for Ad hoc wireless Networks**: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table driven routing protocols (DSDV,WRP,CGSR), On-demand routing protocols (DSR,AODV,TORA).	9

4	**Transport Layer:** Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks(TCP-F,TCP-BUS,ATCP,SPLIT-TCP). Security in ad hoc wireless networks: issues and challenges in security provisioning, network security attacks.	8
5	**QoS:** Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions(cluster TDMA), network layer solutions(Ticket based, TDR, QoS enabled AODV,OQR).	8

Course Outcomes	Description	RBT Levels
CO1	Understand the characteristics, challenges and design goals of wireless ad hoc networks.	**L2**
CO2	Apply the knowledge of MAC and different routing protocols for switching of data between nodes.	**L3**
CO3	Analyze the concepts of transport protocols and security issues in Adhoc networks.	**L4**
CO4	Discuss different QOS protocols for wireless Ad-hoc networks	**L4**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**1**								
CO2	**3**	**3**	**2**	**1**								
CO3	**3**	**3**	**2**	**1**								
CO4	**3**	**3**	**2**	**1**								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. C. Siva Ram Murthy & B. S. Manoj, Ad hoc Wireless Networks Architectures and Protocols, ISBN: 978-81-317-0688-6,2014.

REFERENCE BOOKS:

1.Stefano Basagni , Marco Conti , Silvia Giordano , and Ivan Stojmenovic, Mobile ad hoc networking , ISBN: 978-0-471-65688-3,2010 . 2.C.K. Toh: Adhoc Mobile Wireless Networks- Protocols and Systems, Prentice-Hall PTR, ISBN:0130078174,2007. 3.Jonathan Loo , Jaime Lloret Mauri and Jesús Hamilton Ortiz, Mobile ad hoc networks: current status and future trends, Kindle edition, ISBN 9781439856505 - CAT# K12654, 2011.	
SELF STUDY REFERENCES/WEBLINKS:	
1. C. Siva Ram Murthy & B. S. Manoj, Ad hoc Wireless Networks Architectures and Protocols, ISBN: 978-81-317-0688-6, 2014.	
COURSE COORDINATOR:	**Madhu B**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Storage Area Network		
	Course Code: 18CSE022	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 42 Hours**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 3 hrs/Week**

Course Objectives:	**Description**
	Course Objectives: The objectives of this course are to: 1. To understand the fundamentals of storage centric and server centric systems 2. To understand the metrics used for Designing storage area networks 3. To understand the RAID concepts 4. To enable the students to understand how data centre's maintain the data with the concepts of backup mainly remote mirroring concepts for both simple and complex systems.

Unit No	**Syllabus Content**	**No of Hours**
1	Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks; **Intelligent Disk Subsystems:** Architecture of Intelligent Disk Subsystems, Hard disks and Internal I/O Channels, JBOD, Storage virtualization using RAID, Different RAID levels, Cashing, Intelligent Disk Subsystem, Availability of Disk Subsystems.	**09**
2	**I/O Techniques:** The Physical I/O path from the CPU to the Storage System, SCSI, Fiber Channel Protocol Stack, Fiber Channel SAN, IP Storage.	**08**
3	**SELF STUDY** **Storage Virtualization:** Limitations of Non-virtualized Storage, Definition of Storage virtualization, Implementation Considerations, Storage virtualization on Block or file level, Storage virtualization on various levels of the storage Network, Symmetric and Asymmetric storage virtualization in the Network.	**09**
4	**Network Attached Storage:** The NAS Architecture, The NAS hardware architecture**,** The NAS Software Architecture, Network Connectivity, NAS as a Storage System. **Storage Area Network:** Architecture Overview; Hardware devices; Software components.	**08**
5	**Applications of Storage Networks:** Definitions of the term 'Storage Network', Storage Sharing, Availability of Data, Adaptability and Scalability of IT Systems. **Network Back-up:** General conditions for Back-up, Network Backup Services, Server Components, Back-up clients, Performance Gains as a result of Network Back-Up, Performance Bottlenecks of Network Back-up.	**08**

Course Outcomes	**Description**	**RBT Levels**
CO1	Identify key challenges in managing information and analyze different storage technologies and distinguish different channels.	**L2**
CO2	Interpret the storage virtualization and implementation considerations of virtualization.	**L2**
CO3	Explain components and the working of NAS and SAN	**L3**
CO4	Illustrate the applications and storage infrastructures.	**L2**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**3**	**2**	**2**								
CO2	**2**	**3**	**2**	**2**								
CO3	**2**	**3**	**2**	**2**								
CO4	**2**	**3**	**2**	**2**								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

TEXT BOOKS:

1. Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India,2013. ISBN 978-81-265-1832-6
2. Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011. ISBN 978-0-07-053292-2

REFERENCE BOOKS:

1. Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2011. ISBN-10: 1-58705-162-1ISBN-13: 978-1-58705-162-3
2. Richard Barker and Paul Massiglia: "Storage Area Network Essentials "A Complete Guide to understanding and Implementing SANs", Wiley India, 2012. ISBN: 978-0-471-03445-2
3. EMC Education Services, "Information Storage and Management", Wiley India Publications, 2009. ISBN: 9781118094839

COURSE COORDINATOR:	**Suresha. D**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: PRINCIPLES OF ECONOMICS		
	Course Code: **18CS644**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week :** **3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Choose the concept of scarcity to explain economic trade-offs, opportunity costs, and rational behavior. 2. Interpret measures of elasticity and investigate the production and costs of the firm. 3. Demonstrate how markets function and what happens in the presence of market failures. 4. Analyze the different types of market structures such as monopoly and a competitive market. 5. Determine how economic growth, unemployment and inflation macroeconomics affects the economy of the nation in the short and long-run. 6. Discover the determinants of foreign trade flows and exchange rates, and their effects on the domestic economy.

Unit No	**Syllabus Content**	**No of Hours**
1	**Welcome to Economics,** What Is Economics, and Why Is It Important? Microeconomics and Macroeconomics, How Economists Use Theories and Models to Understand Economic Issues, How To Organize Economies: An Overview of Economic Systems, **Choice in a World of Scarcity**, How Individuals Make Choices Based on Their Budget Constraint , The Production Possibilities Frontier and Social Choices, Confronting Objections to the Economic Approach, **Demand and Supply**: Demand, Supply, and Equilibrium in Markets for Goods and Services, Shifts in Demand and Supply for Goods and Services, Changes in Equilibrium Price and Quantity: The Four-Step Process, Price Ceilings and Price Floors, Demand, Supply, and Efficiency, **Labor and Financial Markets,** Demand and Supply at Work in Labor Markets, Demand and Supply in Financial Markets, The Market System as an Efficient Mechanism for Information.	**09**
2	**Elasticity,** Price Elasticity of Demand and Price Elasticity of Supply, Polar Cases of Elasticity and Constant Elasticity, Elasticity and Pricing, Elasticity in Areas Other Than Price, **Consumer Choices**, Consumption Choices, How Changes in Income and Prices Affect Consumption Choices, Behavioral Economics: An Alternative Framework for Consumer Choice, **Production, Costs, and Industry Structure**, Explicit and Implicit Costs, and Accounting and Economic Profit, Production in the Short Run, Costs in the Short Run, Production in the Long Run, Costs in the Long Run.	**08**

3	**Self-Study** **Perfect Competition,** Perfect Competition and Why It Matters, How Perfectly Competitive Firms Make Output Decisions, Entry and Exit Decisions in the Long Run, Efficiency in Perfectly Competitive Markets. **Monopoly,** How Monopolies Form: Barriers to Entry, How a Profit-Maximizing Monopoly Chooses Output and Price, **Monopolistic Competition and Oligopoly**, Monopolistic Competition, Oligopoly.	**08**
4	**The Macroeconomic Perspective,** Measuring the Size of the Economy: Gross Domestic Product, Adjusting Nominal Values to Real Values, Tracking Real GDP over Time, Comparing GDP among Countries, How Well GDP Measures the Well-Being of Society, **Economic Growth,** The Relatively Recent Arrival of Economic Growth, Labor Productivity and Economic Growth, Components of Economic Growth, Economic Convergence, **Unemployment,** How Economists Define and Compute Unemployment Rate, Patterns of Unemployment, What Causes Changes in Unemployment over the Short Run, What Causes Changes in Unemployment over the Long Run.	**09**
5	**Inflation,** Tracking Inflation, How to Measure Changes in the Cost of Living, How the U.S. and Other Countries Experience Inflation, The Confusion Over Inflation, Indexing and Its Limitations. **The International Trade and Capital Flows**, Measuring Trade Balances, Trade Balances in Historical and International Context, Trade Balances and Flows of Financial Capital, The National Saving and Investment Identity, The Pros and Cons of Trade Deficits and Surpluses, The Difference between Level of Trade and the Trade Balance.	**08**

Course Outcomes	**Description**	**RBT Levels**
CO1	Identify the determinants of supply and demand; demonstrate the impact of shifts in both market supply and demand curves on equilibrium price and output.	**L2**
CO2	Determine the roles that prices and markets play in organizing and directing economic activity.	**L3**
CO3	Calculate and graph the short-run and long-run costs of production, supply and demand elasticities.	**L3**
CO4	Describe governmental efforts to address market failure such as monopoly power, externalities, and public goods.	**L2**
CO5	Examine and interpret a nation's economic performance indicators such as economic growth, unemployment and inflation from a macroeconomic perspective.	**L3**
CO6	Articulate the mechanics and institutions of international trade and their impact on the macro economy.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	3	2	3	2	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	2	3	2	2	2	-	-	-	-	-	-	-
CO5	3	3	2	3	1	-	-	-	-	-	-	-
CO6	3	3	2	2	1	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Steven A. Greenlaw, David Shapiro, **"Principles of Economics",** 2nd Edition, Rice University - OpenStax, 2020. ISBN-13: 978-1947172371 (Available under CC-BY license at https://openstax.org/details/books/principles-economics-2e)

REFERENCE BOOKS:

1) N. Gregory Mankiw, **"Principles of Economics",** 8th Edition, Cengage Learning, 2016. ISBN-13: 978-0357038314
2) Niall Kishtainy, **"The Economics Book: Big Ideas Simply Explained",** 1st Edition, DK Publishers, 2012. ISBN-13: 978-0756698270
3) Yves Hilpisch, **"Python for Finance: Mastering Data-Driven Finance",** 2nd Edition, O'Reilly Media, 2018 ISBN-13: 978-1492024330
4) Quentin Batista, Thomas Sargent and Jesse Perla, **"QuantEcon DataScience: Introduction to Economic Modeling and Data Science",** Center for Innovative Data in Economics, Vancouver School of Economics, UBC, 2020.

SELF STUDY REFERENCES/WEBLINKS:

1. Perfect Competition
https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section8
2. Monopoly
https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section9
3. Monopolistic Competition and Oligopoly
https://www.khanacademy.org/economics-finance-domain/ap-microeconomics/imperfect-competition/monopolistic-competition/v/oligopolies-and-monopolisitc-competition

COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Compiler Design		
	Course Code: 18CS643	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	Description
	1.Present fundamental concepts and techniques for the design of a compiler. 2. Identify the methods and strategies for parsing techniques along with its construction. 3. To enrich the knowledge of storage management and allocation strategies. 4. Optimize the intermediate code and generate its target language code.

Unit No	Syllabus Content	No of Hours
1	**Introduction :** Language Processors, The Structure of a Compiler, The Evolution of Programming Languages, The Science of Building a Compiler, Applications of Compiler Technology, Programming Language Basics.	**8**
2	**Self study /Online class** **Lexical Analysis :** The Role Of Lexical Analyzer, Input Buffering, Specifications Of Tokens, Recognition Of Tokens. **Syntax Analysis I :** Introduction, Context Free Grammars.	**8**
3	**Syntax Analysis II :** Writing a Grammar, Top Down Parsing. Bottom Up Parsing, Operator precedence Parsing, Precedence Functions	**9**
4	**Syntax Analysis III :** Introduction to LR Parsing, Simple LR Parser, More Powerful LR Parsers, Using Ambiguous Grammars.	**8**
5	**Run-Time Environments :** Storage Organization, Storage Allocation of Space, Access to Non Local Data on the Stack, Heap Management, Introduction to Garbage Collection. **Code Generation :** Issues In The Design Of Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks And Flow Graphs, Next-Use Information, Optimization of Basic Blocks, A Simple Code Generator.	**9**

Self study component

1.

Course Outcomes	Description	RBT Levels
CO1	Understand the various phases of compiler and design the lexical analyzer. Demonstrate the phases of the compilation process and be able to describe the purpose and operation of each phase.	**L2**
CO2	Acquire the working principles of parser with its types and extend the knowledge by parsing LL parser and Operator Precedence parser.	**L4**

CO3	Design and describe the various LR parsers for a given CFG.	**L4**
CO4	Describe the storage organization of compiler's run time environment and demonstrate the algorithms to perform code optimization and code generation.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**3**	**2**								
CO2	**3**	**2**	**2**	**2**								
CO3	**2**	**2**	**2**									
CO4	**3**	**3**	**3**	**2**								

Strong -3 Medium -2 Weak -1

TEXT BOOK:

Alfred W Aho, Monica S Lam, Ravi Sethi, and Jeffrey D Ullman, "**Compilers-Principles, Techniques and Tools**" Publisher: Pearson Education; Second edition (1 January 2011)

ISBN-10: 8131759024
ISBN-13: 978-8131759028

REFERENCE BOOKS:

1. Kenneth C Louden, "**Compiler Construction Principles & Practice**", Thomson Education, 2003.
2. Charles N Fischer, Richard J LeBlanc, "**Crafting a Compiler with C**", Benjamin Cummings, 2003.
3. Allen I. Holub "**Compiler Design in C**", Prentice Hall of India, 2003.

SELF STUDY REFERENCES/WEBLINKS:

1.Lecture Notes
2.http://sgbm.in/ebooks/cs/Compiler.pdf

COURSE COORDINATOR:	**Dr. Harish G**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	Course Title: Artificial Intelligence and Prolog Programming		
	Course Code: **18CSE031**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To Implement non-trivial AI techniques in a relatively large system 2. To understand uncertainty and Problem solving techniques. 3. To understand various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent. 4. To understand different logical systems for inference over formal domain representations, and trace how a particular inference algorithm works on a given problem specification. 5. To understand how to write a Prolog programs for Artificial Intelligence 6. Analyzing and Solving Artificial Intelligence programs by using Backtracking methods

Unit No	**Syllabus Content**	**No of Hours**
1	What is Artificial Intelligence: The AI Problems, The Underlying assumption, What is an AI Technique?, The Level of the model, Criteria for success, real world Problems, problem spaces and search: Defining, the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs. **Intelligent Agents**: Agents and Environments, The nature of environments, The structure of agents. *(Text Book 1: Chapter 1 & 2 Text Book 2: Chapter 2)*	**8**
2	**Problem-solving by Searching:** Problem solving agents, example problems, searching for solutions, uninformed search strategies, informed search strategies, heuristic search-a*algorithm, adversarial search-minimax algorithm, of game playing, alpha-beta pruning.*(Text book2:chapter 3.1,3.2,3.3,3.4,3.5,5.1,5.2,5.3)*	**8**
3	Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem. Using predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates. Self study:Logical Agents: Knowledge –based agents, the Wumpus world, Logic-Propositional logic, Propositional theorem proving, syntax and semantics of first order logic, propositional and first order inference *(Text Book 1: chapter 3 ,4. Text book2: chapter 7.1,7.2,7.3,7.4,7.5,8.1.8.2,9.1)*	**8**
4	Prolog Programming for Artificial Intelligence, An Overview of Prolog, An example program: defining family relations, Extending the example program by rules, A recursive rule definition, How Prolog answers	**9**

	questions, Declarative and procedural meaning of programs; Syntax and Meaning of Prolog Programs, Data objects, Matching Declarative meaning of Prolog programs, Procedural meaning, Example: monkey and banana, Order of clauses and goals, Remarks on the relation between Prolog and logic. *(Text Book 3: Chapters 1 & 2)*	
5	Lists, Operators, Arithmetic, Representation of lists, Some operations on lists, Operator notation, Arithmetic, Using Structures: Example Programs, Retrieving structured information from a database, Doing data abstraction, Simulating a non-deterministic automaton, Backtracking, Preventing backtracking, Examples using cut, Negation as failure, Problems with cut and negation, Input and Output, Communication with files. *(Text Book 3: Chapter 3, 4 ,5 & 6)*	**9**

Course Outcomes	**Description**	**RBT Levels**
CO1	Understanding intelligent agents design for general intelligence tasks	R1, R2,R3
CO2	Apply AI technique on current applications for Problem solving, knowledge representation, searching, reasoning and learning.	R4 and R5
CO3	Write prolog codes for implementing Artificial Intelligence problems	R4
CO4	Analyze and Solve real-time AI problems using function of prolog programming	R5

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**	**2**									
CO3	**3**	**3**		**2**	**2**							**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**	**2**					**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2019, ISBN: 978-93-325-4351-5
2. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher**:** Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

REFERENCE BOOKS:

1. Nils J. Nilsson: “Principles of Artificial Intelligence”, Elsevier, ISBN-13: 9780934613101

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Machine Learning		
	Course Code: **18CSE032**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Understand some basic machine learning algorithms and techniques and their applications. **2.** Able to analyse the underlying mathematical relationships among Machine Learning algorithms. **3.** Able to identify formulate and solve machine learning problems that arise in practical applications.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.	**9 hours**
2	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. Text Book1, Sections: 3.1-3.7	**8 hours**
3	**Artificial Neural Networks-Basics:** Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, important terminoligies of ANN, McCulloch-Pitts Neuron, Linear Separabality, Hebb Network. Text book 2, Sections: 2.1 – 2.7	**8 hours**
4	**Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks. Text book 1, Sections: 6.1 – 6.6, 6.9, 6.11	**9 hours**
5	**SELF STUDY** **Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. **Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning,	**8 hours**

	Text book 1, Sections: 5.1-5.6, 8.1-8.5	

Course Outcomes	Description	RBT Levels
At the End of the Course, the students should be able to		
CO1	Acquire knowledge about basic concepts of Machine Learning.	**L2**
CO2	Identify and apply machine learning techniques suitable for a given problem	**L3**
CO3	Design and implement machine learning solutions to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2			2							
CO2	3	3	2		2							
CO3	3	3	3	3	3							
CO4	3	3		3	3							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2. S N Sivanandam, S N Deepa, Principles of Soft Computing,3rd Edition, Wiley Publication,2019.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

SELF STUDY REFERENCES/WEBLINKS:

1. https://machinelearningmastery.com/statistics-for-evaluating-machine-learning-models/
2. https://towardsdatascience.com/ml-algorithms-one-sd-%CF%83-instance-based-algorithms-4349224ed4f3

COURSE COORDINATOR:	**Mrs. Asha K N** **Mrs. Asha Rani K P**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	Sub Title :Android Programming		
	Sub Code: 18CS71	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 42**

Course objectives:

1. To understand the Mobile-Android OS architecture and Features.
2. Understand how Android application works, their life cycle, manifestation,intents and using external resources.
3. Design and use appropriate tools for android development including IDE, device emulator, and profiling tools.
4. To build user interface, text inputs, lists and study database.
5. To understand windows Mobile Programming for Smartphone's.

UNIT No	Syllabus Content	No of Hours
1	**Introduction To Android:** A Little Background; J2ME to Android; What is Android?; An Open-Platform for Mobile Development; Introducing the open handset alliance; Android Architecture (Layers of Android), Android SDK Features; Why Develop for Mobile?; Variants of Android ;Types of Application developed using Android; Native Android Applications and Hybrid Application; Dalvik Virtual Machine; **Android Application Manifestation:** What is a .dex files; What is an .apk file; Basic Building Blocks of Android (Activities, Intents, Content Providers, Services Broadcast Receivers); Structure of Android Project; What Makes an Android Application? Introducing the Application Manifest; Drawable Resources; Resolution and Density Independence;	08
2	**Android Application Life Cycle:** Introducing the Android Application Class; Activity Life Cycle; Creating User Interfaces; The Android Application Life Cycle; Layout Managers (Linear Layout and Relative Layout); Hello World Android Application; View Click Handling; Let's Make a Toast; Fundamental Android UI Design, Introducing Views, Creating and Using Menus; Introducing Intents, Types of Intents; Creating Dialogs; Bundle, Working with Adapters.	09
3	**Data Storage, Retrieval, and Sharing:**Shared Preferences; Types of Preferences; Storing and Retrieving Data from Shared Preferences. Working with Files (Reading and Writing Files). **Introduction to Android Databases:** Introducing Android Databases: SQLite, Working with SQLite Databases, OnCreate() and onUpgrade() methods. Cursors and Content Values, Creating a New Content Provider, Using Content Providers, Creating and Using an Earthquake Content	09

	Provider, Accessing Android Content Providers.	
4	**Background processing:** Asynchronous Tasks, Working with Threads; **Android Services:** Services in Android; Types of Services; Local Service; Remote Service; Intent Service. Broadcast Receivers; Types of Broadcasts; Creating a Broadcast Receivers; Introducing Notifications, Using Alarms;	08
5	**Self-Study Component:** **Location Based Services**: Using Location-Based Services, Configuring the Emulator to Test Location-Based Services, Updating Locations in Emulator Location Providers, Selecting a Location Provider, Finding Your Location, Using Proximity Alerts, Using the Geocoder, Creating Map-Based Activities. **Multimedia and Sensors:** Playing Audio and Video, Recording Audio, Using the Camera and Taking Pictures, Telephony, Introducing SMS and MMS; Android Development Best Practices in designing and developing Android application, Static code Analysis-Lint, Develop your own Android Applications and Publish them on **Google play**.	08

Note 1: Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:	
CO1	Understand the basic history, structure, software components of Android OS
CO2	Apply the knowledge of Android application, Activity classes, UI elements, Intents and Adapters to create robust Android applications.
CO3	Apply the knowledge of Native Android libraries to **Store, Retrieve, and Share** the data within the application that created them and between applications.
CO4	Analyze and apply the knowledge of **Thread**s and **Services** to implement an Android application that runs in the background.
CO5	Create location based, Multimedia and other Applications that provide low-level access to the hardware available on mobile devices using appropriate Application Frameworks.

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-

CO3	3	1	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

TEXT BOOK:

1. Professional Android 2 Application Development by Reto Meier, Wiley Publishing, 2010.
2. Pro Android by Sayed Y. Hashimi, SatyaKomatineni, Apress, 2009.
3. Professional Android Application Development by Reto Meier, Wiley Publishing, 20009.

REFERENCE BOOKS

1. Beginning Android by Mark Murphy, Apress, 2009.
2. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To, Addison-Wesley Professional; 2010.
3. The Busy Coders guide to Android development by Mark L Murphy, COMMONSWARE, 2009.
4. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference”, Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link).

SELF STUDY REFERENCES / WEBLINKS:

1. Beginning Android 4 Application Development by Wei-Meng Lee, Worx Wiley Publishing, 2014. http://www3.ul.ie/ictlc/Android.pdf
2. Android Tutorial Simply Easy Learning, https://www.tutorialspoint.com//android/android_tutorial.pdf
3. https://www.coursera.org/learn/posacontent\
4. https://www.edx.org/xseries/java-android-beginners
5. https://medium.com/@intelia/getting-the-most-out-of-android-lint-6df05a7ab054
6. JAVA CODING STANDARDS (nea.gov.bh)

FACULTY INCHARGE:

Prof. UMA K M

Prof. LAVANYA SANTHOSH

Prof. VEENA A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Internet of Things		
	Course Code: 18CSE033	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Understand the building blocks of IOT and its characteristics and its application Area. 2. Realize the difference between M2M and IOT 3. Explore the architecture, components and working of IOT with the help of Microcontroller. 4. Comprehend the evolution of IOT in Mobile Devices, Cloud & Sensor Networks. 5. Elaborate the need for Data Analytics mechanism & tools in IoT.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction & Concepts:** Introduction to Internet of Things, Definitions and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT levels and Development Templates.	08
2	**IoT and M2M Communication** Introduction, M2M, Difference between IoT and M2M, SDN & NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF- YANG. **IoT Platform Design Methodology:** Introduction, IoT Design Methodology, Case Study: Weather Monitoring.	09
3	**Domain Specific IOTs** Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. **IoT Physical Devices and Endpoints** Basic Building blocks - The Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Controlling led.	09
4	**IoT Physical servers & Cloud Offerings** **Cloud:** introduction to cloud storage models and communication Networks, WAMP – AutoBahn for IoT, Xively cloud for IoT. **Python web application** frame work - django, Designing a RESTful web API, amazon web services for IoT, SkyNetIoT messaging platforms.	09
5	**Self Study:** **Data Analytics for IoT:** Introduction AppacheHadoop, using Hadoop MapReduce for Batch Data Analysis, Apache oozie, Apache Spark, Apache Storm, using Apache Storm for Real-time Data Analysis. **Ethics -** Characterizing the Internet of Things, Privacy, Control, Environment, Solutions	07

Course Outcomes	**Description**	**RBT Levels**
CO1	**Apply** the knowledge of the internet and computer network on to IoT paradigm.	**L1, L3**

CO2	**Adequately** learn and **demonstrate** the IoT communication.	**L3**
CO3	**Apply** the knowledge of python in Raspberry PI programming.	**L2**
CO4	**Analyze** different configuration setups for connecting different types of sensors and upload the code on the board and communicate to the cloud.	**L4**
CO5	**Apply** the knowledge of data analytics and ethics behind a IoT development	**L4, L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**				**1**							**1**
CO2	**3**	**2**	**3**	**1**	**2**							**1**
CO3	**3**	**2**	**2**	**1**	**2**					**1**		**1**
CO4	**3**	**3**	**1**	**2**	**2**					**1**		**1**
CO5	**3**	**2**	**1**	**2**	**3**				**1**	**1**		**1**

Strong -3   Medium -2   Weak -1

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, “Internet of Things (A Hands-on-Approach)”, First Edition, VPT, 2014.

REFERENCE BOOKS:

1. Raj Kamal, “Internet of Things: Architecture and Design Principles”, 1st Edition, McGraw Hill Education, 2017
2. Ovidiu Vermesan, PeterFriess, “Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems”. River Publishers Series in Communication.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things”, 1st Edition, Pearson Education

SELF STUDY REFERENCES/WEBLINKS:

1. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861

COURSE COORDINATOR:	**Dr.Smitha Shekar B** **Lavanya Santhosh**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Introduction to Robotics		
	Course Code: 18CS752	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 03
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42

Course Objectives:	Description
	1. To understand how to build basic robots 2. To understand how to use robot architectures to build robots in realtime 3. To distinguish differences between various architectures and apply in realtime 4. To program the AI robots for various behaviours of different complexity

Unit No	Syllabus Content	No of Hours
1	From Teleoperation To Autonomy: Overview, How Can a Machine Be Intelligent? What Can Robots Be Used For? Social implications of robotics, A Brief History of Robotics, Industrial manipulators , Space robotics and the AI approach, Teleoperation , telepresence, Semi-autonomous control, The Seven Areas of AI	8
2	The Hierarchical Paradigm: Overview, Attributes of the Hierarchical Paradigm, Strips, More realistic Strips example, Strips summary, Closed World Assumption and the Frame Problem, Representative Architectures, Nested Hierarchical Controller, NIST RCS, Evaluation of hierarchical architectures, Advantages and Disadvantages.	8
3	Biological Foundations of the Reactive Paradigm: Overview, Why explore the biological sciences? Agency and computational theory, What Are Animal Behaviors? Reflexive behaviours, Coordination and Control of Behaviors, Innate releasing mechanisms, Concurrent behaviours, Perception in Behaviors, Action-perception cycle, Two functions of perception, Gibson: Ecological approach, Neisser: Two perceptual systems, Schema Theory, Behaviors and schema theory, Principles and Issues in Transferring Insights to Robots	8
4	The Reactive Paradigm : Overview 105 4.2 Attributes of Reactive Paradigm, Characteristics and connotations of reactive behaviours, Advantages of programming by behaviour, Representative architectures, Subsumption Architecture, Example, Subsumption summary, Potential Fields Methodologies, Visualizing potential fields, Magnitude profiles, Potential fields and perception, Programming a single potential field, Combination of fields and behaviours, Example using one behavior per sensor, Pfields compared with subsumption, Advantages and disadvantages , Evaluation of	9

	Reactive Architectures	
5	Designing a Reactive Implementation: Overview, Behaviors as Objects in OOP, Example: A primitive move-to-goal behaviour, Example: An abstract follow-corridor behaviour, Where do releasers go in OOP? Steps in Designing a Reactive Behavioral System , Case Study: Unmanned Ground Robotics Competition, Assemblages of Behaviors, Finite state automata, A Pick Up the Trash FSA, Implementation examples , Abstract behaviors , Scripts	**9**

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand basic operations of robots and their sub-components involved in designing.	R1, R2,R3
CO2	To interpret the biological behaviours of human or animal and mapping them to different robot behaviours	R4 and R5
CO3	To Analyze and design the robot behaviours using different robot architectures that work in real-time environments.	R4
CO4	To use appropriate programming approaches to design and build the robot behaviours	R5

CO-PO Mapping	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**	**2**									
CO3	**3**	**3**		**2**	**2**							**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**	**2**					**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Robin R Murphy, 2000, Introduction to AI Robotics, 2nd Edition, MIT Press, Cambidge, MA, USA, ISBN:978-0-262-13383-8

REFERENCE BOOKS:

1. Kathy Ceceri, Making Simple Robots: Exploring Cutting-Edge Robotics with Everyday Stuff, Make Community, LLC; 1st edition (March 2, 2015), ISBN-10 : 9781457183638; ISBN-13 : 978-1457183638

EXTERNAL REFERENCES/WEBLINKS:	
COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

SUBJECT TITLE: CLOUD COMPUTING LABORATORY		
SUBJECT CODE: 18CSL77	**No. of Credits:0:0:1**	**No. of Lecture hours per week:3**
Exam Duration :3 hours	**Exam Marks:50**	

Course Objectives:

This course will help students to achieve the ability to:

1. Develop web applications in cloud
2. Learn the design and development process involved in creating a cloud-based application
3. Use cloud simulator and analyze the working of data centers using simulator

Note: Use Cloud Analyst Simulator for Simulation

Exp. No		Experiment List
PART-A		
1	a)	Creation of web applications on Salesforce cloud Platform.
	b)	Use the following userbase configuration to simulate following scenarios for the given data centre and virtual machine configuration and answer to the following questions. **Scenario-1**: Nearest data center with round robin policies **Scenario-2**: Optimize response time with round robin policies

User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines
UB1	North America	--	1000	500	DC1-50
UB2	South America	--	800	1200	
UB3	Europe	DC1	2000	1000	
UB4	Africa	--	500	300	
UB5	Asia		3000	300	
UB6	Ocenia		1500	150	

i) Tabulate the overall response time of all the scenarios and plot a line graph
ii) Plot a bar graph for the data processing time of all the scenarios
iii) Compare average response time by regions of all scenarios by plotting line graph
iv) Using Pie chart show the total cost spent for each scenario

2	a)	Install Virtualbox/VMware Workstation with different flavours of linux and execute some C programs

b) Simulate the following scenarios for the given userbase, data centre and virtual machine configuration and answer to the given questions

Scenario	Scenario Description	Load Balancing algorithm	Service broker policy
1	One data center with 50 Virtual Machines for UB1	Nearest Data Centre	Round robin
2	Two data centers with 25 and 50 Virtual Machines respectively for UB1		
3	Three data centers with 100,75 and 25 Virtual Machines respectively for UB1		

i) Tabulate the overall response time and data processing of all the scenarios and plot the bar graph
ii) Plot a line graph of data center request servicing time of all the data centers for all the scenarios
iii) Compare average response time by regions of all scenarios by plotting line graph
iv) Mention the data centers used by the UB2,UB3, UB4 and UB5

3 a) Install Google App Engine. Create hello world app and other simple web applications using python/java.

b) Simulate the following scenarios for given data centre, data centre and virtual machine configuration and answer the following questions
Scenario 1: closest data center and round robin policies
Scenario 2: optimize response time and round robin policies
Use the following userbase configuration for all the scenarios

User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines
UB1	North America	DC1, DC3	1000	500	DC1-50 DC3-100
UB2	South America	---	800	1200	
UB3	Europe	DC4	2000	1000	DC4-150
UB4	Africa	--	500	300	

i) Tabulate and compare the Average response time and data processing time of all the scenarios by plotting the line graph
ii) Tabulate the response time of user bases in all scenarios and compare these by plotting bar graph. Which user base is taking maximum time among three scenarios? Why
iii) Calculate the data transmission time from DC1 to UB2
iv) Plot the bar graph for data center cost of all scenarios

<table>
<tr><td>4</td><td>a)</td><td>Create a RDS and launch in your custom VPC network.</td></tr>
<tr><td></td><td>b)</td><td>Analyze the various service broker policies for the following configuration and answer the following questions.
<table>
<tr><th>Parameter</th><th>Value Used</th></tr>
<tr><td>UB Name</td><td>UB1</td></tr>
<tr><td>Region</td><td>2</td></tr>
<tr><td>Request Per User Per Hour</td><td>60</td></tr>
<tr><td>Data Size Per Request</td><td>100</td></tr>
<tr><td>Peak hour start(GMT)</td><td>3</td></tr>
<tr><td>Peak hour end (GMT)</td><td>9</td></tr>
<tr><td>Avg Peak Users</td><td>40000</td></tr>
<tr><td>Avg Off Peak Users</td><td>4000</td></tr>
<tr><td>DC 1 – No Of VM</td><td>75</td></tr>
<tr><td>DC 2 – No Of VM</td><td>50</td></tr>
<tr><td>DC 3 – No Of VM</td><td>25</td></tr>
<tr><td>VM Image Size</td><td>10000 MB</td></tr>
<tr><td>VM Memory</td><td>512 MB</td></tr>
<tr><td>VM Bandwidth</td><td>1000 bps</td></tr>
<tr><td>DC 1 – No Of Physical Machine</td><td>2</td></tr>
<tr><td>DC 2 – No Of Physical Machine</td><td>2</td></tr>
<tr><td>DC 3 – No Of Physical Machine</td><td>2</td></tr>
<tr><td>DC – Memory Per Machine</td><td>204800 Mb</td></tr>
<tr><td>DC – Storage Per Machine</td><td>100000000 Mb</td></tr>
<tr><td>DC – Available BW Per Machine</td><td>1000000</td></tr>
<tr><td>DC – No Of Processors Per Machine</td><td>4</td></tr>
<tr><td>DC – Processor Speed</td><td>10000 MIPS</td></tr>
<tr><td>DC – VM Policy</td><td>Time Shared</td></tr>
<tr><td>User Grouping Factor</td><td>1000</td></tr>
<tr><td>Request Grouping Factor</td><td>100</td></tr>
<tr><td>Executable Instruction Length</td><td>500</td></tr>
<tr><td>Load Balancing Policy</td><td>Throttled</td></tr>
</table>
a) Tabulate and compare the data processing time of service broker policies by plotting the line graph
b) Tabulate and compare response time of service broker policies by plotting the bar graph
c) Tabulate the cost for service broker policies and represent it using pie chart
d) Which service broker policy is best and why?</td></tr>
<tr><td>5</td><td>a)</td><td>Create a file in one virtual machine and transfer it another virtual machine files from one virtual machine.</td></tr>
<tr><td></td><td>b)</td><td>Analyze the various load balancing algorithms for the given userbase, data centre and virtual machine configuration and answer the following questions. Consider the following userbase configuration for all load balancing algorithms
<table>
<tr><td>Number of User bases</td><td>06</td></tr>
<tr><td>Region for the userbases</td><td>UB1-South America, UB2-Asia, UB3-North America, UB4-Europe, UB5-Africa, UB6-Ocenia</td></tr>
<tr><td>Average peak users for all the user bases</td><td>10000</td></tr>
</table></td></tr>
</table>

		Average off-peak users for all the user bases	100
		Peak hours' time	Depends on the region
		Data centers in each user base	UB1-1, UB2-2, UB3-1, UB4-3, UB5-2, UB6-1
		Virtual machines in each data center	6
		Simulation time	10 mins
		Service broker policy	Nearest data center

a) Tabulate and compare the data processing time of load balancing algorithms by plotting the line graph
b) Tabulate the response time of load balancing algorithms by plotting the bar graph
c) Tabulate the response time by region for load balancing algorithms and plot bar graph
d) Which load balancing algorithm is best and why?

PART-B

Mini Project: Design and implementation of mini projects using concepts of cloud computing.

Course Outcomes	**Statements**	**Blooms Level**
CO1	Develop applications on different cloud platforms Use various services of AWS	**L3**
CO2	Describe the working of Cloud Analyst simulator	**L2**
CO3	Demonstrate the working of datacenters using simulator	**L3**
CO4	Illustrate the working virtualization using Virtualbox/VMware	**L3**
CO5	Implement mini project using cloud services	**L4**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO3**
CO1	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
CO2	1	1	2	1	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
Strong -3 Medium -2 Weak -1															

COURSE COORDINATOR:	**Dr.Siddaraju** **Mr.Srinivasa A. H.**

	SUBJECT TITLE: ANDROID PROGRAMMING LAB		
	SUBJECT CODE:18CSL76	**No. of Credits:0:0:1:0**	**No. of Lecture hours per week:3**
	Exam Duration :3 hours	**Exam Marks: 50**	

Course objectives:

1) To learn and acquire art of Android programming.
2) To configure initial application, run in emulator.
3) Understand and implement Android's advanced User interface functions, audio video applications
4) Create, modify and query on SQlite database.
5) Present different ways of sharing data through the use of services.

1.	i) Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number. ii) Develop a simple application with one EditText so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.
2.	Write a program to create an Activity to read Employee Details (EmpId, Name, Age, Address) from user and store to database and create a menu with menu item (Show Details) on pressing menu details it must go to another activity with employee id search box and search button and display the employee details on the screen.
3.	Write a program to create an activity with a text box and three buttons (save, open and create) open must allow to browse the text file from sdcard and must display the contents of the file on textbox, save button must save the contents of text box to file, create button must allow file user to create a new file and save the entered contents of the textbox.
4.	Write a program to create an activity with two text boxes (date /time and note contents). Create a content provider to store the date and time and note contents to the database. Create another program with a Button (Fetch Today Notes) on press must access the note provider and display the notes stored for today's date.
5.	Write a program to create an activity with two buttons start and stop. On pressing start

	button the program must start the counter and must keep on counting until stop button is pressed.
6.	Create a program to receive the incoming SMS to the phone and put a notification on screen, on clicking the notification it must display sender number and message content on screen.
7.	Write a program to create a service that will put a notification on the screen every 5 seconds.
8.	Create an .aidl service to do add, subtraction and multiplication and create another application with two buttons to read the inputs and three button add,subtract and multiply to call add, subtract and multiply operation on .aidl service.
9.	Create an activity like a phone dialer with (1,2,3,4,5,6,7,8,9,0,*,#) buttons including call, save and delete buttons. On pressing the call button, it must call the phone number and on pressing the save button it must save the number to the phone contacts.
10.	Create a file of JSON type with values for city_name, Latitude, Longitude, Temperature and Humidity. Develop an application to create an activity with button to parse the JSON file which when clicked should display the data in the textview.

At the end of the course the student will be able to

Course Outcomes:

CO1: Create, test and debug Android application by setting up Android development environment.
CO2: Implement adaptive, responsive user interfaces that work across a wide range of devices.
CO3: Infer long running tasks and background work in Android applications.
CO4: Demonstrate methods in storing, sharing and retrieving data in Android applications.
CO5: Infer the role of permissions and security for Android applications.

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	1	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

Text Books

1. Google Developer Training, **"Android Developer Fundamentals Course – Concept Reference",**

Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link)

Reference Books

1. Erik Hellman, **“Android Programming – Pushing the Limits”,** 1st Edition, Wiley India Pvt Ltd, 2014. ISBN-13: 978-8126547197
2. Dawn Griffiths and David Griffiths, **“Head First Android Development”,** 1st Edition, O’Reilly SPD Publishers, 2015. ISBN-13: 978-9352131341
3. Bill Phillips, Chris Stewart and Kristin Marsicano, **“Android Programming: The Big Nerd Ranch Guide”,** 3rd Edition, Big Nerd Ranch Guides, 2017. ISBN-13: 978-0134706054

Lab Incharge

1 Uma K M
2 Lavanya Santhosh
3 Veena A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Soft Computing		
	Course Code: **18CS753**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week :** **03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To learn the key aspects of Soft computing 2. To know about the components and building block hypothesis of Genetic algorithm. 3. To gain insight onto Neuro Fuzzy modeling and control. 4. To gain knowledge in machine learning through Support vector machines

Unit No	**Syllabus Content**	**No of Hours**
1	Introduction to Soft computing: Neural networks, Fuzzy logic, Genetic algorithms, Hybrid systems and its applications. Fundamental concept of ANN, Evolution, basic Model of ANN, Terminologies used in ANN, MP model, linear separability, Hebb Network.	**11**
2	Supervised Learning: Perceptual Network, Adaptive linear neuron, Multiple adaptive linear neurons, Back propagation Network,Associative Memory Network: introduction, training algorithms for pattern association, associative memory network,	**10**
3	Classical sets and Fuzzy Sets – classical and Fuzzy Relations – Features of membership functions, Fuzzification and methods of membership value assignment. Defuzzification lambda cuts for fuzzy relations and fuzzy sets.	**10**
4	Fuzzy Decision Making: introduction, individual decision making, multiperson Decision making, multiobjective decision making, multiattribute decision making, fuzzy Bayesian decision making, Fuzzy logic control systems: introduction, control system design, architecture and operation of FLC systems, FLC system Models, Applications of FLC systems	**11**
5	**Self Study Component** Genetic algorithms: Introduction - Basic operations - Traditional optimization and search techniques. Genetic algorithms and search space, Operators of genetic algorithms – Genetic programming	**10**

Course Outcomes	**Description**	**RBT Levels**

CO1	Understand the basics of soft computing, ANN and Terminologies to relate and understand the real time problems	**R2 R3**
CO2	Solve the real-time problems using ANN representations	**R3 R4**
CO3	Analyze and adopt fuzzy logic in designing and implementing soft computing applications.	**R3 R4**
CO4	Analyze and apply genetic algorithms to solve the optimization problems	**R3 R4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**									
CO2	**3**	**3**	**2**									
CO3	**3**	**3**	**3**									**2**
CO4	**3**	**3**	**3**	**2**	**2**							**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Principles of Soft computing, S N Sivanandam, and S N Deepa, Wiley India, 3rd edition ISBN 13: 978812658744-5, 2019

REFERENCE BOOKS:

1. Neuro-fuzzy and soft computing, J.S.R. Jang, C.T. Sun, E. Mizutani, Phi (EEE edition), 2012, ISBN 0-13-261066-3
2. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, Third Edition

WEBLINKS:

1. **Introduction to Soft Computing by Prof. Debasis Samanta NPTEL course**
2. **L. A. Zadeh, "Fuzzy Algorithms", Information and Control, vol. 12, pp. 94-102, 1968. CrossRef Google Scholar**
3. **2. L. A. Zadeh, "A Rationale for Fuzzy Control", J.Dynamic Systems Measurement and Control, vol. 94, pp. 3-4, 1972. CrossRef Google Scholar**
4. **3. L. A. Zadeh, "Outline of a New Approach to the Analysis of Complex Systems and Decision Processes", IEEE Trans. Systems Man and Cybernetics, vol. SMC-3, pp. 28-44, 1973**

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	Course Title: Computer Vision		
	Course Code: 18CS751	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand the basics of computer vision and image processing. 2. To understand the different kinds of detectors and matching applications. 3. To understand the need of motion and its techniques. 4. To understand the importance of detection and recognition. 5. To understand the basics of motion estimation and image stitching.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** What is computer vision? , A brief history, overview. **Image formation**: Geometric primitives and transformations, Photometric image formation, The digital camera. **Image processing:** Steps in image processing, filtering, Fourier transformation, neighborhood operation.	**8**
2	**Feature detection and matching**:-Points and patches , Feature detectors , Feature descriptors ,Feature matching , Feature tracking ,Application: Performance-driven animation ,Edges- Edge detection, Edge linking ,Application: Edge editing and enhancement, Lines- Successive approximation , Hough transforms , Vanishing points	**9**
3	**Structure from motion:** Triangulation, Two-frame structure from motion, Projective (uncalibrated) reconstruction ,Self-calibration Application: View morphing, Factorization ,Perspective and projective factorization , Application: Sparse 3D model extraction ,Bundle adjustment ,Exploiting sparsity ,Application: Match move, and augmented reality ,Uncertainty and ambiguities ,Application: Reconstruction from Internet photos ,Constrained structure and motion ,Line-based techniques Plane-based techniques.	**9**
4	**Recognition:** object detection, face detection, face recognition, instance recognition, category recognition, context and scene understanding, recognition databases and test sets.	**9**
5	**Self study: Dense motion estimation:** translational alignment, parametric motion, Spline based motion, optical flow, layered motion, **Image Stitching**: motion models, global alignment, compositing and blending.	**7**

Course Outcomes	**Description**	**RBT Levels**
CO1	**Acquire** fundamental concepts and applications of computer vision and image processing.	**L1, L3**
CO2	**Interpret and Apply** the various detectors and matching applications.	**L2, L3**
CO3	**Explain** the importance motion and usage of its techniques.	**L1, L2**

CO4	**Apply** the analysis on scene and recognizing all of its constituent objects.	**L3**
CO5	**Develop** motion estimation algorithms that can be used for wide variety of applications.	**L4,L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**3**			**2**	**3**			**1**			**3**
CO2	**3**	**3**	**2**	**2**	**2**	**3**			**1**			**3**
CO3	**3**	**3**	**2**	**2**	**2**	**3**			**2**			**3**
CO4	**3**	**3**	**2**	**2**	**2**	**3**			**1**			**3**
CO5	**2**	**2**	**2**	**2**	**2**	**3**			**2**			**3**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Computer vision: algorithms and applications by Richard Szelski 2010 Springer.

REFERENCE BOOKS:

1. Forsyth A. David and Ponce Jean, Computer Vision, A Modern Approach. 2nd ed., 2011.
2. Trucco and Verri, Introductory Techniques for 3D Computer Vision, 1998.

SELF STUDY REFERENCES/WEBLINKS:

1. http://szeliski.org/Book/.
2. **http://www.amazon.com/Computer-Vision-Models-Learning-Inference/product-reviews/1107011795/ref=dp_top_cm_cr_acr_txt?showViewpoints=1**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Software Project Management		
	Course Code: 18CS743	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42

Course Objectives:	Description
	1. To understand the Software Project Planning and Evaluation techniques. 2. To plan and manage projects at each stage of the software development life cycle (SDLC). 3. To learn about the activity planning and risk management principles. 4. To manage software projects and control software deliverables. 5. To develop skills to manage the various phases involved in project management and people management.

Unit No	Syllabus Content	No of Hours
1	**Project Evaluation and Project Planning :** Importance of Software Project Management, Activities, Methodologies, Categorization of Software Projects, Setting objectives, Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation, Strategic program Management, Stepwise Project Planning.	9
2	**Project Life Cycle and Effort Estimation :** Software process and Process Model, Choice of Process models, Rapid Application development, Agile methods, Dynamic System Development Method, Extreme Programming, Managing interactive processes, Basics of Software estimation, Effort and Cost estimation techniques - COSMIC Full function points, COCOMO II - a Parametric Productivity Model.	8
3	**Activity Planning and Risk Management :** Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Formulating Network Model, Forward Pass and Backward Pass techniques - Critical path (CRM) method, Risk identification, Assessment, Risk Planning, Risk Management, PERT technique, Monte Carlo simulation, Resource Allocation, Creation of critical paths, Cost schedules.	9
4	**Project Management and Control:** Framework for Management and control, Collection of data, Visualizing progress, Cost monitoring, Earned Value Analysis, Prioritizing Monitoring, Project tracking, Change control, Software Configuration Management, Managing contracts, Contract Management.	9
5	**SELF-STUDY –** **Staffing in Software Projects:** Managing people, Organizational behavior, Best methods of staff selection, Motivation, The Oldham, Hackman job characteristic model, Stress, Health and Safety, Ethical and Professional concerns, Working in teams, Decision making, Organizational structures, Dispersed and Virtual teams, Communications genres, Communication plans, Leadership.	7

Course Outcomes	Description	RBT Levels
CO1	Understand Project Management principles while developing software.	Level1, Level2
CO2	Gain extensive knowledge about the basic project management concepts, framework and the process models.	Level 2
CO3	Obtain adequate knowledge about software process models and software effort estimation techniques.	Level 3
CO4	Estimate the risks involved in various project activities.	Level 3
CO5	Learn staff selection process and the issues related to people management	Level 3

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2								2	2
CO2	3	2	1								2	2
CO3	2	2	1		3			1				
CO4	2	2		2		1		1			2	2
CO5	1	2										2

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

*1. **Software Project Management, Bob Hughes, Mike Cotterell and Rajib Mall**, Fifth Edition, Tata McGraw Hill, New Delhi, 2012.*

REFERENCE BOOKS:

1. **Effective Software Project Management, Robert K. Wysocki**, Wiley Publication, 2011.
2. **Managing Global Software Projects, Gopalaswamy Ramesh,** McGraw Hill Education (India), Fourteenth Reprint 2013.

SELF STUDY REFERENCES/WEBLINKS:

1. https://mopinion.com/top-20-best-project-management-software-an-overview/

2. https://www.thebalancesmb.com/best-project-management-software-4175032

COURSE COORDINATOR:	**Praveena M V**

	Course Title: Cyber Forensics		
	Course Code: 18CS742	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	This course will enable students to: 1. Define and classify cybercrimes and further understand the associated Cyber laws in India 2. Explore various Cyber forensic concepts and Forensic examination processes. 3. Learn the acquisition, analysis and validation of forensics data. 4. Get familiarized with existing forensics tools.

Unit No	Syllabus Content	No of Hours
1	**Introduction to Cybercrime** Cybercrime: Introduction, Role of Electronic Communication devices and Information and Communication Technologies in Cyber crime, Types of Cyber crime, Classification of Cybercriminals, Cybercrime, The Present and the Future: Cryptocurrency characteristics and types, Deep web and Dark web	8
2	**Introduction to Cyber forensics** Interrelation among Cybercrime, Cyber Forensics and Cyber Security, Cyber Forensics: Definition, Need, Objectives, Computer Forensics Investigations, Steps in Forensic Investigation, Forensic Examination Process, Methods employed in Forensic Analysis, Classification of Cyber Forensics:Disk, Network, Wirelesss, Database, Malware, Mobile, GPS, Email and Memory Forensics	8
3	**Digital Evidence Analysis using Forensics tools and techniques** Digital evidence: Sources, Collection procedure, Preliminaries of Digital evidence; Digital evidence acquisition and seizure, Acquisition of evidence from : Computer and Electronic device, Mobile phone and PDA, Optical and removable media ; Chain of Custody ; Forensic Tools, types and categories, Cyber Forensic Suite; Forensic tools for: Drive Imaging and Validation, Integrity verification and Hashing, Data recovery, RAM analysis, Encryption/Decryption, Password recovery, Analyzing network, Metadata	9

	processing, Forensic auditing, Antiforensics ; Analysis of Digital Evidence: Capturing Forensic copy of memory and hard drive with Toolkit Forensic imager, RAM analysis with Volitility, Analysing hard drive with Win Hex, Working with Autopsy, email tracing and tracking ; Admissibility of Digital Evidence : Introduction, Digital evidence electronic record	
4	**Cyber security: Organizational Implications** Introduction , Cost of Cybercrimes and IPR issues, Web threats for organizations, Security and privacy implications from Cloud computing Social media marketing: security risks, Protecting people's privacy in organization, Organizational guidelines for internet usage, safe computing and computer usage policy, Incident Handling : essential component of cyber security, Forensics best practices for organizations, Media and asset protection. Importance of end-point security	9
5	**Cyber Forensics case studies and Cyber Laws** Cyber breaches examples and case studies discussion: New zealand's Waikato District Health Board cyber attack, Colonial pipeline cyber attack (ransomware case study) etc. ; Introduction to Cyber laws: need, legal issues; Cyber laws in India and case studies: Cyber laws in India, Information Technology Act 2000; Cyber Laws associated to Cyber crime against Individual, Property and Nation, Cyber laws for Cyber security	8

NOTE:
1. Unit 5 will be the Self study component

Course Outcomes	Description	RBT Levels
CO1	Discuss the various types of cyber crimes and Cyber Laws applicable to them	**L1, L2**
CO2	Apply Forensic examination process	**L1,L2,L3, L4**
CO3	Analyze and validate forensics data	**L1,L2,L3,L4**
CO4	Use forensics tools	**L1, L2, L3**
CO5	Identify the best practices followed in the organization with respect to cyber security	**L1, L2**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	**3**	**2**										
CO2	**3**	**3**	**1**	**3**								**2**
CO3	**3**	**3**	**2**	**3**								**1**
CO4	**3**	**2**	**1**	**2**	**3**							**2**
CO5	**3**	**2**	**2**									**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1.Dejey, S Murugan, "**Cyber Forensics**", Oxford University Press, 2018.

2.Nina Godbole, SunitBelapure, "**Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives**",Wiley Publications, 2017.

REFERENCE BOOKS:

1. John R.Vacca, "**Computer Forensics**", Cengage Learning, 2005

3. Marjie T.Britz, "**Computer Forensics and Cyber Crime": An Introduction**", 3rd Edition, Prentice Hall, 2013.

SELF STUDY REFERENCES/WEBLINKS:

Dejey, S Murugan, "**Cyber Forensics**", Oxford University Press, 2018.

COURSE COORDINATOR:	**Vinutha H**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: BUSINESS INTELLIGENCE		
	Course Code: **18CS741**	**No. of Credits:** **3: 0: 0 (L-T-P)**	**No. of Lecture Hours/Week: 3**
	Exam Duration: **3 Hours**	**CIE + Assignment + SEE =** **45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	Description
	1. Describe the concepts and components of Business Intelligence. 2. Understand the technological architecture that underpins the Business Intelligence systems. 3. Determine how dimensional modeling fits in an enterprise. 4. Examine the data integration techniques to discover previously hidden insights that can profoundly impact the success of any business. 5. Develop Business Intelligence systems using data analytics tools to aid the decision making process.

Unit No	Syllabus Content	No of Hours
1.	**The Business Demand for Data, Information, and Analytics,** Just One Word: Data. Welcome to the Data Deluge, Taming the Analytics Deluge, Too Much Data, Too Little Information, Data Capture versus Information Analysis, The Five Cs of Data, Common Terminology from our Perspective, **Justifying BI: Building the Business and Technical Case,** Why Justification is Needed, Building the Business Case, Building the Technical Case, Assessing Readiness, Creating a BI Road Map, Developing Scope, Preliminary Plan, and Budget, Obtaining Approval, Common Justification Pitfalls, **Defining Requirements -** Business, Data and Quality, The Purpose of Defining Requirements, Goals Deliverables, Roles, Defining Requirements Workflow, Interviewing, Documenting Requirements.	**08**
2.	**Architecture Framework,** The Need for Architectural Blueprints, Architectural Framework, Information Architecture, Data Architecture, Technical Architecture, Product Architecture, Metadata, Security and Privacy, Avoiding Accidents with Architectural Planning, Do Not Obsess over the Architecture, **Information Architecture,** The Purpose of an Information Architecture, Data Integration Framework, DIF Information Architecture, Operational BI versus Analytical BI, Master Data Management, **Data Architecture,** The Purpose of a Data Architecture, History, Data Architectural Choices, Data Integration Workflow, Data Workflow - Rise of EDW Again, Operational Data Store.	**09**
3.	**SELF-STUDY** **Foundational Data Modeling,** The Purpose of Data Modeling, Definitions - The Difference Between a Data Model and Data Modeling, Three Levels of Data Models, Data Modeling Workflow, Where Data Models Are Used, Entity-Relationship (ER) Modeling Overview, Normalization, Limits and Purpose of Normalization, **Dimensional Modeling,** Introduction to Dimensional Modeling,	**09**

	High-Level View of a Dimensional Model, Facts Dimensions, Schemas, Entity Relationship versus Dimensional Modeling, Purpose of Dimensional Modeling Fact Tables, Achieving Consistency, Advanced Dimensions and Facts, Dimensional Modeling Recap, **Business Intelligence Dimensional Modeling,** Introduction, Hierarchies, Outrigger Tables, Slowly Changing Dimensions, Causal Dimension, Multivalued Dimensions, Junk Dimensions, Value Band Reporting, Heterogeneous Products, Alternate Dimensions, Too Few or Too Many Dimensions.	
4.	**Data Integration Design and Development,** Getting Started with Data Integration, Data Integration Architecture, Data Integration Requirements, Data Integration Design, Data Integration Standards, Loading Historical Data, Data Integration Prototyping, Data Integration Testing, **Data Integration Processes,** Introduction: Manual Coding versus Tool-Based Data Integration, Data Integration Services.	**08**
5.	**Business Intelligence Applications,** BI Content Specifications, Revise BI Applications List, BI Personas, BI Design Layout - Best Practices, Data Design for Self-Service BI, Matching Types of Analysis to Visualizations, **BI Design and Development,** BI Design, BI Development, BI Application Testing, **Advanced Analytics,** Advanced Analytics Overview and Background, Predictive Analytics and Data Mining, Analytical Sandboxes and Hubs, Big Data Analytics, Data Visualization.	**08**

Course Outcomes	**Description**	**RBT Levels**
CO1	Establish Business Intelligence in the enterprise by defining the requirements for businesses that demand information.	**L3**
CO2	Employ a well architected foundation that provides information that helps in aligning the company's data with its business strategies.	**L3**
CO3	Articulate how the data and dimensional models are considered the cornerstone to building Business Intelligence applications.	**L3**
CO4	Illustrate the Data Integration workflow of source data as it is transformed to become actionable information.	**L3**
CO5	Develop Business Intelligence applications with user interfaces and standards that resonate with the intended audience and employ analytics for forecasting.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1	2	2	-	-	-	-	-	-	-
CO2	2	3	3	3	3	-	-	-	-	-	-	-
CO3	1	2	2	2	3	-	-	-	-	-	-	-

CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Rick Sherman, **"Business Intelligence Guidebook: From Data Integration to Analytics",** 1st Edition, Morgan Kaufmann Publishers/Elsevier Publishers Pvt Ltd., 2014. ISBN-13: 978-0124114616.

REFERENCE BOOKS:

1. R N Prasad and Seema Acharya, **"Fundamentals of Business Analytics",** 2nd Edition, Wiley Publications, 2016. ISBN-13: 978-8126563791.
2. U Dinesh Kumar, **"Business Analytics: The Science of Data - Driven Decision Making",** 1st Edition, Wiley Publications, 2017. ISBN-13: 978-8126568772.
3. Foster Provost and Tom Fawcett, **"Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking",** 1st Edition, O'Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2013. ISBN-13: 978-9351102670.
4. Ramesh Sharda, Dursun Delen and Efraim Turban, **"Business Intelligence, Analytics, and Data Science: A Managerial Perspective",** 1st Edition, Pearson Education, 2019, ISBN-13: 978-9353067021.
5. Carolo Vercellis, **"Business Intelligence: Data Mining and Optimization for Decision Making",** 1st Edition, Wiley Publications, 2013. ISBN-13: 978-8126541881.

SELF-STUDY REFERENCES/WEBLINKS:

1. **Foundational Data Modeling**
   https://www.youtube.com/watch?v=CyP8UfeXVWg
2. **Dimensional Modeling**
   https://www.youtube.com/watch?v=lWPiSZf7-uQ
3. **Business Intelligence Dimensional Modeling**
   https://www.youtube.com/watch?v=rcpM0MZX-qc

COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	Course Title: Introduction To Big Data Analytics		
	Course Code: 18CS73	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
Aided By Govt. of Karnataka	**Exam Duration : 3 hours**	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	This course will enable students to: • Understand fundamentals process of adopting Big Data analytics • Learn the Hadoop framework and NOSQL concepts • Learn to use Spark APIs, write SQL queries, Streaming concepts • Design distributed Machine Learning models with Spark's MLlib • Get exposed to case studies of complex real world problems

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction to Big Data Analytics:** Big data and its characteristics, Market and Business Drivers for Big Data Analytics, Business Problems Suited to Big Data Analytics, Developing a Strategy for Integrating Big Data Analytics into the Enterprise, Introduction to High-Performance Appliances for Big Data Management, NoSQL Data Management for Big Data	**8**
2	**Introduction to Hadoop:** Introduction, Hadoop and its Ecosystem, Hadoop Distributed File System, MapReduce Framework and Programming Model, Hadoop Yarn, Hadoop Ecosystem Tools **Introduction to Apache Spark:** The genesis of Spark, Hadoop at Yahoo and Spark early years, What is Apache Spark, Unified Analytics, Apache Spark's Distributed Execution, Spark Application and Spark session, Spark Jobs, Spark stages , Spark tasks, Transformation, Actions and Lazy Evaluation, Narrow and wide transformation, The Spark UI, Your first Standalone application.	**9**
3	**Adding structure to Apache Spark:** Apache Spark's structured APIs : The Dataframe API, The dataset API, Spark SQL and the underlying engine, Using Spark SQL in Spark Applications, SQL Tables and Views, Data sources for Data frames and SQL Tables, Common Data frames and Spark SQL operations, Structured Streaming, Programming model of Structured streaming, The fundamentals of Structured Streaming query, Streaming data sources and sinks : Apache Kafka.	**9**
4	**Reliable Storage solutions with Apache Spark:** Importance of Optimal storage solutions, Databases, Data lakes, Data houses, Apache Hudi, Apache Iceberg, Delta lake **Machine Learning with MLlib:**Supervised and Unpervised Machine	**8**

	Learning, Designing machine Learning pipelines, Hyperparameter Tuning, Model Management using MLflow	
5	**Advanced analytics with Spark, Case studies**: Exploring key machine learning algorithms on Spark for Recommender engines, Anomaly detection in network, Latent Semantic analysis in Natural language processing, Geospatial and temporal data Analysis, Image data analysis	**8**

Course Outcomes	**Description**	**RBT Levels**
CO1	Explore the fundamentals and process of adopting Big Data analytics	**L1, L2**
CO2	Explore Hadoop framework and NOSQL Data Management for Big Data	**L1, L2, L3**
CO3	Use Spark to process structured data to perform data engineering tasks	**L1,L2, L3, L4**
CO4	Build distributed Machine Learning models with Spark's MLlib	**L1, L2, L3**
CO5	Create complex analytics on large datasets using Machine learning tools by building and evaluating models	**L1,L2, L3, L4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**2**	**1**	**2**								**2**
CO2	**1**	**2**	**2**									
CO3	**3**	**2**	**2**		**2**							
CO4	**3**	**3**	**2**	**2**								
CO5	**3**	**2**	**2**	**2**	**2**							**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.
2. Holden Karau, Andy Konwinski, Patrick WendellMatei Zaharia, "Learning Spark: Lightning-Fast Big Data Analysis", O'Reilly, 2015, Edition 1.
3. Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills,"Advanced Analytics with Spark by Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills (O'Reilly). Copyright 2015 .

REFERENCE BOOKS:

<table>
<tr><td colspan="2">1. Raj Kamal and Preeti Saxena, “Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning”, McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966

2. Douglas Eadline, "Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem", 1st Edition, Pearson Education, 2016. ISBN-13: 978-9332570351

3. Raj Kamal and Preeti Saxena, “Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning”, McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966</td></tr>
<tr><td colspan="2">SELF STUDY REFERENCES/WEBLINKS:</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>COURSE COORDINATOR:</td><td>Vinutha H</td></tr>
</table>

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

<table>
<tr><td rowspan="3"></td><td colspan="3">Course Title: CLOUD COMPUTING</td></tr>
<tr><td>Course Code:
18CS72</td><td>No. of Credits:
4: 0: 0 (L-T-P)</td><td>No. of Lecture Hours/Week: 4</td></tr>
<tr><td>Exam Duration:
3 Hours</td><td>CIE + Assignment + SEE =
45 + 5 + 50 = 100</td><td>Total No. of Contact Hours: 52</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="2">Course Objectives:</td><td colspan="3">Description</td></tr>
<tr><td colspan="3">1. Explain the fundamentals of cloud computing.
2. Illustrate the cloud applications and services.
3. Compare the different cloud platforms used in the industry.</td></tr>
</table>

Unit No	Syllabus Content	No of Hours
1.	**Scalable Computing Over the Internet:** The Age of Internet Computing, Scalable Computing Trends and New Paradigms, Virtual Machines and Virtualization Middleware, Data Center Virtualization for Cloud Computing, **System Models for Distributed and Cloud Computing:** Clusters of Cooperative Computers, Grid Computing Infrastructures, Peer-to-Peer Network Families, Cloud Computing over the Internet, **Software Environments for Distributed Systems and Clouds:** Service-Oriented Architecture (SOA), **Performance, Security and Energy Efficiency:** Performance Metrics and Scalability Analysis, Fault Tolerance and System Availability, Network Threats and Data Integrity, Energy Efficiency in Distributed Computing	**10**
2.	**Implementation of Virtualization:** Levels of Virtualization Implementation, VMM Design Requirements and Providers, Virtualization Support at the OS Level, Middleware Support for Virtualization, **Virtualization Structures/Tools and Mechanisms:** Hypervisor and Xen Architecture, Binary Translation with Full Virtualization, Para-Virtualization with Compiler Support, **Virtualization of CPU, Memory and I/O Devices:** Hardware Support for Virtualization, CPU Virtualization, Memory Virtualization, I/O Virtualization, **Virtual Clusters and Resource Management:** Physical versus Virtual Clusters, Migration of Memory, Files, and Network Resources, Dynamic Deployment of Virtual Clusters, **Virtualization for Data-Center Automation:** Server Consolidation in Data Centers, Virtual Storage Management, Cloud OS for Virtualized Data Centers.	**10**
3.	**Cloud Computing and Service Models:** Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS), **Data-Center Design and Interconnection Networks:** Warehouse-Scale Data-Center Design, Data-Center Interconnection Networks, Modular Data Center in Shipping Containers, Interconnection of Modular Data Centers, Data-Center Management Issues, **Architectural Design of Compute and Storage Clouds:** A Generic Cloud Architecture Design, Layered Cloud Architectural Development, Virtualization	**12**

	Support and Disaster Recovery, Architectural Design Challenges, **Public Cloud Platforms: GAE, AWS, AND AZURE:** Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Services (AWS), Microsoft Windows Azure, **Inter-Cloud Resource Management:** Extended Cloud Computing Services, Resource Provisioning and Platform Deployment, , Virtual Machine Creation and Management, Global Exchange of Cloud Resources, **Cloud Security and Trust Management:** Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques.	
4.	**Features of Cloud and Grid Platforms:** Cloud Capabilities and Platform Features, Traditional Features Common to Grids and Clouds, Data Features and Databases, Programming and Runtime Support, **Programming Support of Google APP Engine:** Programming the Google App Engine, Google File System (GFS), BigTable, Google's NOSQL System, Chubby, Google's Distributed Lock Service, **Programming on Amazon AWS and Microsoft AZURE:** Programming on Amazon EC2, Amazon Simple Storage Service (S3), Amazon Elastic Block Store (EBS) and SimpleDB, Microsoft Azure Programming Support, **Emerging Cloud Software Environments:** Open Source Eucalyptus and Nimbus, OpenNebula, Sector/Sphere, and OpenStack, Manjrasoft Aneka Cloud and Appliances.	**10**
5.	**SELF-STUDY** **Cloud Trends in Supporting Ubiquitous Computing:** Use of Clouds for HPC/HTC and Ubiquitous Computing, Large-Scale Private Clouds at NASA and CERN, Cloud Mashups for Agility and Scalability, Cloudlets for Mobile Cloud Computing, **Performance of Distributed Systems and the Cloud:** Review of Science and Research Clouds, Data-Intensive Scalable Computing (DISC), Quality of Service in Cloud Computing, Benchmarking MPI, Azure, EC2, MapReduce, and Hadoop, Communities and Applications of Social Networks, Twitter for Microblogging, News, and Alert Services.	**10**

Course Outcomes	**Description**	**RBT Levels**
CO1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.	**L2**
CO2	Discuss virtualization and outline its role in enabling the cloud computing system model.	**L2**
CO3	Identify the architecture and infrastructure of cloud computing and explain the core issues of cloud computing such as security and privacy.	**L3**
CO4	Determine the appropriate cloud computing solutions and provide recommendations according to the applications used.	**L3**
CO5	Compute the performance of cloud systems under different scenarios.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	2	1	2	1	-	-	-	-	-	-	-
CO2	3	2	3	3	2	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	2	2	3	3	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, **"Distributed and Cloud Computing: From Parallel Processing to the Internet of Things",** 1st Edition, Morgan Kaufmann/Elsevier Publications, 2012, ISBN-13: 978-0123858801.

REFERENCE BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, **"Mastering Cloud Computing",** 1st Edition, McGraw Hill Education, 2013, ISBN-13: 978-1259029950.
2. Dan C. Marinescu, "Cloud Computing - Theory and Practice", 1st Edition, Morgan Kaufmann/Elsevier Publications, 2013, ISBN-13: 978-9351070948.
3. Dinkar Sitaram and Geetha Manjunath, "Moving to the Cloud - Developing Apps in the New World of Cloud Computing", 1st Edition, Syngress/Elsevier Publications, 2012, ISBN-13: 978-9381269251

SELF-STUDY REFERENCES/WEBLINKS:

1. https://www.youtube.com/watch?v=PE-zbhDgf1c
2. https://www.youtube.com/watch?v=sS7fyW_qDrg

COURSE COORDINATOR:	**Dr.Siddaraju** **Mr.Srinivasa A. H.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Syllabus for 2018-19 Batch UG (CV)

Semester: VII / VIII	
Course Title: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)	
Course Code: **18HS72 / 82**	Evaluation Procedure:
Credits: **02**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 26 Hrs. (L:T:P:S) - 2:0:0:0	SEE Duration: 2 Hrs

Course Learning Objectives:	
1	To gain an historical, economic, and organizational perspective of occupational safety and health.
2	To investigate current occupational safety and health problems and solutions.
3	To identify the forces that influence occupational safety and health.
4	To demonstrate the knowledge and skills needed to identify work place problems and safe work practice.

UNIT - I	
OCCUPATIONAL HAZARD AND CONTROL PRINCIPLES: Safety, History and development, National Safety Policy. Occupational safety and Health Act (OSHA), Occupational Health and Safety administration - Laws governing OSHA and right to know. Accident – causation, investigation, investigation plan, Methods of acquiring accident facts, Supervisory role in accident investigation.	**6 Hrs**
UNIT - II	
ERGONOMICS AT WORK PLACE: Ergonomics Task analysis, Preventing Ergonomic Hazards, Work space Envelops, Visual Ergonomics, Ergonomic Standards, Ergonomic Programs. Emergency Response - Decision for action – purpose and considerations.	**5 Hrs**
UNIT - III	
FIRE PREVENTION AND PROTECTION: Fire Triangle, Fire Development and its severity, Effect of Enclosures, early detection of Fire, Classification of fire and Fire Extinguishers. Electrical Safety.	**5 Hrs**
UNIT – IV (Blended Learning)	
HEALTH CONSIDERATIONS AT WORK PLACE: Types of diseases and their spread, Health Emergency. Personal Protective Equipment (PPE) – types and advantages, effects of exposure and treatment for engineering industries, municipal solid waste. Environment management plans (EMP) for safety and sustainability.	**5 Hrs**
UNIT - V	
OCCUPATIONAL HEALTH AND SAFETY CONSIDERATIONS: Handling of chemicals and safety measures in water and wastewater treatment plants and labs, Construction material manufacturing industries like cement plants, RMC Plants, precast plants and construction sites. Policies, roles and responsibilities of workers, supervisors and managers.	**5 Hrs**

Course Outcomes: The students will be able to	
1	Acquire knowledge on OSHA policies, Laws and regulations.
2	Identify hazards in the workplace that pose a danger or threat to the safety or health, or that of others.
3	Control unsafe or unhealthy hazards and propose methods to eliminate the hazards.
4	Discuss the role of health and safety in the workplace and effects of industries on environment.
5	Identify workplace hazards, safety considerations and roles and responsibilities of workers, supervisors and managers.

Question paper pattern:
• Each unit has two full questions with internal choice. • Each full question will have a maximum of two sub question. • Each full question will be for 10 Marks. • Students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	S Sharma, Vineet Kumar, “Safety, Occupational Health and Environmental Management in Construction”. Khanna Publisher, 2013.
2	R K Jain, Sunil S Rao, “Industrial Safety, Health and Environment Management Systems”. Createspace Independent Publishing Flat form, 2000.
3	Charles D Reese, “Occupational Safety and Health Fundamental principles and Philosophies”, Tailor and Francis Ltd, 2017.
4	Sudhakar Paul T Rani, “Occupational Safety and Health”, Createspace Independent Publishing Platform, 2018.
5	Akhil Kumar Das, “Principles of Fire Safety Engineering-Understanding Fire and Fire Protection-”, PHI Learning Pvt. Ltd, 2019.
6	Lakhwinder Pal Singh, “Work study and Ergonomics”, Cambridge University Press, 2018.
7	Industrial safety Sectional Committee CHD8, IS-14489:2018; Occupational Health and Safety Audit- Code' of Practice (First Revision) Bureau of Indian Standards.

Reference Books:	
1	Mishra R K, “Safety Management”, AITBS Publisher.
2	Rana S P, Goswami P K, and Indu Rathee, “Handbook of Occupational Safety and Industrial Psychology”. S. Chand and Company Ltd, 2014.
3	Narayanaraju G (Secretary to GOI), “The Occupational Safety, Health and Working Conditions Code, 2020”, NO. 37 OF 2020, Govt. of India, Ministry of Law and Justice.
4	Goetsch D. L., “Occupational Safety and Health for Technologists, Engineers and Managers”, Prentice Hall Publishers, 2010.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2					✓							
CO3					✓							
CO4							✓					
CO5									✓			✓

2020 Syllabus

Dr. Ambedkar Institute of technology, Bengaluru-56

Department of Computer Science & Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. Siddaraju

Department of Computer Science & Engineering

Professor & Head
Department of Computer Science & Engineerin
Dr. Ambedkar Institute of Technology
Bangalore-560 056.

Scheme for the Batch 2018 (175 CREDITS)

Semester	Credits
1st	20
2nd	20
3rd	24
4th	24
5th	25
6th	24
7th	23
8th	15
Total	175

Dr.Ambedkar Institute of Technology, Bengaluru-56

Scheme of Teaching and Examination from the Academic Year 2018 – 19

Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

I SEMESTER B.E (CHEMISTRY GROUP)

Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week			Examination				
						Theory Lecture	Tutorial	Drawing/ Practical	Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
						L	T	P					
1	BC	18MA11	Calculus and Linear Algebra	Mathematics	Science	3	2	--	3	50	50	100	4
2	BC	18CH12	Engineering Chemistry	Chemistry	Science	3	2	--	3	50	50	100	4
3	ES	18CS13	Programming for Problem Solving	Computer Science and Engineering	Computer Science and Engineering	2	2	--	3	50	50	100	3
4	ES	18EC14	Basic Electronics	ECE/E and I/ TC	E and C Engineering	2	2	--	3	50	50	100	3
5	ES	18ME15	Elements of Mechanical Engineering	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	2		3	50	50	100	3
6	BC	18CHL16	Engineering Chemistry Laboratory	Chemistry	Science	--	--	2	3	50	50	100	1
7	ES	18CSL17	Computer Programming Laboratory	Computer Science and Engineering	Computer Science and Engineering	--	--	2	3	50	50	100	1
8	HS	18HS11/ 18HS12	English/ Kannada	Humanities	Humanities	1	--	2	2	50	50	100	1
					TOTAL	**13**	**10**	**6**	**23**	**350**	**350**	**700**	**20**

First year scheme

Dr.Ambedkar Institute of Technology, Bengaluru-56													
Scheme of Teaching and Examination from the Academic Year 2018 – 19													
Outcome Based Education(OBE) and Choice Based Credit System (CBCS)													
II SEMESTER B.E (PHYSICS GROUP)													
Sl. No	Course and Course Code		Course Title	Teaching Department	Paper Setting Board	Teaching Hours /Week		Examination					Credits
						The L	Tuto T	Prac tical P	Duratio	CIE Marks	SEE Marks	Total Marks	
1	BC	18MA21	Advanced Calculus and Numerical Methods	Mathematics	Science	3	2	--	3	50	50	100	4
2	BC	18PH22	Engineering Physics	Physics	Science	3	2	--	3	50	50	100	4
3	ES	18EE23	Basic Electrical Engineering	E and E Engineering	E and E Engineering	2	2	--	3	50	50	100	3
4	ES	18CV24	Civil Engineering and Mechanics	Civil Engineering	Civil Engineering	2	2	--	3	50	50	100	3
5	ES	18MEL25	Engineering Graphics and Design	ME, Auto, IP, IEM, Mfg Engineering	Mechanical Engineering	2	--	2	3	50	50	100	3
6	BC	18PHL26	Engineering Physics Laboratory	Physics	Science	--	--	2	3	50	50	100	1
7	ES	18EEL27	Basic Electrical Engineering Laboratory	E and E Engineering	E and E Engineering	--		2	3	50	50	100	1
8	HS	18HS21/ 18HS22	English/ Kannada	Humanities	Humanities	1		2	2	50	50	100	1
TOTAL						**13**	**8**	**8**	**23**	**400**	**400**	**800**	**20**

Note: BS: Science Course, ES: Engineering Science, Hu: Humanity and Social Science.

Definition of Credit:	
	1 hour Lecture (L) per week per semester = 1 Credit
	2 hour Tutorial (T) per week per semester =1 Credit
	2 hour Practical/Laboratory/Drawing (P) per week per semester=1 Credit.

Second year scheme

III SEMESTER												
Sl. No	**Course and Course Code**		**Course Title**	**Teaching Department**	**Teaching Hours /Week**			**Examination**				**Credits**
					Theory Lecture	**Tutorial**	**Practical/ Drawing**	**Duration in hours**	**CIE Marks**	**SEE Marks**	**Total Marks**	
					L	**T**	**P**					
1	BC	18MA31	Discrete Mathematical Structures	Mathematics	2	2	--	04	50	50	100	3
2	PC	18CS31	Digital Logic and Computer Design	CSE	4	0	--	04	50	50	100	4
3	PC	18CS32	Data Structures and Algorithms	CSE	4	0	--	04	50	50	100	4
4	PC	18CS33	Operating System	CSE	3	0	--	03	50	50	100	3
5	PC	18CS34	Python Programming	CSE	3	0	--	03	50	50	100	3
6	PC	18CS35	Web Technology	CSE	3	0	--	03	50	50	100	3
7	PC	18CSL36	Data Structures and Algorithms Laboratory	CSE	--	--	2	02	50	50	100	1
8	PC	18CSL37	Digital Logic and Computer Design Laboratory	CSE	--	---	2	03	50	50	100	1
9		18CSL39	Python Programming Laboratory	CSE	--	---	2	02	50	50	100	1
10	HS	18HS31/32	Constitution of India Professional Ethics and Human Rights/ / Env. Studies	Hu/Civ	1	--	--	02	50	50	100	1
11	MC	18HS33	Soft skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**24**	**02**	**06**	**33**	**450**	**450**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
11	MC	18MAD31	Advance Mathematics - I	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, MC: Mandatory Course.

18CSL38: Student must complete a certification under anyone online course as specified in the scheme

Second year scheme

IV SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	BC	18MA41	Probability Statistics & Queuing Theory	Mathematics	2	2	--	04	50	50	100	3
2	PC	18CS41	Algorithms Design Techniques	CSE	3	0	--	03	50	50	100	3
3	PC	18CS42	OOP Principles and Practices using C++	CSE	3	0	--	03	50	50	100	3
4	PC	18CS43	Microcontroller and Embedded System	CSE	4	0	--	04	50	50	100	4
5	PC	18CS44	Theoretical Foundation of Computer Science	CSE	4	0	--	04	50	50	100	4
6	PC	18CS45	Computer Organisation and Architecture	CSE	3	0	--	03	50	50	100	3
7	PC	18CSL46	Microcontroller and Embedded System Laboratory	CSE	--	--	2	03	50	50	100	1
8	PC	18CSL47	Object Oriented Programming Laboratory	CSE	--	---	2	03	50	50	100	1
9	PC	18CSL48	Algorithm Design Techniques Laboratory	CSE	--	---	2	03	50	50	100	1
10	HS	18HS41/42	Constitution of India Professional Ethics and Human Rights/ Env. Studies	Hum/Civ	1	--	--	02	50	50	100	1
11	MC	18HS43	Employability skills (MC)	Humanities	04	-	--	03	50	-	50	0
				TOTAL	**24**	**02**	**06**	**35**	**450**	**450**	**900**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
	MC	18MAD41	Advance Mathematics - II	Mathematics	02	01	--	03	50		50	0

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, NCMC: Non-Credit Mandatory Course.
ENV: Environmental Studies, CIP: Constitution of India Professional Ethics and Human Rights
18CSL48: Student must complete a certification under anyone online course as specified in the scheme

Third year scheme

V SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	HS	18HS51/52	M&E / IPR (title as per BOS decision)	Hu	2	2	--	03	50	50	100	3
2	PC	18CS51	Software Engineering	CSE	3	-	--	03	50	50	100	3
3	PC	18CS52	Core Java	CSE	4	-	--	04	50	50	100	4
4	PC	18CS53	Database Management System	CSE	3	--	--	03	50	50	100	3
5	PC	18CS54	Computer Networks & Internet Protocols	CSE	4	--	--	04	50	50	100	4
6	PE	18CS55X	Elective -1 (PENDING)	CSE	3	--	--	03	50	50	100	3
7	OE	18XXE01	Open Elective -A	CSE	3	--	--	03	50	50	100	3
8	PC	18CSL56	Database Application Laboratory	CSE	--	--	2	02	50	50	100	1
9	PC	18CSL57	Network Programming lab using java & NS	CSE	--	--	2	02	50	50	100	1
				TOTAL	22	2	4	27	450	450	900	25

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

Electives

Course code	Professional Electives -2
18CS551	Web Technologies
18CS552	Advanced Algorithms
18CS553	Artificial Intelligence
18CS554	TCS-Elective

Open Elective -A

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
OOPS with C++	18CSE011	3
Python programming	18CS E012	3
Unix Shell Programming	18CS E013	3

Open Elective -A

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.
Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

Third year scheme

VI SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week: Theory Lecture (L)	Tutorial (T)	Practical/ Drawing (P)	Examination: Duration in hours	CIE Marks	SEE Marks	Total Marks	Credits
1	HS	18HS61/62	M&E/IPR	Hu	3	2	--	03	50	50	100	3
2	PC	18CS61	Internet of Things	CSE	4	--	--	04	50	50	100	4
3	PC	18CS62	Machine Learning	CSE	4	--	--	04	50	50	100	4
	PC	18CS63	Unix Programming	CSE	3	--	--	03	50	50	100	3
4	PE	18CS64X	Professional Elective -2	CSE	3	--	--	03	50	50	100	3
5	OE	**18XXE02**	**Open Elective -B**	CSE	3	--	--	03	50	50	100	3
6	PC	18CSL65	Internet of Things Lab	CSE	--	--	2	02	50	50	100	1
7	PC	18CSL66	Machine Learning Lab	CSE	--	--	2	02	50	50	100	1
8	MP	18CSP67	Mini-project	CSE				03	50	50	100	2
9	INT	18CSI68	Industry Internship	(To be carried out during the intervening vacations of VI and VII semesters)				--	--	--	--	--
				TOTAL	**20**	**2**	**4**	**24**	**400**	**400**	**800**	**24**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MP: Mini-Project, INT: Internship.

Electives

Course code	**Professional Electives -2**
18CS641	Distributed Operating System
18CS642	Digital Image Processing
18CS643	Compiler Design
18CS644	Principles of Economics

Open Elective -B

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	**Sub Code**	**No. of Credits**
Wireless Sensor Networks	18CSE021	3
Storage Area Network	18CS E022	3
Adhoc Wireless Networks	18CS E023	3

Open Elective -B

Students can select any one of the open electives (Please refer to consolidated list of Dr AIT for open electives) offered by any Department.
Selection of an open elective is not allowed provided,

- The candidate has studied the same course during the previous semesters of the programme.
- The syllabus content of open elective is similar to that of Departmental core courses or professional electives.
- A similar course, under any category, is prescribed in the higher semesters of the programme.

Registration to electives shall be documented under the guidance of Programme Coordinator/ Mentor.

Fourth year scheme

VII SEMESTER

Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	MC	18HS71/72	CMEP / OSHA	IM/CV	2	--	--	03	50	50	100	2
2	PC	18CS71	Android Programming	CSE	3	--	--	03	50	50	100	3
3	PC	18CS72	Cloud Computing	CSE	4	--	--	04	50	50	100	4
4	PC	18CS73	Introduction to Big Data Analytics	CSE	3	--	--	03	50	50	100	3
5	PE	18XX74X	Professional Elective -3	CSE	3	--	--	03	50	50	100	3
6	PE	18XX75X	Professional Elective -4	CSE	3	--	--	03	50	50	100	3
7	OE	18XXE03	Open Elective - C	CSE	3	--	--	03	50	50	100	3
8	PC	18CSL77	Android Programming Laboratory	CSE	--	--	2	02	50	50	100	1
9	PC	18CSL78	Cloud Computing Laboratory	CSE			2	02	50	50	100	1
10	Project	18CSP79	Project Work Phase - 1	CSE	--	--	-	-	-	-	-	-
11	INT	18CSI80	Internship	(If not completed after VI semester examinations, it has to be carried out during the intervening vacations of VII and VIII semesters)				--	--	--	--	--
				TOTAL	**21**	--	**4**	**26**	**350**	**350**	**900**	**23**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Internship: All the students admitted to III year of BE have to undergo mandatory internship of 4 weeks during the vacations of VI and VII semesters and /or VII and VIII semesters. A SEE examination will be conducted during VIII semester and prescribed credits shall be added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent SEE examination after satisfy the internship requirements.

Electives

Course code	Professional Electives - 3	Course code	Professional Electives - 4
18CS741	Block Chain Technologies	18CS751	Computer Vision
18CS742	Cyber Forensics	18CS752	Introduction to Robotics
18CS743	Software Project Management	18CS753	Soft Computing

Open Elective -C

INTER-DEPARTMENTAL ELECTIVE OFFERED BY CSE

Subject Title	Sub Code	No. of Credits
Artificial Intelligence with Prolog programming	18CSE031	3
Machine Learning	18CS E032	3
Internet of Things	18CS E033	3

CMEP: Cost Management of Engg Projects, OSHA: Occupational Safety and Health Administration

VIII SEMESTER												
Sl. No	Course and Course code		Course Title	Teaching Department	Teaching Hours /Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	MC	18XX81	CMEP / OSHA	IM /CV	4	--	--	04	50	50	100	2
2	Project	18CSP84	Project Work Phase - 2	CSE	--	--	3	03	50	50	100	10
3	Seminar	18CSS85	Technical Seminar	CSE	--	--	3	03	50	50	100	1
4	INT	18CSI86	Internship	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semesters.)				03	50	50	100	2
TOTAL					**4**	**--**	**6**	**13**	**200**	**200**	**400**	**15**

Note: PC: Professional Core, PE: Professional Elective, OE: Open Elective, INT: Internship, MC: Mandatory Course

Internship: Those, who have not pursued /completed the internship will be declared as failed and have to complete during subsequent SEE examination after they satisfy the internship requirements.

CMEP: Cost Management of Engg. Projects, OSHA: Occupational Safety and Health Administration

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

DR. AMBEDKAR INSTITUTE OF TECHNOLOGY

SCHEME AND SYLLABUS

Outcome Based Education (CBCS)

(As per NEP 2020)

Scheme of Teaching and Examinations
(Common to all B.E. Programmes)
For I Year B.E. (I & II Semester)

Academic Year 2021-2022

Dr. Ambedkar Institute of Technology

Approved by AICTE, New Delhi, Aided by Government of Karnataka,
Accreditated by NAAC, Accreditated by NBA, New Delhi

(An Autonomous Institution, Affiliated to VTU, Belagavi)

Outer Ring Road, Near Jnanabharathi Campus

Mallathahalli, Bengaluru - 560 056

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4	21EET103/203	Basic Electrical Engineering	19
5	21CST103/203	Problem solving through Programming	23
6	21CVT104/204	Civil Engineering & Mechanics	26
7	21ECT104/204	Basic Electronics and Communication Engineering	30
8	21MET105/205	Elements of Mechanical Engineering	34
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Dr. Ambedkar Institute of Technology, Bengaluru-560056

Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)

Scheme of Teaching and Examination for I Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Physics Cycle : I Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101	Calculus and Differential Equations	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21PHT102	Engineering Physics	Physics	3	0	0	0	3	3	50	50	100	3
3	ES	21EET103	Basic Electrical Engineering	Electrical	2	2	0	0	4	3	50	50	100	3
4	ES	21CVT104	Civil Engineering & Mechanics	Civil	3	0	0	0	3	3	50	50	100	3
5	ES	21MEL105	Engineering Graphics	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21PHL106	Engineering Physics Lab	Physics	0	0	2	0	2	3	50	50	100	1
7	ES	21EEL107	Basic Electrical Engineering Laboratory	Electrical	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108	Communicative English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21HST109	Health and Wellness	Humanities	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN110	Career Development skill-I	Humanities	1	0	1*	0	2	--	50	-	PP/NP	0
								Total	29		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)
Scheme of Teaching and Examination for I Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Chemistry Cycle: I Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT101	Calculus and Differential Equations	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21CHT102	Engineering Chemistry	Chemistry	3	0	0	0	3	3	50	50	100	3
3	ES	21CST103	Problem solving through Programming	Computer Science	2	2	0	0	4	3	50	50	100	3
4	ES	21ECT104	Basic Electronics and Communication Engineering	Electronics	2	2	0	0	4	3	50	50	100	3
5	ES	21MET105	Elements of Mechanical Engineering	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21CHL106	Engineering Chemistry Laboratory	Chemistry	0	0	2	0	2	3	50	50	100	1
7	ES	21CSL107	Computer Programming Laboratory	Computer Science	0	0	2	0	2	3	50	50	100	1
8	HS	21HST108	Communicative English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21CVT109	Rural Development Engineering	Civil	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN110	Career Development skill-I	Humanities	1	0	1*	0	2	----	50	--	PP/NP	0
								Total	30		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education (OBE) and Choice Based Credit System (CBCS) (As per NEP 2020)
Scheme of Teaching and Examination for II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Physics Cycle: II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT201	Advanced Calculus and Numerical Methods	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21CHT202	Engineering Chemistry	Chemistry	3	0	0	0	3	3	50	50	100	3
3	ES	21CST203	Problem solving through Programming	Computer Science	2	2	0	0	4	3	50	50	100	3
4	ES	21ECT204	Basic Electronics and Communication Engineering	Electronics	2	2	0	0	4	3	50	50	100	3
5	ES	21MET205	Elements of Mechanical Engineering	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21CHL206	Engineering Chemistry Laboratory	Chemistry	0	0	2	0	2	3	50	50	100	1
7	ES	21CSL207	Computer Programming Laboratory	Computer Science	0	0	2	0	2	3	50	50	100	1
8	HS	21HST208	Professional writing skills in English		1	0	1*	0	2	2	50	50	100	1
9	AE	21CVT209	Rural Development Engineering	Civil	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN210	Career Development skill-II	Humanities	1	0	1*	0	2	----	50	--	PP/NP	0
								Total	30		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr. Ambedkar Institute of Technology, Bengaluru-560056

Outcome Based Education(OBE) and Choice Based Credit System (CBCS) (As per NEP2020)

Scheme of Teaching and Examination for II Semester B.E., (Common to all B.E. Programmes) Academic Year:2021-22

Chemistry Cycle : II Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hours/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BS	21MAT201	Advanced Calculus and Numerical Methods	Mathematics	3	2	0	0	5	3	50	50	100	4
2	BS	21PHT202	Engineering Physics	Physics	3	0	0	0	3	3	50	50	100	3
3	ES	21EET203	Basic Electrical Engineering	Electrical	2	2	0	0	4	3	50	50	100	3
4	ES	21CVT204	Civil Engineering & Mechanics	Civil	3	0	0	0	3	3	50	50	100	3
5	ES	21MEL205	Engineering Graphics	Mechanical	2	0	2	0	4	3	50	50	100	3
6	BS	21PHL206	Engineering Physics Laboratory	Physics	0	0	2	0	2	3	50	50	100	1
7	ES	21EEL207	Basic Electrical Laboratory	Electrical	0	0	2	0	2	3	50	50	100	1
8	HS	21HST208	Professional writing skills in English	Humanities	1	0	1*	0	2	2	50	50	100	1
9	AE	21HST209	Health and Wellness	Humanities	1	0	1*	0	2	2	50	50	100	1
10	MC	21HSN210	Career Development skill-II	Humanities	1	0	1*	0	2	--	50	-	PP/NP	0
								Total	29		500	450	900	20

Note: BS: Basic Science Course, ES: Engineering Science Course,HS: Humanities & Social Science Course,
AE: Ability Enhancement Course, MC: Mandatory Course, * No practical evaluation,
L: Lecture, T:Titorial, P:Practical/drawing, S:Self study, CIE: Continuous Internal Evaluation, SEE: Semester End Examination

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - CBCS – 2021 -2022

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<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>03</td><td>02</td><td>00</td><td>00</td><td>05</td><td>65</td><td>04</td></tr>
<tr><td>CIE Marks: 50</td><td>SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="4">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: This course is intended to impart to the students the skills of employing the basic tools of differential and for solving basic and difficult engineering problems.

UNIT I **8+5 hours**

Differential Calculus-1: Recapitulation of differentiation, Taylor's and Maclaurin's series for single variable (no proof). Introduction to polar curves, expression for angle between radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature-Cartesian, parametric, polar and pedal forms.

Self-study: Indeterminate forms, center and circle of curvature.

UNIT II **8+5 hours**

Differential Calculus-2: Partial derivative of first and second order, total derivative, derivative of composite function. Euler's theorem for function of two variables. Jacobians and property $JJ' = 1$.Taylor's series for functions of two variables (no proof). Maxima and minima for function of two variables.

Self-Study: Errors and approximations, Extended Euler's theorem, Lagrange's undetermined multiplier method.

UNIT III **8+5 hours**

Ordinary differential equations (ODE's) of first order: Linear differential equations. Reducible to linear differential equation, Bernoulli's equations. Exact and reducible to exact differential equations. Orthogonal trajectories in Cartesian and polar form. Introduction to general and singular solutions; solvable for *p* only and Clairaut's equations.

Self-study: Reducible to Clairaut's equations. Application to Newton's law of cooling.

UNIT IV	**8+5 hours**
Ordinary differential equations (ODE's) of higher order: Higher order linear ODE's with constant coefficients, Inverse differential operator method (no product of functions). Method of variation of parameter. Cauchy's and Legendre's homogenous linear differential equations. Applications: L-C-R circuits. ***Self-study: Method of Undetermined co-efficients.***	
UNIT V	**8+5 hours**
Linear Algebra: Elementary row and column operations of a matrix**,** echelon form, Rank of matrix. Consistency of homogeneous and non-homogeneous equations. Gauss elimination, Gauss Jordan and Gauss-Seidel methods. ***Self-study: Solution of system of linear equations by Jacobi method, eigenvalues and eigenvectors.***	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Determine the rate of changes, extreme values, Taylor's series for the function of two variables and rank of a matrix.

CO2: Solve ordinary differential equations and system of linear equations.

CO3: Test for angle of polar curves, consistency of linear equations, the independency of two functions of two identical independent variables and orthogonally of two polar curves.

CO4: Describe Mathematical procedures to find integrating factors, orthogonal trajectories, complementary functions, particular integrals and consistency of system of equations.

CO5: Apply the terminologies of calculus and linear algebra for approximations.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44th Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10th Ed. (Reprint)2016.

REFERENCE BOOKS

1. V. Ramana : Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I& II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/ Cole, 2005.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3										
CO3	3	3										
CO4	3	3										
CO5	3	3	3									
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**ENGINEERING PHYSICS**						
Course Code	**21PHT102/202**						
Category	Basic Science Course (BS)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE: To introduce the Engineering students to the basics of elasticity, vibrations, quantum mechanics, electrical and dielectric properties of materials,laser and fiber optics, crystal structure and nanomaterials with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I **8 hours**

Elasticity: Torsion: Expression for couple per unit twist of a solid cylinder (derivation). Torsional Pendulum: Expression for period of oscillation and Rigidity modulus (derivation). Bending of Beams: Definition of beam, neutral surface and neutral axis. Expression for bending moment of a beam (derivation). Expression for Young's modulus of the material of a single cantilever (derivation). Numerical problems.

Vibrations: Theory of free vibrations, theory of damped vibrations and discussion of three cases of damping. Theory of Forced vibrations. Resonance: Condition for resonance, sharpness of resonance. Numerical problems.

Self-study component: Types of beams and its engineering applications, application of damping in automobiles, LCR resonance.

UNIT II	**8 hours**

Modern Physics: de- Broglie hypothesis: de Broglie wavelength for free and accelerated electron. Concept of wave packet. Phase velocity, group velocity (no derivation), relation between phase velocity and group velocity, relation between group velocity and particle velocity, relation between phase velocity, group velocity and velocity of light. Numerical problems.

Quantum Mechanics: Heisenberg's uncertainty principle and its physical significance. Application of uncertainty principle: Non-confinement of electron in the nucleus. Wave function. Properties and Physical significance of a wave function. Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrödinger's wave equation. Eigen values and Eigen functions. Application of Schrödinger wave equation to a particle in a box: Expression for energy Eigen values and Eigen functions for a particle in one-dimensional potential well of infinite height and finite width, discussion of wave functions and probability density for a particle in a box for ground and first excited state. Numerical problems.

Self-study component: Davisson and Germer experiment, Matter waves and their properties. Discussion of wave functions and probability density for a particle in a box for n=3, Quantum tunneling.

UNITIII	**8 hours**

Electrical properties: Assumptions of quantum free electron theory, Fermi level, Fermi energy, Fermi velocity and Fermi temperature. Fermi factor f(E) and its dependence on temperature. Expression for density of states (qualitative), expression for Fermi energy at absolute temperature (derivation). Electrical conductivity using effective mass and Fermi velocity (derivation). Merits of quantum free electron theory. Numerical problems.

Dielectric properties: Introduction to dielectrics: types of dielectrics, polarization, polarizability, dielectric constant, relation between dielectric constant and polarizability. Polarization mechanism and types of polarization. Derivation of equation for internal field in liquids and solids (1-Dimensional). Expression for Classius-Mossotti equation (Derivation). Numerical problems.

Self-study component:Distinguish between CFET and QFET, applications of dielectric materials in engineering (Mica, glass, rubber, and porcelain), Piezo-electricity.

UNIT IV **8 hours**

Lasers: Interaction of radiation with matter: Induced absorption, spontaneous emission and stimulated emission of radiation. Expression for energy density in terms of Einstein's coefficients (derivation). Requisites of a laser system. Condition for laser action. Principle, construction and working of He-Ne laser. Application of laser: Holography, principle, recording (wave front division technique) and reconstruction of 3-D images. Mention of applications of holography. Numerical problems.

Optical fibers: Propagation mechanism in optical fibers. Expression for angle of acceptance and numerical aperture (derivation). Fractional index change, V- number and modes of propagation (N). Types of optical fibers. Attenuation: expression for attenuation coefficient (derivation). Application of optical fibers: Point to point communication with block diagram. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems.

Self-study component: Applications of laser in medical and industry. Discuss the causes for attenuation in optical fibers.

UNIT V **8 hours**

Crystal Structure: Seven crystal systems, Miller indices, Interplanar spacing in terms of miller indices. X-ray diffraction, Bragg's law (derivation), Bragg's X-ray spectrometer (construction and working) and determination of crystal structure by Bragg's X-ray spectrometer, Numerical Problems.

Nanomaterials: Nano Scale, Surface to Volume Ratio, Quantum Confinement, types of nanomaterials, Synthesis of nanomaterials: Top-down approach: High energy Ball-milling method and Bottom-Up approach: Sol-Gel method. Characterization Technique: Scanning Electron Microscope (SEM), Properties of nanomaterials: Mechanical, electrical, magnetic and optical.

Self-study component: Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.

TEACHING and LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:Apply the knowledge of elasticity and vibrations to engineering.

CO2:Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system.

CO3:Summarize the importance of free electrons in determining the properties of metals; understand the concept of Fermi energy. Gain the knowledge of the electrical and dielectric properties of a materials.

CO4:Describe the basics of laser Physics, working of lasers, holography and principle of propagation of light in optical fibers.

CO5:Recognize various planes in a crystal and describe the structure determination using X-rays.

TEXT BOOKS

1. P. S. Aithal, H. J. Ravindra, Textbook of Engineering Physics, Acme Learning Pvt. Limited, New Delhi, 1st edition, (2017).
2. Dr. Amit Sarin, Anil Rewal, Engineering Physics Books, Wiley India Private Ltd., New Delhi 9th Edition (2014).
3. Avadhanulu M. N. and P.G. Kshirsagar, A text Book of Engineering Physics, 10th Edition (2014).
4. Engineering Physics by Gaur and Gupta, DhanpatRai Publications (P) Ltd.
5. Dr. K. Vijayakumar, Dr. S. Chandralingum, Modern Engineering Physics, S. Chand and Company Limited, 1st edition 2010
6. K. K. Chattopadhyay, Introduction to Nanoscience and Nanotechnology, PHI India, (2009).
7. Sulabha Kulkarni, Introduction to Nanoscience and Nanotechnology 2nd Edition (2012)

REFERENCE BOOKS

1. S. O. Pillai, Solid State Physics, New Age International. Sixth Edition.
2. A Marikani, Engineering Physics, PHI Learning Private Limited, Delhi - 2013
3. Prof. S. P. Basavaraju, Engineering Physics, Subhas Stores, Bangalore.
4. V. Rajendran , Engineering Physics, Tata McGraw Hill Company Ltd., New Delhi -2012
5. S. Mani Naidu, Engineering Physics, Pearson India Limited – 2014
6. AjoyGhatak, Optics, Tata McGraw Hill, 2005.
7. Arthur Beiser, Concepts of Modern Physics, McGraw Hill,7th edition 2017.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://physicsworld.com/

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
CO5	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Chemistry
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING CHEMISTRY</td></tr>
<tr><td>Course Code</td><td colspan="7">21CHT102/202</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>03</td><td>00</td><td>00</td><td>00</td><td>03</td><td>40</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: To expose first year engineering students to various physicochemical aspects of engineering materials such as metals, alloys, plastics, conducting polymers etc. with a view to highlight their significance and importance in application oriented systems.

UNIT I **8 hours**

Electrochemical energy sources:

Electrochemical cells

Introduction to electro chemical cells, origin of single electrode potential, sign convention and cell notation, standard electrode potential, derivation of Nernst equation for single electrode potential, numerical problems.

Types of electrodes- Classification of reference electrodes, calomel electrode – construction, working and applications, Measurement of single electrode potential using calomel electrode, Electrochemical series,Concentration cells-Derivation of Emf of a concentration cell - numerical Problems. Ion selective electrodes – Glass electrode – construction and working, Determination of pH of a solution using glass electrode.

Batteries and fuel cells

Basic concepts – principal components of a battery, operation of a battery during charging and discharging, Battery characteristics – voltage, capacity, energy efficiency, cycle life and shelf life. Classifications of batteries, Construction, working and applications of Lead acid, Ni-metal hydride and Li-ion battery, significance of Lithium.

Fuel cells – Construction, working and applications of CH3OH-O_2 fuel cell using H2SO4 electrolyte.

Self-study : Introduction to Refrence electrode, Ag-AgCl electrode, Introduction to fuel cells & battery, H2-O2 Fuel cell.

UNIT II	**8 hours**

Corrosion and Metal finishing

Corrosion science

Corrosion – Introduction, electrochemical theory of corrosion, galvanic series: Types of corrosion – Differential metal corrosion –Differential aeration corrosion, Stress corrosion. Factors– Related to nature of metal: electrode potential, relative sizes of anode and cathode, nature of the corrosion product. Related to environment: pH of the medium, temperature, humidity and presence of impurities in the atmosphere.

Corrosion control: Inorganic coatings; Anodizing – anodized coating of aluminium. Phosphating. Metallic coatings – Anodic metallic coating ex : Galvanizing, Cathodic metallic coating ex : Tinning .Organic coatings – examples, Corrosion inhibitors – definition, anodic and cathodic inhibitors, Cathodic protection – definition, sacrificialanode method.

Metal finishing

Technological importance, Electroplating – pre-treatment, process.

Significance of Polarization, Decomposition potential and Overvoltage in electroplating and their applications. Effect of plating variables on the nature of electrodeposit – metal ion concentration, organic additives (Complexing agents, brighteners, levelers, structure modifiers and wetting agents), current density, pH, temperature and throwing power of the plating bath, Electroplating of chromium.

Electroless plating: difference between electroplating and electroless plating. Pre-treatment and activation of the surface, electroless plating of copper in the manufacture of PCBs.

Self-study : Metallic coating : Anodic metallic coating- Galvanization, Cathodic metallic coating- Tinning, Organic coating

UNIT III	**8 hours**

Energy: Sources & Conversion

Chemical fuels: Hydrocarbon fuels, classification. Calorific value –GCV and NCV. Bomb calorimeter, numerical problems.

Petroleum cracking – Fluidized catalytic cracking process, Knocking – mechanism and harmful effects, Octane and Cetane numbers, Reforming of petrol. Unleaded petrol, power alcohol, Biodiesel, Catalytic converters – construction and working.

Solar energy: Photovoltaic cells – Introduction, definition, production of solar grade silicon, purification of silicon by zone refining process,construction and working of silicon-photovoltaic cell, advantages and disadvantages.

Self-study :Determination of GCV & NCV of gaseous fuel by Buoys calorimeter and numerical problems.

UNIT IV	8 hours
Polymer science and Environmental Pollution **Polymer science** Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of epoxy resins. Conducting polymers: mechanism of conduction in polyacetylene and its applications. **Environmental Pollution:** Introduction, Air pollutants: Sources and effects of primary& Secondary air Pollutants, Ozone depletion, greenhouse effect - global warming. Sources of water pollution, Determination of BOD and COD **Self-study :Characterization of nanomaterials- FT-IR, XRD, SEM, TGA, BET-surface area analysis.**	
UNIT V	**8 hours**
Instrumental methods of chemical analysis: theory, instrumentation and applications- Colorimetric estimation of Cu, Potentiometric estimation of FAS, Conductometric estimation of acid mixture. **Water technology** Impurities in water –water analysis: Hardness – types, determination by EDTA method, dissolved oxygen by Winkler's method. Potable water- desalination of water by electrodialysis method. **Green chemistry:** Introduction, Principles, green synthesis – Aspirin and ibuprofen Green catalyst – Zeolite and Silica. Microwave assisted reaction in water – Methyl benzoate to Benzoic acid, oxidation of toluene, Ultrasound assisted reaction – Sonochemicalsimmons-smith reaction **Self –study: Importance of green chemistry in industry, environment related issues.**	

TEACHING AND LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

Course Outcomes:

1. CO1: At the end of the first unit the student will be able to understand the basic concepts electrochemistry and its applications, in the construction of electrochemical energy sources.
2. CO2: At the end of the second unit the student will be able to understand concepts of corrosion and its control in the fabrication and design of structural materials and importance of metal finishing in

enhancing physicochemical properties.

3. CO3: At the end of the third unit the student will be able to understand concepts of renewable and non-renewable energy sources.
4. CO4: At the end of the fourth unit the student will be able to understand the application of polymeric materials for different applications.
5. CO5: At the end of the fifth unit the student will be able to understand the instrumental techniques and water quality parameters.

REFERENCE:

1. Principles of Physical Chemistry B.R.Puri, L.R.Sharma&M.S.Pathania, S.Nagin Chand &Co.
2. Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
3. Corrosion Engineering – by M.G.Fontana, Mc Graw Hill Publications.
4. Environmental Chemistry by Stanley E. Manahan, 7th Edition, lewis Publishers, 2000
5. Engineering Chemistry by DrRenubapna, Macmilan publisher India limited
6. Engineering Chemistry by Jayaprakash and VenugopalSubhash Publications.
7. Nano Metal Oxides For Environmental Remediation. United Publications Dr. Jahagirdar A.A and Dr. Nagaswarupa H P

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
CO5	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Scheme and Syllabus - CBCS –2021 -2022

Course Title	**BASIC ELECTRICAL ENGINEERING**						
Course Code	**21EET103/21EET203**						
Category	Engineering Science (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	02	00	00	04	52	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. Understand the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Analyze the series and parallel electrical circuits for voltage, current, power, and energy.
4. Describe the construction and working principles of electrical machines.
5. Explain electric power generation, transmission and distribution, wiring schemes and equipment and personal safety measures.

UNIT I **6+6 hours**

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel, and series-parallel circuitsexcited by independent voltage sources. Power and energy, maximum power transfer theorem appliedto the series circuit and its applications.

Electromagnetism and AC Fundamentals: Faraday's laws, Lenz's law. Fleming's rules & dynamically induced e.m.f. Statically induced e.m.f.s., the concept of self and mutual inductance & coefficient of coupling, force on the current-carrying conductor. Generation of sinusoidal voltage, average and RMS value, form factor, and peak factor.

Self-Study: Basics of lead acid batteries, nickel - iron batteries, lithium – ion batteries, advantages and disadvantages of batteries, rating of batteries in ampere - hour.

UNIT II	**5+5 hours**
Single-phase circuits: Voltage, current, and power waveforms with phasor diagram, in R, L, and C circuits. Analysis of R-L, R-C, R-L-C Series and Parallel circuits, Real, reactive and apparent powers, power triangle, and Power factor. **Three-phase circuits:** advantages of three-phase systems, generation of three-phase power, representation of the balanced star (3 wire and 4 wire system) and delta connected loads, phase and line relations of voltages and currents from phasor diagrams. Measurement of three-phase power by the two-wattmeter method. **Self-Study:** Electric Wiring : Casing and cap wiring, Open conduit and closed conduit systems. Advantages and disadvantages. Types of wires used for lighting and heating (power) circuits.	
UNIT III	**5+5 hours**
DC Machines: (**a)** Principle of operation, constructional details, induced emf equation, types of generators, and the relation between induced emf and terminal voltage. (**b**) Principle of operation, back emf and torque equations, types of motors, characteristics (shunt and series only), and applications. **Transformers**: Necessity of transformer, the principle of operation, Types, and construction of single-phase transformers, emf equation, losses, efficiency, and condition for maximum efficiency. **Self-Study:** DC compound generators, compound motors, three phase transformers **–** types and constructions.	
UNIT IV	**5+5 hours**
Three-phase induction Motors: Concept of rotating magnetic field, the principle of operation, constructional features of motor, types – squirrel cage and wound rotor and their applications., slip, the significance of slip, and problems on slip calculations. **Three-phase synchronous generators:** Principle of operation, constructional features of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation, with the concept of winding factor (excluding the derivation and calculation of winding factors) **Self-Study:** Single phase induction motors: Double field revolving theory. Types, Working principle and constructions.	

UNIT V **5+5 hours**

Power transmission and distribution- Concept of electric power transmission and distribution. Low voltage distribution system (400 V and 230 V) for domestic, commercial, and small scale industry through block diagram/single line diagrams only

Electricity bill: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two- part electricity tariff, calculation of electricity bill.

Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB)merits and demerits.

Personal safety measures: Electric Shock, Safety Precautions, Earthing, and its types.

Self-Study: Electrical Power Generation: Sources of energy – renewable and non-renewable, working principle of hydel, thermal, nuclear, wind and solar power plants through block diagrams, environmental effects and advantages and disadvantages.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the basic concepts in electrical engineering.

CO2: Analyze-dc circuits, single-phase, and three-phase ac circuits.

CO3: Explain the construction and operation principle of electrical machines.

CO4: Solve basic problems on electrical machines.

CO5: Explain the concept of electric power transmission, distribution, electricity billing, equipment, and personal safety measures.

TEXT BOOKS

1. Basic Electrical Engineering, D. C. Kulshreshtha, McGraw-Hill Education, Revised first edition, 2019
2. Electrical and Electronic Technology, Edward Hughes, Pearson, 12th edition, 2016
3. Lecture Notes (for module 5), Dr. AIT.

REFERENCE BOOKS

1. Basic Electrical Engineering, D.P. Kothari I.J.Nagrath, McGraw-Hill Education, 4th Edition,2019.
2. Fundamentals of Electrical Engineering and Electronics, B.L. Theraja, S Chand and Company, Reprint Edition 2013.
3. Principles Electrical Engineering and Electronics, V.K Mehata, Rohit Mehta, S Chand and Company, 2nd edition, 2015.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://www.youtube.com/watch?v=IZA_bJiGiJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1
3. https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijj2Eub-UHs_y

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO11	PSO2	PSO3
CO1	3	3						1		1		1	3	1	1
CO2	3	3						1		1		1	3	1	1
CO3	3	3						1		1		1	3	1	1
CO4	3	3						1		1		1	2	1	1
CO5	3	3				3	1	1		1		1	3	1	1
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department ofComputer Science & Engineering
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**PROBLEM SOLVING THROUGH PROGRAMMING**						
Course Code	**21CST103/203**						
Category	Engineering Science Course(ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	02	02	00	00	03	52	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

1. Elucidate the basic architecture and functionalities of a Computer.
2. Apply programming constructs of C language to solve the real-world problems.
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures.

UNIT I **8+3 hours**

Fundamentals of Problem Solving:
Art of programming through Algorithm and Flowchart, Designing solutions to various problems.
Overview of C: Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions
Self Study Component:Introduction to Computer: Computer generations, computer types, CPU, Primary memory, Secondary memory, input devices, output devices.

UNIT II **8+3 hours**

Managing Input and output operations:Conditional Branching and Loops: Example programs, finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascal's triangle.
Self Study Component: Hardware and Software: Computers in a network, Network hardware, Software basics, software types.

UNIT III **8+2 hours**

Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching and Sorting Algorithms(Linear search, Binary search, Bubble sort and Selection sort).
Self Study Component:Programming Examples

UNIT IV	**8+2 hours**
User Defined Functions and Recursion. Example programs: Finding Factorial of a positive integer, GCD of two numbers and Fibonacci sequence. ***Self Study Component:*** Storage classes: auto, extern, static, register.	
UNIT V	**8+2 hours**
Structures, Unions and Pointers, Programs like Addition of two complex numbers using structures, compute the sum, mean and standard deviation of all elements stored in an array of N real numbers using pointers. ***Self Study Component: Case Study related to Functions and Structures :*** ***<u>Example:</u> Implement structures to read, write and compute average marks and the students scoring above and below average marks for a class of 'N' students with the structure definition as*** ***struct student*** ***{*** ***char name[20];*** ***introllno;*** ***int m1, m2, m3;*** ***intavg;*** ***}***	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to: At the end of the course the student will be able to:

CO1:Elucidate the basic architecture and functionalities of a computer and also recognize the hardwareparts.

CO2:Apply programming constructs of C language to solve the real worldproblem

CO3:Explore user-defined data structures like arrays in implementing solutions to problems like searching andsorting

CO4:Explore user-defined data structures like structures, unions and pointers in implementingsolutions

CO5: Design and Develop Solutions to problems using modular programmingconstruct Using functions

TEXT BOOKS

1. E. Balaguruswamy, "Programming in ANSI C", 7th Edition, TataMcGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Prentice Hall ofIndia.

REFERENCE BOOKS

1. “Programming in C”by ReemaThereja, , Cengage publication.
2. “C- Programming Techniques” by A.M. Padma Reddy, Sri Nandi Publications

ONLINE RESOURCES

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/

MOOC courses can be adopted for more clarity in understanding the topics and varieties ofproblem solving methods.

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2		2	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-
Strength of correlation: Low-1, Medium- 2, High-3												

<table>
<tr><td>Course Title</td><td colspan="7">Civil Engineering and Mechanics</td></tr>
<tr><td>Course Code</td><td colspan="7">21CVT104 / 204</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ESC)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Teaching Hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>0</td><td>3</td><td>40</td><td>3</td></tr>
<tr><td>CIE Marks:50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course Objectives: Students will be revealed to

1. Apply the various lawsand principles of mechanics in various fields of engineering curricula and develop analytical ability and powers of reasoning.
2. Become conversant with basics of force systems to analyze various conditions developed in supports, static, relative motions and surfaces of the bodies in various planes.
3. To understand the significance of the area concentrated at one point in the planes and bodies, determine itscoordinate'sfor simple and composite sections and its higher properties like Moment of Inertia.
4. To familiarize with laws of rectilinear motion, kinematics of motion and their inter relationships.

UNIT I: **7 Hours**

Basics of Civil Engineering: Introduction to Civil engineering: Scope of different fields of civil engineering – Surveying, Building materials, Construction technology, Geotechnical engineering, Structural engineering, Hydraulics, Water resource engineering and Irrigation engineering, Transportation engineering, Environmental engineering.

Infrastructure: Types of infrastructure, role of civil engineer in the infrastructure development, Effect of the infrastructure facilities on socio-economic development of a country.

Self-study: -Roads, Bridgesand Dams; Types of roads, bridges and Dams, components and their function with simple sketches.

UNIT II:	**10 Hours**

Fundamental principles of mechanics: Introduction**,** basic principles and concepts of mechanics, Laws of mechanics, Idealization of mechanics.
Basic principles of statics: Introduction to Force and its characteristics, equivalent system of forces, principles of transmissibility of a force, systems of forces, resultant of coplanar concurrent forces, component of a force, moment of a force with respect to a point, principles of moments (Varignon's theorem), Couples, effects of a force at another point, equations of static equilibrium, free body diagram.
Co-planar forces (forces in a plane): Resultant of co-planar concurrent forces, equilibrium of co-planar concurrent forces and Numerical problems.
Co-planar non concurrent force system: Resultant of co-planar non-concurrent forces, equilibrium of coplanar non concurrent forces and Numerical problems.

UNIT III:	**8 Hours**

Support Reactions: Introduction, Beam, Classification of beams, types of loads and supports, support reactions in statically determinate beams - Numerical problems.
Friction: Introduction, laws of dry friction, limiting friction, co-efficient of friction, angle of friction, angle of repose and cone of friction. Numerical problems on Blocks (horizontal and inclined plane), Ladder friction and Wedge friction.

UNIT IV:	**8 Hours**

Centroid: Introduction, centroid and center of gravity. Derivations of simple geometrical sections – rectangle, triangle, semicircle and quarter circle. Numerical problems on composite sections.
Moment of Inertia: Introduction, Moment of Inertia of an area, Parallel axis theorem, Perpendicular axis theorem, Radius of gyration, Polar moments of inertia. Derivations of simple geometrical sections – Rectangle, Triangle, Circle, Semicircle and Quarter circle. Numerical problems on composite sections.

UNIT V:	**7 Hours**

Basic Principles of Dynamics: Introduction, kinematics and kinetics, Definitions of Displacement, Speed, Velocity and Acceleration. D'Alembert's principlewith numerical problems.Newton's Laws of motion,Concept of Rectilinear motion: withsimple-numerical problems.Differential relationship between displacement, velocity and accelerations. Principles of projectile with numerical problems.

COURSE OUTCOMES: The students will be able to

CO1: Discuss the basics of Civil Engineering, Concept of Engineering Mechanics, Forces and ForceSystems to determine the resultant

CO2: Define the effect of forces on the bodies in respect of its contact surfaces and the reactions developed in the system

CO3: Identify the geometrical properties like, centroid and Moment of Inertia of regular, composite and built-up sections.

CO4: Illustrate the concept of rectilinear motion,kinetics and kinematics of bodies with numerical approach.

TEXT BOOKS:

1. Irving H Shames, Engineering Mechanics, Prentice Hall.
2. F P Beer and E R Johnson, Vector Mechanics for Engineers, Vol-II-Dynamics, Tata McGraw Hill.
3. Engineering Mechanics by Timoshenko-Young and J V Rao, Mc Graw-Hills Book Company, New, Delhi
4. Elements of Civil Engineering (IV Edition) by S S Bhavikatti, Vikas Publishing House Pvt. Ltd. New, Delhi.
5. Elements of Civil Engineering and Engineering Mechanics, by M N Shesha Prakash and G VMogaveer, PHI Learning 2009.

1 R C Hibler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.

2 Endy Ruina and Rudraprathap, Introduction to Statics and Dynamics, Oxford University Press.

3 Shanes and Rao, Engineering Mechanics, Pearson Education.

4 Bansal R J, Text Book of Engineering Mechanics, Likshmi Publications.

5 Engineering Mechanics by M V S Rao and D R Durgaiah, University Press 2005.

REFERENCE BOOKS:

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

SCHEME FOR EXAMINATION

QUESTION PAPER PATTERN FOR SEE										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	01		02		03		04		05	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING OF Cos WITH POs

CO & PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓		✓								✓
CO2	✓	✓										✓
CO3	✓	✓										✓
CO4	✓	✓		✓								✓

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electronics and Communication Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">BASIC ELECTRONICS AND COMMUNICATION ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21ECT104/204</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>02</td><td>00</td><td>00</td><td>03</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVES:

1. Preparation:To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. Core Competence: To equip students with a basic foundation in electronic engineering fundamentals required for comprehending the operation and application of electronic circuits, logic design, embedded systems and communication systems.
3. Professionalism & Learning Environment: To inculcate in first year engineering students an ethical and a professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context and life- long learning needed for a successful professional career.

UNITI	**8+3 hours**
Electronic Circuits: Rectifiers, Reservoir and smoothing circuits, Full-wave rectifiers, Bi-phase rectifier circuits, Bridge rectifier circuits, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers, Power Supplies–Block diagram, (No Derivations, Numericals on Rectifiers included). **Amplifiers:** Types of amplifiers, Class of operation, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback. **Operational amplifiers:** Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits, Multi-stage amplifiers. **Oscillators:** Positive feedback, Conditions for oscillation, Ladder network oscillator, Wein bridge oscillator. (No Derivations, Numericals on Op-amp included). **Text 1** ***Self-study component: BJT types, comparison of BJT, FET &FinFET.***	
UNITII	**8+3 hours**
Logic Circuits: Boolean Algebra, Logic gates, Realization of Boolean Expressions using basic gates and their truth table. Half Adder and Full Adder, Multiplexer and decoder. Shift registers and its types – operation and truth table, Counters and asynchronous counters. Bistables, R-S Bistables, D-type Bistables, J-K Bistables. **Text 4** Data representation, Data types, Data storage, A microcontroller system. **Sensors and Interfacing**: Instrumentation and control systems, Transducers, Sensors. **Text 1** Actuators, LED, 7-Segment LED Display, Optocoupler, Stepper Motor, Relay, Piezo Buzzer, PushButton Switch, Keyboard. **Text 2** ***Self-study component: Actuator types, LCD, Touch screen displays***	
UNITIII	**8+2 hours**
Embedded Systems: Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvardvs Von-Neumann, Big-EndianvsLittle-Endian,Memory,Program storage memory (ROM),RAM, Embedded firm ware, other system components. **Text 2** **Communication Interface:** UART, Parallel Interface, USB, Bluetooth, Wi-Fi, GPRS. **Text 2** ***Self-study component: Block diagrams of the architectures of RISC, CISC, Harvard and Von-Neumann.***	

UNITIV **8+2 hours** **Analog and Digital Communication**: Modern communication system scheme, Information source and input transducer, Transmitter, Channel – Hardware and Software, Noise, Receiver, Multiplexing, Types of communication systems. **Text 3** Types of modulation (only concepts)– AM,FM,PhaseModulation,PulseModulation,PAM,PWM,PPM,PCM. Concept of Radio wave propagation. Concepts of Sampling theorem, Nyquist rate, Digital Modulation Schemes– ASK, FSK,PSK ***Self-study component: Evolution of Wireless Network Communication Technologies (1G, 2G, 3G and4G, 5G).***	
UNITV **8+2 hours** **Data Transmission:** Asynchronous Transmission, Synchronous Communication, Data Compression, Encryption. Radio Waves, Antennas, Satellite Communication, Microwave Communication, Optical Fiber Communication (OFC): Block diagram of OFC, Advantages of OFC, Applications of OFC. **Text 4** **Cellular Wireless Networks** - Introduction, cellular telephone system, cellular concept and frequency reuse. **Text 3** ***Self-study component:*** **Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.**	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: Describe the concepts of electronic circuits encompassing power supplies, amplifiers and oscillators.

CO2: Explain the concepts of digital logic circuits, sensors, actuators and I/O subsystems.

CO3: Discuss the characteristics of embedded systems and types of communication interface.

CO4: Describe the fundamental concepts of analog communication, digital communication and radio wave propagation.

CO5: discuss the techniques of data transmission, different modes of communication, wired and wireless communication systems.

TEXT BOOKS

1. MikeTooley, 'Electronic Circuits, Fundamentals & Applications', 4th Edition, Elsevier, 2015. DO Ihttps://doi.org/10.4324/9781315737980. eBook ISBN9781315737980
2. KVShibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016.
3. SLKakaniand Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017. https://elib4u.ipublishcentral.com/pdfreader/communication-systems
4. DPKothari, IJNagrath, 'BasicElectronics', 2ndedition, McGraw Hill Education (India), Private Limited, 2018.

REFERENCE BOOK

1. Mitchel E. Schultz, 'Grob's Basic Electronics', 11th Edition, McGraw-Hill, 2011.

ONLINE RESOURCES

1. https://onlinecourses.nptel.ac.in/noc21_ee55/preview

MODERN TOOLS:

1. PSPICE

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1		1			2	1	1		3
CO2	3	2	1					2	1	1		3
CO3	3							2	1	1		3
CO4	3							2	1	1		3
CO5	3							2	1	1		3
Strength ofcorrelation: Low-1, Medium-2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ELEMENTS OF MECHANICAL ENGINEERING</td></tr>
<tr><td>Course Code</td><td colspan="7">21MET105/205</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (EC)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>00</td><td>02</td><td>00</td><td>04</td><td>52</td><td>03</td></tr>
<tr><td>CIE
Marks: 50</td><td colspan="2">SEE
Marks: 50</td><td colspan="2">Total Max.
Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE:

1. Acquire a basic understanding role of Mechanical Engineering in the industry and society, formation of steam and its industrial application, renewable energy resources and basic concepts of Hydraulic turbines.
2. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning.
3. Acquire knowledge of various engineering materials, and metal joining techniques.
4. Acquire essential experience on basic Power transmission systems and Robotics.
5. Acquire knowledge of basic concepts on manufacturing principles and machine tools and their advancement.

UNIT 1 **8+3 hours**

Introduction to Mechanical Engineering (Overview only):
Role of Mechanical Engineering in Industries and Society

Sources of energy: Classification, renewable and non- renewable sources of energy and comparison.

Steam: Steam formation at a constant pressure: properties of steam, simple numerical problems to understand the use of steam tables. Applications of steam in industries.

Power generating systems: Introduction, construction and working of: Steam turbines – Impulse and reaction turbine, Gas turbines – Open and closed cycle, Hydraulic turbines – Pelton wheel, Francis and Kaplan turbine.

Power absorbing systems: Introduction, classification of pumps and compressors.

Self-study:

Harnessing of renewable energy sources: Wind energy, Solar energy, Bio-mass and their applications

Boilers- Introduction, classification of boilers, difference between fire tube and water tube boilers.

Laboratory Components:

1. Study/Visit any one Conventional or Renewable Energy Power Plant and prepare a comprehensive report.

***2.** Demonstration of Components of any one Turbo-machine.*

***3.** Study/Visit to an Industry using steam for their process and prepare a comprehensive report.*

UNIT 2 **8+3 hours**

Internal combustion engines: Introduction, classification, parts and terminology of I C engines, working of 4-stroke petrol & diesel engines, simple numerical problems on four stroke engines. Applications of IC engines.

Hybrid and Electrical vehicles: Introduction, basic working principle ofelectrical and hybrid vehicles.

Refrigeration and Air conditioning- Introduction, definition and unit of refrigeration. Refrigerants and their properties. Types of refrigeration systems- Vapour absorption and Vapour compression refrigeration systems and their comparison. Principle & working of room air conditioner. Applications of Refrigerators and Air conditioning system.

Self-study:

Engines: Two stroke petrol and diesel engines, emission norms.

Laboratory Components:

1. Study of Engine Components through Cut Sections

2. *Demonstrate Components and Working principles of Domestic Refrigerator and prepare a comprehensive report* **OR** *Study/visit any commercial centralized Air-Conditioning unit, understand various components and operations, and prepare a comprehensive report.*

UNITIII **8+2 hours** **Engineering Materials:** Types and applications of ferrous, nonferrous metals and alloys. Composite Materials: Introduction, classification and applications. **Heat treatment:** Introduction to heat treatment, Types of Heat Treatment: Annealing, quenching, carburizing, and hardening. **Metal Joining Processes:** **Soldering and brazing:** Definition, types, advantages, limitations and applications of soldering and brazing. Working principle of soldering iron and torch brazing methods. **Welding:** Introduction, classification and applications of welding. Working principle of electric arc welding and oxy-acetylene gas welding. Introduction to TIG and MIG welding. ***Self-study:*** ***Engineering materials: Polymers, Ceramics, Bio materials, Smart materials and its engineering applications.*** ***Laboratory Components*** *1. One exercise each involving Welding, Soldering, and Brazing.* 2. *Study oxy-acetylene gas flame structure and its application to gas welding* *3. Demonstration of* ***anyone*** *Heat transfer application device and prepare a comprehensive report*
UNIT IV **8+2 hours** **Power transmission:** **Belt drives** – Introduction, types of belts and belt drive. Terminology - velocity ratio, creep and slip. **Gear drives** - Introduction, classification; Gear trains – types of gear train. Simple numerical problems on gear drives. **Robotics**: Robot anatomy, Joints & links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly, and Inspection. ***Self-study:*** ***Power transmission: Rope drives, Chain drives and Pulleys.*** ***Laboratory Components:*** *1. Demonstration of the machine consists of Gear Trains* *2. Demonstration of various elementary mechanisms and their motion.* *3. Demonstration of any one model of Robot*

UNIT V **8+2 hours**

Manufacturing process: Introduction and classification of manufacturing process.

Machine tools: Lathe -Working principle and specification of center lathe.Sketch and description of operations performed – turning, facing, knurling, thread cutting, drilling, taper turning. Construction and Working of Milling Machines and applications.

Introduction to Mechatronics: Concept of open-loop and closed-loop systems, Examples of Mechatronic systems and their working principle.

Rapid prototyping (3D printing) - Definition, Classifications, Advantages, Disadvantages, Applications, Brief introduction of 3D Printers-SLA, SLS, FDM.

Self-study:

Introduction to Modern Manufacturing Tools and Techniques:

CNC: Introduction, components of CNC, advantages and applications of CNC, CNC Machining centres and Turning Centers.

Laboratory Components:

1. Demonstration of developing one model involving Lathe, Milling and Drilling

2. Study/Visit an Industry using CNC/ modern techniques and submit a report

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:**Demonstrate** the working of various power generation devices such as steam, gas, hydraulic turbines and power absorbing devices like air compressors.

CO2: **Analyze** about the various IC engines, and power absorbing devices such as refrigerators and air conditioning.

CO3:**Describe** the engineering materials, heat treatment, joining processes for various applications.

CO4:**Describe** power transmission methods for various applications.

CO5:Demonstrate the principle, application of various basic and advanced manufacturing processes.

TEXT BOOKS

1. Elements of Mechanical Engineering - K.R. Gopalkrishna, Subhash publishers, Bangalore.
2. A Text Book of Elements of Mechanical Engineering – S. Trymbaka Murthy I. K. International Pvt Ltd, 2010 - Mechanical engineering
3. Elements of Mechanical Engineering – Dr. A.S. Ravindra, Best Publications, 7th edition, 2009.
4. Robotics, AppuKuttan KK K. International Pvt Ltd, volume 1.
5. Material Science, by Raghavan, Fifth Edition,PHI(P)LTD.

REFERENCE BOOKS

1. Elements of Workshop Technology. Vol 1 & 2, S.K.H. Chowdhary, A.K.H. Chowdhary and Nirjhar Roy, 11th edition 2001, Media Promoters and Publishers, Mumbai.
2. Hand books of Mechanical Engineering.
3. Material science, by Callister, Reprint 2008,Wiley India(P) LTD

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org
3. https://mechanicalengineeringworld.com/

Assessment Details both (CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) and Semester End Exam (SEE) is 50% each. The students have to obtain a minimum of 40% marks individually both in CIE and SEE to pass. Student has to score a minimum of 40% marks individual in thoery and laboratory test components to quality to take up SEE. Student has to score a minimum of 40% marks in SEE to pass.

<table>
<tr><th colspan="2">CONTINUOUS INTERNAL EVALUATION (CIE)</th><th colspan="2">Max Marks</th><th>Minimum Marks to be scored in CIE, to qualify to take SEE (40% individually)</th></tr>
<tr><td>Theory</td><td>Weightage of Tests (Test1, Test2)</td><td colspan="2">30</td><td>12</td></tr>
<tr><td rowspan="2">Laboratory components</td><td>Lab demonstration components: Rubrics for each lab component are added, then taken average (more emphasized on demonstrationtopics)</td><td>10</td><td rowspan="2">20</td><td rowspan="2">08</td></tr>
<tr><td>Lab Test</td><td>10</td></tr>
<tr><td colspan="2">TOTAL</td><td colspan="2">50</td><td>20</td></tr>
</table>

Note: Questions from Self-study component will not be asked for CIE and SEE.

<table>
<tr><th colspan="11">QUESTION PAPER PATTERN (SEE)</th></tr>
<tr><td>Q. No.</td><td>Q1</td><td>Q2</td><td>Q3</td><td>Q4</td><td>Q5</td><td>Q6</td><td>Q7</td><td>Q8</td><td>Q9</td><td>Q10</td></tr>
<tr><td>UNIT</td><td colspan="2">1</td><td colspan="2">2</td><td colspan="2">3</td><td colspan="2">4</td><td colspan="2">5</td></tr>
<tr><td colspan="11">1. Two full questions (each of 20 Marks) are to be set from each unit.</td></tr>
<tr><td colspan="11">2. Student shall answer five full questions selecting one full question from each unit.</td></tr>
</table>

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1	1	1	2	2	1	1	1	1	3
CO2	3	2	2	1	1	2	2	1	1	1	1	3
CO3	2	1	1	1	2	2	2	1	1	1	1	3
CO4	3	1	2	1	2	2	2	1	1	1	1	3
CO5	3	1	1	1	1	2	2	1	1	1	1	3
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mechanical Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING GRAPHICS</td></tr>
<tr><td>Course Code</td><td colspan="7">21MEL105/205</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (EC)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>02</td><td>00</td><td>02</td><td>00</td><td>04</td><td>52</td><td>03</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course Objectives:

1. To understand the basic principles and conventions of engineering drawing
2. To use drawing as a communication mode
3. To generate pictorial views using CAD software
4. To understand the development of surfaces
5. To visualise engineering components

Teaching-Learning (General Instructions):

- Students should be made to aware of powerful communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point Presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

UNIT I	**12 hours**

Introduction: ***(Not for SEE)***

Significance of Engineering drawing, Lettering, BIS Conventions of Engineering Drawing, Freehand sketching of engineering drawing, Introduction to Scales and its types.

Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet andcurves.

Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections, Orthographic projections of points in all the quadrants. Orthographic projections of lines placed in first quadrant only; Inclined to HP,toVP and to both the planes.

Orthographic projections of planes placed in first quadrant only; resting on HP and on VP, inclined to HP,to VP and toboth the planes viz. triangle, square, rectangle, pentagon, hexagon and circular laminae.

Application on projections of Lines & Planes (Not for SEE)

UNIT II	**12 hours**

Orthographic Projection of Solids:

Orthographic projection of right regular solids resting on HP, inclined to HP and to VP only.

Prisms and Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, Tetrahedron. Applications problems on projections of Solids (Not for SEE)

Projections of Frustum of cone, pyramid & truncated sphere (Not for SEE)

UNIT III	**10 hours**

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simplesolids.

Conversion of simple isometric drawings into orthographic views.

Problems on applications of Isometric projections of simple objects / engineering components***(Not for SEE)***

Introduction to drawing views using 3D environment (Not for SEE)

UNIT IV **10 hours** **Development of Lateral Surfaces of Solids:** Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with baseonHPonly. Development of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels, trays ***(Not for SEE)*** ***Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and*** **rectangular duct** ***(Not for SEE)***	
UNIT V **08 hours** **Multidisciplinary Applications & Practice** ***(Not for SEE):*** **Free hand Sketching;** True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc. **Drawing Simple Mechanisms;** Gear trains, Ratchets, two wheeler cart & Four wheeler carts to dimensions etc. **Electric Wiring and lighting diagrams;** Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software **Basic Building Drawing;** Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software, **Electronics Engineering Drawings**- Like, Simple Electronics Circuit Drawings. **Graphs & Charts**: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.	

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1. Understand and visualize the objects with definite shape and dimensions

CO2. Analyse the shape and size of objects through different views

CO3.Develop the lateral surfaces of the object

CO4.Create a 3D view using CAD software

CO5. Identify the interdisciplinary engineering components or systems through its graphical representation

TEXT BOOKS:

1. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited,2019.
2. K.R Gopalakrishna & Sudhir GopalakrishnaTextbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017.
3. S. N. Lal: Engineering Drawing with an Introduction to Auto CAD: First-angle Projection 1st Edition, Cengage, Publication, 2018.
4. S.N. Lal, & T Madhusudhan:, Engineering Visulisation, 1st Edition, Cengage, Publication.
5. LuzadderWarrenJ.,DuffJohnM., Fundamentals of Engineering Drawing: with an Introduction to Interactive Computer Graphics for Design and Production, Prentice-Hall of India Pvt. Ltd., New Delhi, Eastern Economy Edition,2005.

REFERENCE BOOKS:

1. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press,2015.
2. Dhawan R. K., A Textbook of Engineering Drawing, 3/e, S. Chand Publishing,2019.
3. Venugopal K., Engineering Drawing and Graphics, New Age International publishers,2014.
4. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint2005.
5. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes,1997.
6. K S Sai Ram Design of steel structures, Third Edition by Pearson.
7. Nainan p kurianDesign of foundation systems, Narosa publications.
8. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgraw hill.

SCHEME FOR CIE		
	DETAILS	**MAX. MARKS**
Manual Sketching (25)	Classwork	**15**
	Assignment	**10**
Computer Printout (15)	Classwork	**15**
	Test Marks*	**10**
	TOTAL CIE MARKS	**50**

* Test marks is based on the average of two tests conducted in the mid-semester and end-semester.	

QUESTION PAPER PATTERN FOR SEMESTER END EXAMINAITON (SEE)								
UNIT	1		2		3		4	
Max. Marks	15		15		10		10	
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

NOTE:
1. Two Full Questions to be set from each Unit with internal choice.
2. Each Full question shall cover all the topics of the Unit.
3. Model question paper may be referred for distribution of topics in each Full Question.

SCHEME OF EVALUATION FOR SEE			
Unit	**Maximum Marks**	**Manual Sketching**	**Computer display and print out**
1	15	08	07
2	15	07	08
3	10	05	05
4	10	05	05
Total	**50**	**25**	**25**
NOTE: Evaluation shall be carried out jointly by both the examiners.			

MAPPING OF COs WITH POs												
COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	1	2	0	1	1	2	2	0	2
CO2	3	2	2	1	2	0	1	1	2	2	0	2
CO3	3	2	2	1	2	0	1	1	2	2	0	2
CO4	3	2	2	1	2	0	1	1	2	2	0	2
CO5	3	2	2	1	2	0	1	1	2	2	0	2
Strength of correlation: Strongly related-3, Moderately related-2, Weakly related-1, Not related-0												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING PHYSICS LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21PHL106/206</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE
Marks: 50</td><td colspan="2">SEE
Marks: 50</td><td colspan="2">Total Max.
Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course objective: To make Engineering students to understand basic concepts and principles of Physics. Gain the practical knowledge of elasticity, vibrations, Laser and optical fibers.

Sl. No.	Title of the Experiment	Compatibility with the theory course
1.	Determination of Young's Modulus of a material by single cantilever.	Unit I
2.	Determination of Rigidity modulus of a material by torsional pendulum.	Unit I
3.	Determination of acceleration due to gravity by using bar pendulum.	Unit I
4.	Determination of resonant frequency & quality factor in Series & Parallel LCR Circuits	Unit I
5.	Determination of Planck's constant using LED's	Unit II
6.	Determination of knee voltage and resistance from I-V characteristics of Zener Diode.	Unit III
7.	Measurement of dielectric constant.	Unit III
8.	Determination of Fermi energy of copper.	Unit III
9.	Determination of wavelength of Semiconductor Laser by diffraction method.	Unit IV
10.	Determination of Acceptance angle and numerical aperture of an optical fiber.	Unit IV
11.	Radius of curvature of Plano convex lens using Newton's rings	Unit IV
12.	Energy gap of a given semiconductor	Unit III

COURSE OUTCOMES: At the end of the course the students will be able to:

CO1: Apply the Physics concepts relevantly and appropriately where ever required.

CO2: The mechanical properties of solids will be understood by carrying out experiments of Young's Modulus, rigidity modulus and bar pendulum.

CO3: The optics experiments such as wavelength of laser by diffraction and numerical aperture of an Opticalfiber will help the students to understand the significance of Physics in various fields of Science and Technology.

CO4: Understand the importance of Physics in electronics.

REFERENCE BOOKS:

1. Laboratory Manual in Applied Physics -- H. Sathyaseelan. – New Age International.
2. An Advanced Course in Practical Physics -- D. Chattopadhyay and P.C. Rakshit, New Central Book Agency (p) Ltd, Kolkata .

Web link for Physics virtual lab: https://www.vlab.co.in/broad-area-physical-sciences

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">ENGINEERING CHEMISTRY LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21CHL106/206</td></tr>
<tr><td>Category</td><td colspan="7">Basic Science Course (BS)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>12</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE: To expose first year engineering students to various experimental technique related to potentiometric, conductometric, colourimetric and PKa with a view to highlight their significance and importance in application oriented systems. Students will be able to analyze hardness of water, COD of waste water.

Sl. No.	Syllabus content
	PART-A
1	Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2	Colorimetric determination of Copper.
3	Conductometric estimation of acid mixture using standard NaOH solution.
4	Determination of pKa of a weak acid using pH meter.
5	Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
6	Flame photometric estimation of Sodium and Potassium in the given sample of water. (Demonstration)
	PART-B
7	Determination of Total Hardness of water using disodium salt of EDTA.
8	Determination of Calcium Oxide in the given cement by Rapid EDTA method.
9	Determination of percentage of Copper in the given brass solution using standard Sodium thiosulphate solution.
10	Determination of Iron in Hematite ore solution using Potassium dichromate crystals by external indicator method.

11	Determination of Chemical Oxygen Demand of the given industrial waste water sample.
12	Determination of Total Alkalinity of given water sample using standard Hydrochloric acid.(Demonstration)

Course Outcomes:

1. Students will be able to apply the basic concepts electrochemistry in experiments such as potentiometry and determination of PKa of weak acid, conductometry experimentsetc
2. Students will be able to understand concepts of electromagnetic radiation and perform coulorimetric experiments.
3. Students will be able to analyze the total hardness of water sample and COD of the wastewater
4. Students will be able to analyze the hematite ore in the given sample.

References Books:

1. Laboratory manual in Engineering Chemistry Sudharani, Dhanpatrai Publishing Company.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G.H.Jeffery, J.Bassett, J.Mendham and R.C Denney.

VIRTUAL LAB LINK DETAILS:

- https://www.labster.com/chemistry-virtual-labs/
- https://youtu.be/OwZbw6Mhrqc
- https://youtu.be/UOLOsKZxi6Y

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√										
CO2	√	√										
CO3	√	√										
CO4	√	√										
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">BASIC ELECTRICAL ENGINEERING LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21EEL107/207</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVE:

1. To understand and measure electrical quantities and parameters.
2. To verify the relation between line and phase quantities, measure power and power factor in three-phase circuits.
3. To demonstrate fundamental laws of electrical engineering.
4. To determine the efficiency of single-phase transformers
5. To understand the significance of power, power factor, and control electrical Lamps from different places.

Expt No	Syllabus Contents	No.of Hours	Blooms Taxonomy level.
1	Measurement of Resistance using Voltmeter-Ammeter method and verification using Wheatstone bridge.	2	L1
2	Measurement of Inductance in single-phase circuit by the three-voltmeter method.	2	L2
3	Measurement of voltage, current, power, and power factor and verify line and phase relationship in the three-phase star-connected circuit.	2	L3
4	Verification of Kirchhoff's Laws in DC circuits	2	L2
5	Verification of maximum power theorem in DC circuits.	2	L2
6	Comparison of domestic lamps against their power consumption.	2	L3
7	Improvement of power factor in inductive circuits.	2	L3
8	Control of electrical Lamp from one, two and three points.	2	L2
9	Load test on a single-phase transformer.	2	L3

10	Demonstration of FUSE and MCB by creating overload and fault.	2	L1
	EXPERIMENTS BEYOND SYLLABUS		
1	Speed load characteristics of a three-phase induction motor.	2	L2
2	Voltage regulators to control electrical output.	2	L3

Course Outcomes:

CO1: Verify basic laws and theorem of electrical circuits.

CO2: Understand the power consumption of different types of lamps and control of lamps

from different points.

CO3: Determine the impedance of an electrical circuit and power consumption by a 3-phase

load.

CO4: Evaluate the performance of single-phase transformers.

CO5: Demonstrate the effects of fault and protection of electrical circuits.

References.

1. Dr. Eranna Dr. S. Vasudevamurthy, "Department manual.

Web Links.

1. http://vlab.amrita.edu/?sub=1&brch=75&sim=217&cnt=1/
2. http://vlab.amrita.edu/?sub=1&brch=75&sim=322&cnt=1

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				1		1	1	1		1	3		1
CO2	3	3				1		1	1	1		1	3		1
CO3	3	3				1		1	1	1		1	3		1
CO4	3	3				1		1	1	1		1	3		1
CO5	3	3				1		1	1	1		1	3		1
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Computer Science and Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td></td><td colspan="7">COMPUTER PROGRAMMING LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21CSL107/207</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./ semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>0</td><td>2</td><td>26</td><td>1</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

Course objectives to:

- Explain problem statements and identify appropriate solutions
- Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
- Development of algorithms and programs using constructs of C programming language
- Reporting the observations

Practice Programs	
1.	To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) (SI = P*T*R/100).
2.	To print the ASCII value of the given input.
3.	To findlargest of three numbers.
4.	To perform simple calculator using switch case statement.
5.	To find factorial of a number.
6.	To print even and odd numbers using looping Construct.
7.	To find sum of N natural Numbers
8.	Write a C Program to search for the given key element with the help of Linear search technique.
9.	Develop a c program to implement selection sort technique.
10.	Develop a C program to swap two numbers using pointers (Call by Reference).

Lab Programs		
1	a	Write a C program to find the roots of a quadratic equation.
	b	Write a C program to print the numbers in triangular form 1 1 2 1 2 3 1 2 3 4
2	a	Write a C program to check whether the given four digit number is palindrome or not.
	b	Write a C program using function to sort the given array elements using bubble sort technique.
3	a	Develop a C program to Store age of n students and perform the following operations i. Find minimum age of student in the list ii. Find maximum age of a student in the list
	b	Develop a C Program to compute Sin(x) using Taylor series approximation.Compare your resultWith the built- in Library function. Print both the results with appropriate messages.
4	a	If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss and determine how much profit or loss incurred in percentage.
	b.	Write a C program to implement Recursive functions for Binary to Decimal Conversion.
5	a	Write a C program to generate N Fibonacci series.
	b	Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
6	a	Write a C program to check whether the given number is prime or not.
	b	Write a C program to i. read N Bank Employees name ii. Search for an employee in the list using Binary Search Technique. Note: Use 2-D character array to store Bank employees names

<table>
<tr><td>7</td><td>a</td><td>Develop a C program to calculate tax based on given yearly salary and tax percentages. Read monthly salary of an employee as an input from the user.
Conditions to calculate tax, if yearly salary is:
<table>
<tr><th>Income Range</th><th>Tax Charges</th></tr>
<tr><td><=1,50,000</td><td>No tax</td></tr>
<tr><td>1,50,001 to 3,00,000</td><td>10%</td></tr>
<tr><td>3,00,001 to 5,00,000</td><td>20%</td></tr>
<tr><td>5,00,001 and above</td><td>30%</td></tr>
</table>
</td></tr>
<tr><td></td><td>b</td><td>Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.</td></tr>
<tr><td>8</td><td></td><td>Write C functions to implement string operations such as Compare, Concatenate and String length. Convince the parameter passing techniques.</td></tr>
<tr><td>9</td><td></td><td>Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. Which shop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:
Demanded quantity of foodstuff:
<table>
<tr><th></th><th>roll</th><th>bun</th><th>cake</th><th>bread</th></tr>
<tr><td>P_1</td><td>6</td><td>5</td><td>3</td><td>1</td></tr>
<tr><td>P_2</td><td>3</td><td>6</td><td>2</td><td>2</td></tr>
<tr><td>P_3</td><td>3</td><td>4</td><td>3</td><td>1</td></tr>
</table>
Prices in shops S_1 and S_2:
<table>
<tr><th></th><th>S_1</th><th>S_2</th></tr>
<tr><td>roll</td><td>1.50</td><td>1.00</td></tr>
<tr><td>bun</td><td>2.00</td><td>2.50</td></tr>
<tr><td>cake</td><td>5.00</td><td>4.50</td></tr>
<tr><td>bread</td><td>16.00</td><td>17.00</td></tr>
</table>
MATRIX MULTIPLICATION
Write a C program by considering 2 matrices A (M x N) and B (P x Q) that uses functions to perform the following: i. Reading data to p1, p2, p3 (Matrix A) ii. Reading data to s1, s2 (Matrix B) iii. Multiplication of Two Matrices(C=AXB)</td></tr>
<tr><td>10</td><td></td><td>Write a C Program To maintain a record of bank customer's with four fields (Customer ID, Customer Name, Address and ACC-Num). Read and display the bank customer details.
Note: Using array of structures.</td></tr>
</table>

<u>Note:</u> In the practical examination the student need to select one question and both a, b (if present) should beexecuted. All the questions listed in the syllabus have to be included in the lots. The change ofquestion has to be considered by deducting marks(20% of execution), provided the request is made for the same,within half an hour from the start of the examination.

Course Outcomes:

At the end of the course the student will be able to:

CO1: Define the problem statement and identify the need for computer programming

CO2: Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming

CO3: Develop algorithm, flowchart and write programs to solve the given problem

CO4: Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.

Suggested Learning Resources:

1. Yashavanth Kanetkar, Let us C, Authentic Guide to C Programming Langauge, bpb publisher, 17th Edition, 2020.

2. Herbert Schildt, C: The complete reference, Mc Graw Hill, 4th Edition, 2017 Programming in C, Reema Theraja, Cengage publication.

Weblinks and Video Lectures (e-Resources):

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/

- The maximum Marks prescribed for SEE is 50.
- Students shall perform one or two experiments (50 Marks) for the duration of 3 hours.

MAPPING of COs with POs

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2		3	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-
CO	3	3	3	2	3	-	-	-	-	-	-	-

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2021 -2022

Course Title	**COMMUNICATIVE ENGLISH**						
Course Code	**21HST108**						
Category	**Humanities & Social Sciences (HS)**						
Scheme and Credits	No. of Hours/Week					Total Hrs./ semester	Credits
	L	T	P	SS	Total		
	1	0	1*	-	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVE: To enable the students to assimilate the correct patterns of the language, & to develop students insight into the structure of English language. To enrich vocabulary bank, to communicate more effectively in English, to express opinions including facts & ideas & maintain conversation in everyday situations. To use digital literacy tools their LSRW skills can be enhanced and to master good speaking skills with different strategies.

UNIT I	**4 hours**
Introduction to Communicative English, Fundamentals of Communicative English, Barriers to Effective Communicative English, Different styles in Communicative English, Interpersonal Communication Skills, How to improve Interpersonal Communication Skills, Developing Interpersonal Skills. Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Preposition, Articles, Conjunctions.	
UNIT II	**6 hours**
Grammar: Preposition, kinds of Preposition and Prepositions often confused / used in different situations. Word Accent – Rules for Word Accent, Stress Shift, Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags and Exercises, Vocabulary: One Word Substitutes and Exercises, Synonyms and Antonyms, Exercises on it. Idioms & Phrases, Words often confused, Homophones, homonyms	

UNIT III	**6 hours**
Grammar: Articles – Definite & Indefinite articles, Spelling Rules and Words often Misspelt, Word Pairs (Minimal Pairs), Sequence of Tenses (Rules in use of Tenses), Situational dialogues: Self-introduction, greeting, thanking, accepting thanks, apologizing, invitations, making complaints, Wh-questions/ yes-no questions, Vocabulary: Contractions/Abbreviations, strong and Weak forms of verbs, Words Formation-Prefixes and Suffixes.	
UNIT IV	**5 hours**
Communication Skills: LSRW Skills	
UNIT V	**5 hours**
Speaking Skills**:** Extempore / Public Speaking, Difference between Extempore / Public Speaking, and Guidelines for Practice. Listening Comprehension. Oral Presentation, Role Plays Just a minute (JAM), Group Discussion, Persuasion Speech, Description.	
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Learn basic grammar rules, developed the mastery of language.

CO2: Enhance vocabulary and fluency will be increased.

CO3: Gain the ability to communicate confidently in various situations.

CO4: improve listening, speaking, reading and writing skills.

CO5: Overcome their stage freight and express their views freely without hesitation.

TEXT BOOKS

1. Workbook
2. English Grammar and composition by WREN AND MARTIN
3. Contemporary English Grammar by JAYANTHI DAKSHINAMURTHY
4. English for Technical Communication by LAKSHMINARAYANA K.R
5. Effective English for Technical Communication by FARATULLAH T.M

REFERENCE BOOKS

1. Objective English (Multiple choice questions with answers for competitive examinations) by Dr.B.James
2. The English Errors of Indian Students by T.L.H Smith Pearse.

3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018.
4. A Textbook of English Language Communication Skills, Infinite Learning Solutions – (Revised Edition) 2020.
5. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press 2018.
6. Technical Communication by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
7. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – 2019.
8. Practical English Usage by Michael Swan, Oxford University Press – 2016.
9. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
10. Effective Technical Communication – Second Edition by M. Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

Ss	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										3		
CO2										3		
CO3										3		
CO4										3		
CO5										3		
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56

Department of Humanities & Social Sciences

Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">HEALTH & WELLNESS</td></tr>
<tr><td>Course Code</td><td colspan="7">21HST109</td></tr>
<tr><td>Category</td><td colspan="7">Ability Enhancement Course (AE)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./ semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>1</td><td>0</td><td>1*</td><td>0</td><td>02</td><td>26</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="3">Duration of SEE: 02 Hours</td></tr>
</table>

Course objective:

The definition of Health and quality of life will teach the learner the necessity for a balanced strength and well-being. The Determinants of Health and Wellness topics like Diet, Food & Nutrition, life style, bring the points of understanding. Physical health, mental health, Social Health, Spiritual health, etc is a point to learn. The adolescent chooses the food as per the taste rather than the usefulness. Warming up exercises, physical exercises, yogasanas, pranayama and certain aspects of personality development may help in going a long way to improve the health and personality of the youth.

UNIT I	**5 hours**
Fundamentals of Balanced Health: Health and quality of life, Definition of Health (WHO), Five Pillars of Balanced Health, Body and Mind concepts, Disease and Healing, Genetics & Environment.	
UNIT II	**4 hours**
Determinants of Health and Wellness: Lifestyle and Health, Sleep and health, Relaxation and Meditation, Physical Fitness and Stamina, Reproductive health and hygiene.	
UNIT III	**7 hours**
Seven dimensions of Health & Wellness: Physical health, Mental health, Social Health, Spiritual health, Cultural health, Moral health, Economical health.	
UNIT IV	**5 hours**
Healthy Eating- Diet and Nutrition: Food and Diet – Difference, Concept of DIET, Nutrition.	

UNIT V	5 hours
Physical activity and personality Development: Warming up exercise, Physical exercise, Yogasanas, Pranayama etc. Special training for the challenged students A few words on personality development (personal quality).	
TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos	

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Understand the necessity for a balanced health and well-being.

CO2: Know one's life style, physical fitness and stamina.

CO3: Differentiate types of health.

CO4: understand 'Food is medicine' or 'Medicine is food' concept.

CO5: Have the knowledge of yogasanas & pranayama for an overall personality.

TEXT BOOKS

1. Dixit Suresh (2006) Swasthya Shiksha Sports Publications, Delhi.
2. Pinto John and Ramachandra K (2021) Kannada version " Daihika Shikshanada Parichaya", Louis Publications, Mangalore.

REFERENCE BOOKS

1. Simplified Physical Exercises, Thathvagnani, The World Community Service Center, Vethathiri Maharshi, Vethathiri Publications, Erode, SKY Yoga.
2. Puri K. & Chandra S.S (2005) "Health & Physical Education', Surjeet Publication, New Delhi.
3. Shanti K.Y (1987) "The Science of Yogic Breathier" Pranayama D B Bombay.S.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type   (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3						
CO3						3						
CO4						3						
CO5						3						
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Civil Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

Course Title	**RURAL DEVELOPMENT ENGINEERING**						
Course Code	**21CVT109/209**						
Category	**Ability Enhancement Course (AE)**						
Scheme and Credits	No. of Hours/Week					Total Teaching Hours	Credits
	L	T	P	SS	Total		
	1	**0**	**1***	**0**	**2**	**26**	**1**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

Course Objectives:

1. Describe the scope of Rural Development Planning and Concept of Appropriate Technology and implementation of various national policies.
2. Understand the need and concept of low-cost construction materials for individual and group housing;
3. Illustrate the concept of Water Supply and Rural Sanitation.
4. Interpret the concept of rural transport system and issues related to it.
5. Summarize the need of effective Watershed and catchments area development methods and problems relating to watershed management, watershed structures.

UNIT I	**3 Hours**
Rural Development Planning and Concept of Appropriate Technology: Scope; development plans; various approaches to rural development planning; concept of appropriate technology. Rural development program / projects.	
UNIT II	**3 Hours**
Rural Housing: Low-cost construction materials for housing; Composite material - ferro-cement & fly ash, soil-stabilized un-burnt brick; Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry; rat-trap bond for walls; Panels for roof, ferro-cement flooring / roofing units.	

UNIT III	**3 Hours**
Rural Water Supply and Sanitation: Sources of water. BIS & WHO water standards. Quality, Storage and distribution for rural water supply works; low-cost water treatment technologies; conservation of water; rainwater harvesting; drainage in rural areas, septic tank; low-cost community & individual Garbage disposal systems	
UNIT IV	**3 Hours**
Rural Transportation System: Categories of Pavement Layers, Types of roads, Surface Treatments for roads in rural areas. Soil Stabilization, Lime, Lime Fly ash and Cement Treated Course.	
UNIT V	**3 Hours**
Irrigation Techniques: Consideration of low-cost irrigation techniques, drip & sprinkler irrigation systems. Watershed and catchments area development - problems and features of watershed management, watershed structures	

COURSE OUTCOMES: The students will be able to,

CO1: Understand the concepts and relative Technology for implementation of various National Policies relating to Rural Development in the Country

CO2: Apply the knowledge for Designing and selection of the Construction Materials for Rural Housing

CO3: Analyze and Conceptualize Rural Water Supply and Rural Sanitation.

CO4: Evaluate and interpret the aspects of Rural Transport System

CO5: Appraise and Evaluate the effectiveness of Watershed and Catchment Management for Modern Irrigation System

TEXT BOOKS:

1. Rural Development by Katar Singh, SAGE Publication
2. A.G.Madhov Rao, D.S.Ramachandra Murthy, Appropriate Technologies for low cost Housing Oxfordand IBH Publishing Co. Pvt .Ltd.

REFERENCE BOOK(S):

1 Rural Infrastructure by P.Nair, SBS Publication

2 Rural Infrastructure by Samalia Bihari Verma, Gyaneshwar Prasad & Sahib Kumari Singh, Sarup & Sons.

3 C. Satyanarayana Murthy, Design of Minor Irrigation and Canal Structures. Wiley Eastern Ltd.,

4 Document on Rural Road Development in India Volume1& 2; Central Road Research Institute, New Delhi.

ONLINE RESOURCE:

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√				√	√					
CO2							√					
CO3			√				√					√
CO4							√					
CO5					√		√					√

Dr Ambedkar Institute of Technology, Bengaluru-56
Career Guidance and Placement Cell
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">Career Development Skills - I</td></tr>
<tr><td>Course Code</td><td colspan="7">21HSN110</td></tr>
<tr><td>Category</td><td colspan="7">HSS (Humanities)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>01</td><td>00</td><td>01*</td><td>00</td><td>02</td><td>26</td><td>00</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: -</td><td colspan="2">Total Max. Marks=50</td><td colspan="3">Duration of SEE: NIL</td></tr>
</table>

COURSE OBJECTIVE:

1. The lessons under this unit are designed to enable the students to plan their career on correct measures and motivate them to set their goals on prior basis.
2. This unit aims to develop the personality skills of the students and teach them to lead a corporate discipline nurture. It also helps them to get groomed with professional ethics.
3. This unit is designed to give the awareness to the students about the job market to prepare themselves at their own pace and potential. It also teaches them about the self-developing attitude through their emotions and intelligence.
4. This unit complies with the overcoming ability of students dealt in stress and it also teaches the punctuality and time managing.
5. This lesson will help students make inferences and predictions about spoken, writing & listening discourse. And by utilizing digital literacy tools, their LCRW skills can be enhanced.

Unit no	Syllabus content	Hours/COs
1	1. Career Planning 2. Goal Settings	5 CO1
2	1. Personality Effectiveness 2. Building Personality and Discipline 3. Grooming, hygiene and Cleanliness	6 CO2

3	1. Self- Awareness & Self Confidence 2. Attitudes 3. Emotional & Intelligent Quotient	6 CO3
4	1. Time Management 2. Stress Management	4 CO4
5	1. LICRW Skills (Listening, Interpersonal, Conversation, Reading & Writing skills)	5 CO5

COURSE OUTCOME:

1. The students will be able to learn about the overview of their goals and also gets to know diversities in the field of their career planning.
2. The student will develop and improve their personal and professional effectiveness. At the end of this unit, students will have deploy themselves about the corporate culture.
3. At the completion of this unit, students will develop the self-confidence and emerge as the confident person.
4. After the completion of this unit students will understand the stress, time and emotional management. Also they will learn about the overcoming the fear and uncomfortable situations such as Public speaking.
5. After the completion of this unit, students will gain knowledge about the assertiveness of Listening, Reading, Writing& Interpersonal segments.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing

- The Pattern of question paper for test is MCQ (1 mark each).

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**ADVANCED CALCULUS AND NUMERICAL METHODS**						
Course Code	**21MAT201**						
Category	Basic Science Course (BS)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	02	00	00	05	65	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks=100**	**Duration of SEE: 03 Hours**			

COURSE OBJECTIVE: This course is intended to impart to the students the skills of employing the basic tools of Calculus and Numerical methods for solving basic and difficult engineering problems.

UNIT I **8+5 hours**

Multiple Integrals: Evaluation of double and triple Integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find area as double integral and volume as triple integral.

Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.

Self- Study: Centre of gravity, Moment of inertia.

UNIT II **8+5 hours**

Vector Differentiation: Scalar and vector point functions, gradient, directional derivative, divergence, curl and Laplacian of a vector field. Solenoidal and irrotational vector fields. Vector identities (without proof).

Vector Integration: Line integrals, Applications to work done by a force. Green's theorem in a plane and Gauss Divergence theorem (without proof) involving cubes and rectangular parallelepiped.

Self- Study: Surface integrals and Stoke's theorem.

UNIT III **8+5 hours**

Partial Differential Equations (PDE's): Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDE's involving derivative with respect to the one independent variable only. Solution of one- dimensional heat equation and wave equation by the method of separation of variables.

Self- Study: Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.

UNIT IV **8+5 hours**

Numerical Methods-1: Solution of polynomials and transcendental equations: Regula–Falsi and Newton–Raphson method (without proof). Interpolation-Newton's forward and backward difference formulae, Newton's divided difference formula, Lagrange's interpolation formula and its inverse interpolation formula(without proof).

Numerical differentiation and Integration: Approximation of derivatives using Newton's forward and backward interpolation polynomials. Numerical integration using Simpson's $(1/3)^{rd}$ and Simpson's $(3/8)^{th}$ rules (without proof).

Self- Study: Newton–Raphson method for repeated roots, Weddle's rule.

UNIT V **8+5 hours**

Numerical Methods-2: Numerical solutions of Ordinary Differential Equations of first order and first degree: Taylor's series method, Modified Euler's method, Fourth order Rungekutta method (without proof). Multi steps methods-Milne's predictor- corrector formula (No derivation).

Self- Study: Euler's method, Picard's method, Adam- Bashforth method.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: At the end of the course the students are able to:

CO1: Show the equivalences of mathematical expressions involving differentiation and integration.

CO2: Find divergence, directional derivatives, area bounded, flux and work done.

CO3: Illustrate mathematical procedures to change the order of integration, method of separation, predictor and corrector.

CO4: Identify the mathematical tool for solving flow models, improper integrals, interpolation and quadrature.

CO5: Apply the integral operator and vector differential operator for mensuration and measurements in complex engineering field.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics (44^{th} Edition 2018), Khanna Publishers, New Delhi.
2. E. Kreysizig, Advanced Engineering Mathematics, John Wiley and sons, 10^{th} Ed. (Reprint) 2016.

REFERENCE BOOKS

1. V. Ramana : Higher Engineering Mathematics, McGraw –Hill Education,11th Ed..
2. H. C. Taneja, Advanced Engineering Mathematics, Volume I& II, I.K. International Publishing House Pvt. Ltd., New Delhi.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/ Cole, 2005.

ONLINE RESOURCES

1. http://www.nptel.ac.in
2. https://en.wikipedia.org

Note: Questions from Self-study component will not be asked for CIE and SEE.

QUESTION PAPER PATTERN (SEE)										
Q. No.	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
UNIT	1		2		3		4		5	
1. Two full questions (each of 20 Marks) are to be set from each unit.										
2. Student shall answer five full questions selecting one full question from each unit.										

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3										
CO2	3	3										
CO3	3	3										
CO4	3	3										
CO5	3	3	3									
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2021 -2022

Course Title	**PROFESSIONAL WRITING SKILLS IN ENGLISH**						
Course Code	**21HST208**						
Category	**Humanities & Social Sciences (HS)**						
Scheme and Credits	No. of Hours/Week					Total Hrs./ semester	Credits
	L	T	P	SS	Total		
	1	0	1	-	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. Marks: 100**		**Duration of SEE: 02 Hours**		

Course objective:

To implement English vocabulary at command and ensure language proficiency, to achieve better Technical writing and Presentation skills, identify the common errors in speaking and writing English. Learn better sentence structures, acquire Employment and Workplace communication skills, to learn about Techniques of Information Transfer through presentation in different levels.

UNIT I	**4 hours**
Identifying Common Errors in Writing and Speaking English, Subject Verb Agreement (Concord Rules with Exercises), Common errors in Subject-verb agreement, Noun-pronoun agreement, Adjective, Adverb, Verb, Sequence of Tenses, Misplaced modifiers, Common errors in Conjunctions, Common errors in the use of Idioms and phrases.	
UNIT II	**6 hours**
Nature and Style of sensible writing, organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Redundancies & Clichés.	
UNIT III	**6 hours**
Technical Reading and Writing Practices, Effective Technical Reading and Writing Practices, technical Reports writing and Technical Proposals Writing, Grammar – Voice (Active and Passive Voices), Reported Speech, Vocabulary – Analogies, Words Confused/Misused, Collocations	

UNIT IV	**5 hours**
Communication for Employment, Components of a formal letter, Formats and types of business letters, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing and other recent communication types, Reading Skills and Reading Comprehension.	
UNIT V	**5 hours**
Communication at Workplace, Interpersonal Communication Skills, Non-Verbal Communication Skills (Body Language), Group Discussion and Employment Interviews, Presentation skills and Formal Presentations by Students, Dialogues in Various Situations (Practical Sessions by Students).	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Identify common errors in spoken and written communication.

CO2: Get familiarized with English vocabulary and language proficiency.

CO3: Improve nature and style of sensible writing & acquire employment and workplace skills.

CO4: Improve their Technical Communication Skills through Technical Reading and Writing practices.

CO5: Perform well in campus recruitment, engineering and all other general competitive examinations.

TEXT BOOKS:

1. Workbook
2. Functional English, Cengage learning India Pvt Limited [Latest Revised Edition] - 2020.
3. Communication Skills by Sanjay Kumar and Pushp Lata, Oxford University Press - 2018. Refer it's workbook for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018.
4. A Course in Technical English, Cambridge University Press – 2020.

REFERENCE BOOKS

1. Professional Writing Skills in English, Infinite Learning Solutions – (Revised Edition) 2021.
2. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
3. High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
4. Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private Limited – 2018.
5. Intermediate Grammar, Usage and Composition by M.L.Tichoo, A.L.Subramanian, P.R.Subramanian, Orient Black Swan – 2016.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

CIE- Objective type (Max. marks: 30 marks)

- The Pattern of question paper is MCQ (1 mark each).
- Theory SEE paper will be set for 50 questions.
- The time allotted for SEE is 02 hour.

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
Strength of correlation: Low-1, Medium- 2, High-3												

Dr Ambedkar Institute of Technology, Bengaluru-56
Career Guidance and Placement Cell
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<tr><td>Course Title</td><td colspan="7">Career Development Skills - II</td></tr>
<tr><td>Course Code</td><td colspan="7">21HSN210</td></tr>
<tr><td>Category</td><td colspan="7">HSS (Humanities)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>01</td><td>00</td><td>01*</td><td>00</td><td>02</td><td>26</td><td>00</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: -</td><td colspan="2">Total Max. Marks=50</td><td colspan="3">Duration of SEE: NIL</td></tr>
</table>

COURSE OBJECTIVE:

1. The main goal of this unit is to help students to overcome the fear of speaking in both personal and professional culture and it also focuses on the presenting the topics with confidence. This unit also teaches the students about the team building activities
2. This unit depicts the easier decision making and problem solving techniques for overcoming the hardships of interview process. It also teaches on behavior & mannerism that should be maintained during the interview.
3. The lessons under this unit help students' to learn to business communication activities which sought to help them to become an entrepreneur.
4. This unit deals with the preparation of Interview skill and also teaches the students about the various interview structures like Resume Building, GD etc..
5. This unit is completely an activity session, constructed to overcome the stage presence or fear.

Unit no	Syllabus content	Hours/COs
1	1. Presentation Speaking skills 2. Public Speaking skills 3. Team Building	**5** **CO1**

2	1. Decision Making & Problem Solving 2. Mannerism & Behavior 3. Reaching your potential	**5** **CO2**
3	1. Business Communication 2. Sales & Negotiations 3. Customer Service	**5** **CO3**
4	1. Interview Skills 2. Resume Building 3. Group Discussion (Each student will be assessed based on their body language, voice modulation, content & Creativity	**6** **CO4**
5	1. Activity Sessions > Debate > Picture Connector 2. Mock Interview	**5** **CO5**

COURSE OUTCOME:

1. The students will have learnt about the way of quality communication with the co-workers and it will also help to build a strong social relationship with outside society. And students will also learn to deliver the presentation in a more powerful and persuasive way.
2. At the end of this unit, students will have deploy themselves in the active thinking and also learns about the effective usage of words. And students will learn about the synchronization with the workmate and also gives them an opportunity to unlock their individual potentials.
3. After the completion of this unit, student will have learnt how to undergo business etiquettes with proper negotiations and customization.
4. After the completion of this unit student have learnt about the interview standards that being asked during the recruitment process. It also improves the clarity and confidence of the students.
5. At the end of this sessions, students will be confident on their speech and will be exposed to interview standards that being asked during the recruitment process.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing
7. Enhancing English and Employability Skills by State Board of Technical.
8. Soft skills an integrated approach to maximize personality by SANGEETHA SHARMA, GAJENDRA SINGH CHAUHAN, and Wiley Publishing.

- The Pattern of question paper for test is MCQ (1 mark each).

Course Title: PYTHON PROGRAMMING		
Course Code: 18CS34	**No. of Credits: 3: 0: 0 (L-T-P)**	**No. of lecture hours/week: 3**
Exam Duration: 3 hours	**CIE + Assignment + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	**Description**
	1. Describe the core syntax and semantics of Python programming language. 2. Discover the need for working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions to navigate the file system. 5. Infer the Object-oriented Programming concepts in Python.

Unit No	Syllabus Content	No of Hours
1	**Parts of Python Programming Language,** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements,** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, **Functions**, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	**09**
2	**Strings,** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	**08**
3	**SELF-STUDY** **Dictionaries,** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	**08**
4	**Files,** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression**	**08**

	Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.	
5	**Object-Oriented Programming,** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.	**09**

Course Outcomes	Description	RBT Levels
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	**L2**
CO2	Express proficiency in the handling of strings and functions.	**L2**
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	**L3**
CO4	Identify the commonly used operations involving file systems and regular expressions.	**L2**
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	3	-	-	-	-	-	-	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS:

1) Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data",** 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2) Aurelien Geron, **"Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 2nd Edition, O'Reilly Media, 2019. ISBN – 13: 978-9352139057.
3) Wesley J Chun, **"Core Python Applications Programming",** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

4) Miguel Grinberg, **"Flask Web Development: Developing Web Applications with Python",** 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.	
SELF-STUDY REFERENCES/WEBLINKS:	
1. Dictionaries https://www.youtube.com/watch?v=daefaLgNkw0 **2. Tuples and Sets** https://www.youtube.com/watch?v=W8KRzm-HUcc	
COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
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Bangalore-560 056.

	SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN		
	Sub Code:18CS31	**No. of Credits:4=4:0:0 (L-T-P)**	**No.of.lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1 Understand the basic digital principles and working of various logic gates, and different techniques for simplification of Boolean function.

2. Design combinational logic circuits and describe their applications.

3. Analyze working of Flip Flops and sequential circuits.

4. Study the basic organization and architecture of digital computers such as CPU, memory, I/O, and software

5. Discussions of digital logic and microprogramming to understand the design and application of computer systems and can be used as foundation for more advanced computer-related studies

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Combinational Logic Circuits:** Binary Logic, Integrated Circuits, Boolean Functions, Canonical And Standard Forms, The Map Method Two, Three, Four -Variable Maps, Map Manipulation, Essential Prime Implicants, Product-Of-Sums Optimization, Don't-Care Conditions ,minimal sum and minimal product. The Tabulation Method, Determination Of Prime Implicants.	11
2	**Data processing circuits:** Combinational Logic Design Procedure, Adders, Subtractors, Code Converter, Magnitude Comparator, Multiplexers, De multiplexers, Decoder, Encoders.	10
3	**Sequential Logic:** Introduction, FLIP-Flops, Triggering Of Flip Flops, Excitation Tables, Design Procedure. Registers, Shift Registers, Ripple Counter, Synchronous Counter.	10

4	**Processor Logic Design:** Introduction, Processor Organization, Arithmetic Logic Unit, Design Of Logic Circuit, Design Of Arithmetic Circuit, **Control logic design**: Introduction, Control Organization, Hard Wired Control, Hard Wired control –example.	10
5	**Computer Design**: Introduction, System of Configuration, Computer Instructions, Timing and Control, Execution of Instructions, **Microcomputer System Design**: Introduction, Microcomputer Organization, Microprocessor Organization, Instructions and Addressing Modes	11

Text Book:

1. M Morris Mano: Digital Logic and Computer Design, 14th Impression, Pearson, 2012.
ISBN 978-81-7758-409-7.

Reference Books:

1. M. Morris Mano and Charles Kime: Logic & Computer Design, Fundamentals, Pearson, 2014
ISBN 978-93-325-1872-8

2. Andrew S Tenenbaum: Structured Computer Organization, Pearson, 2006,
ISBN 81-7808-692-1

Course Outcomes:

Course Outcomes	**Statements**	**Blooms Level**
CO1	Demonstrate the various techniques like K-map, Quine-McCluskey method for minimization of combinational functions.	**L3**
CO2	Develop and Analyze different combinational and sequential circuits using Logic gates, Multiplexers Decoders, PLA, Flip flops.	**L3**
CO3	Describe the structure of CPU, memory and I/O unit	**L2**
CO4	Discuss the design of logic circuits for arithmetic operation in computer system	**L2**

CO5	Illustrate the use of timing and control signal in the execution of machine instructions of computer system	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	2	3	-	-	-	-	-	-	-	3	3	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-	2	3	-
CO3	2	1	2	2	3	-	-	-	-	-	-	-	1	2	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-	1	2	-
CO5	3	2	2	2	3	-	-	-	-	-	-	-	2	3	-

FACULTY NAME:

SREENIVASA A.H **ARATHI P**

Associate Professor **Assistant Professor**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

SUBJECT TITLE: DIGITAL LOGIC AND COMPUTER DESIGN LAB		
SUBJECT CODE: 18CSL37	**No. of Credits:0:0:1**	**No. of Lecture hours per week:3**
Exam Duration :3 hours	**Exam Marks:50**	

Course Objectives:

This course will help students to achieve the ability to:

1. Implement different logic design circuits using components like logic gates, multiplexer, decoder, flip-flops.

2. Understand the various computer operations using simulation

Detailed Syllabus

Expt No.	Experiment List
	PART-A
1	Given a 4-variable logic expression, simplify it using K-Map and realize using logic gates.
2	Design and implement arithmetic combinational circuit.
3	Design and implement various flip flops.(SR,JK,D,T)
4	Design and implement synchronous counter using flip flops.
5	Design and implement asynchronous counter.
6	Design and implement shift registers.(ring ,switched tail)
	PART-B
1	Design and implementation of combinational circuits.
2	Design and implementation sequential circuits.
3	Design of memory units.(RAM and ROM)
4	Designing a logic circuit to perform various functions.
5	Designing an ALU to perform various operations.
6	Demonstrating the assembly language instruction execution.

Course Outcomes	Statements	Blooms Level
CO1	Implement different combinational and sequential logic circuits.	**L3**
CO2	Develop the different sequential circuits	**L3**
CO3	Demonstrate the various operations of computer using appropriate simulator (Logisim, Marie Sim, CPUos)	**L3**
CO4	Illustrate the working of computer components by analyzing their operation using simulator	**L3**
CO5	Describe the assembly language instruction execution using simulator	**L2**

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	3								3	3	-
CO2	3	3	3	3	3								3	3	-
CO3	3	3	3	2	3								2	3	-
CO4	3	3	3	2	3								2	3	-
CO5	3	3	3	2	3								3	3	-

FACULTY NAME:

SRINIVASA A.H
Associate Professor

ARATHI P
Assistant Professor

Professor & Head
Department of Computer Science &
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Sub Title : Operating System		
Sub Code:18CS33	No. of Credits:3=3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
Exam Duration : 3 hours	CIE +Assignment + SEE = 45 + 5 + 50 =100	Total No. of Contact Hours : 42

Course objectives:

- Introduce concepts and terminology used in OS
- Explain threading and multithreaded systems
- Illustrate process synchronization and concept of Deadlock
- Introduce Memory and Virtual memory management, File system and storage techniques

UNIT No	Syllabus Content	No of Hours
1	Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot. Process Management Process concept; Process scheduling; Operations on processes; Inter process communication.	08
2	Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. Process Synchronization: Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.	09
3	Deadlocks : Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.	09
4	Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. File System, Implementation of File System: File system: File concept; Access methods; Directory structure; File system mounting; File sharing.	08
5	Secondary Storage Structures, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.	08

Course Outcomes	Statements	Blooms Level
CO1	Illustrate the role of resource management, interfaces and system calls as handled by the operating system.	**L2**
CO2	Apply the process scheduling algorithms to select the processes for execution and compare their performances.	**L3**
CO3	Interpret the requirements for process synchronization and coordination handled by operating system.	**L2**
CO4	Describe and analyze the memory management and its allocation methods.	**L2**
CO5	Identify the storage management methods with respect to different storage management techniques.	**L2**

Course	**POs**												**PSOs**		
Outcomes	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2	1	-	-	-	-	-	-	-	-	1	2	-
CO2	3	3	2	2		-	-	-	-	-	-	-	2	2	-
CO3	2	2	3	1	-	-	-	-	-	-	-	-	2	1	-
CO4	2	3	2	1	-	-	-	-	-	-	-	-	2	1	-
CO5	2	3	1	1		-	-	-	-	-	-	-	1	2	-

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Concepts, 8th edition, Wiley India, 2011. **ISBN: 9781118063330**

REFERENCE BOOKS/WEBLINKS:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012. **ISBN13: 9781259005589**
2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010. **ISBN-10: 9788120348363**
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011. **ISBN**: **9788131712894**

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Sub Title: Python Programming Laboratory		
Sub Code: 18CSL38	No. of Credits: 1 = 0: 0: 1 (L: T: P)	No. of lecture hours/week : 2
Exam Duration: 3 hours	CIE + SEE = 50 + 50 = 100	

Course objectives:

1. Interpret the use of procedural statements like assignments, conditional statements, loops and function calls.
2. Infer the supported data structures like lists, dictionaries and tuples in Python.
3. Illustrate the application of matrices and regular expressions in building the Python programs.
4. Discover the use of external modules in creating excel files and navigating the file systems.
5. Describe the need for Object-oriented programming concepts in Python.

PART – A

Sl. No.	Programs
1.	Write a Python program to print all Disarium numbers between 1 and 100.
2.	Write a Python program to encrypt the text using Caesar Cipher technique. Display the encrypted text. Prompt the user for input and the shift pattern.
3.	Write a Python program to simulate ATM transactions by including the following operations: a) Check for correctness of the ATM pin. b) Perform Balance, Withdraw and Deposit Operations. The above operations should be menu-driven and display appropriate messages after performing each of these operations.
4.	The celebrity problem is the problem of finding the celebrity among n people. A celebrity is someone who does not know anyone (including themselves) but is known by everyone. Write a Python program to solve the celebrity problem.
5.	Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
6.	Perform the following file operations using Python a) Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories. b) Read a file content and copy only the contents at odd lines into a new file.

PART – B

Sl. No.	Programs
1.	Devise a Python program to implement the Rock-Paper-Scissor game.
2.	Create a menu drive Python program with a dictionary for words and their meanings. Write functions to add a new entry (word: meaning), search for a particular word and retrieve meaning, given meaning find words with the same meaning, remove an entry, display all words sorted alphabetically.
3.	Write a Python program to perform Jump Search for a given key and report success or failure. Prompt the user to enter the key and a list of numbers.
4.	Using Regular Expressions, develop a Python program to

	a) Identify a word with a sequence of one upper case letter followed by lower case letters. b) Find all the patterns of "1(0+)1" in a given string. c) Match a word containing 'z' followed by one or more o's.
5.	Write a Python program to plot the Line chart in MS Excel Sheet using XlsxWriter module to display the annual net income of the companies mentioned below.
6.	Devise a Python program to implement the Hangman Game.

Year	Company	Profit
2010	Microsoft	18.76
2011	Microsoft	23.15
2012	Microsoft	16.98
2013	Microsoft	21.86
2014	Microsoft	22.07
2015	Microsoft	12.19
2016	Microsoft	16.8
2017	Microsoft	21.2
2010	Alphabet	8.372
2011	Alphabet	9.706
2012	Alphabet	10.179
2013	Alphabet	12.733
2014	Alphabet	14.136
2015	Alphabet	16.348
2016	Alphabet	19.478
2017	Alphabet	12.662
2010	Amazon	1.152
2011	Amazon	0.631
2012	Amazon	0.139
2013	Amazon	0.274
2014	Amazon	0.241
2015	Amazon	0.596
2016	Amazon	2.371
2017	Amazon	3.033

COs	**Statements**	**Bloom's Level**
CO1	Describe the Python language syntax including control statements, loops and functions to write programs for a wide variety problem in mathematics, science, and games.	**L2**
CO2	Examine the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data.	**L3**
CO3	Interpret the concepts of Object-oriented programming as used in Python using encapsulation, polymorphism and inheritance.	**L3**
CO4	Discover the capabilities of Python regular expression for data verification and utilize matrices for building performance efficient Python programs.	**L2**
CO5	Identify the external modules for creating and writing data to excel files and inspect the file operations to navigate the file systems.	**L2**

Conduct of Practical Examination

- All laboratory programs are to be included for practical examination.
- The breakup of marks and instructions printed on the cover page of the answer script are to be strictly adhered by the examiners.
- Students should pick one program from Part A and one program from part B.
- Change of program is allowed only once (either Part A or Part B) and marks will be deducted as per the Dr.AIT Autonomous/Examination rules and regulations.

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	-	-	-	-	-	-	-	1	3	-
CO2	3	2	2	3	3	-	-	-	-	-	-	-	2	3	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-	2	3	-
CO4	2	1	2	2	3	-	-	-	-	-	-	-	1	2	-
CO5	2	1	2	1	3	-	-	-	-	-	-	-	1	1	-

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Sub Title : DATA STRUCTURES AND ALGORITHMS		
Sub Code:18CS33	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course objectives:
The objectives of this course are to:

1. Understand the concept of pointers, arrays, structures and unions, dynamic memory allocation.
2. To analyse and implement some examples that comes under linear data structures.
3. Compare and implement different kinds of linked list by studying its pros and cons.
4. Understand and implement trees and graphs, its types and comparison with other data structures and implement searching techniques BFS & DFS.

UNIT No	Syllabus Content	No of Hours
1	**BASIC CONCEPTS:** Pointers and Dynamic Memory Allocation, **ARRAYS and STRUCTURES:** Arrays, Dynamically Allocated Arrays, Structures and Unions, Sparse Matrices, Representation of Multidimensional Arrays, Recursion.	**10**
2	**STACKS AND QUEUES:** Stacks, Stacks Using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions-Evaluation of Postfix Expression, and Conversion from infix to postfix.	**10**
3	**LINKED LISTS:** Singly Linked list, Linked Stacks and Queues, Circular Linked List.Polynomials-Adding Polynomials, Circular List representation of polynomials with header node, Doubly Linked Lists with header node.	**11**
4	**TREES:** Introduction, Binary Trees-Properties, representation, Binary Tree Traversals-Inorder, Preorder, Postorder, Level order, Heaps-Max heap, Min heap. Binary Search Trees-Insertion, Deletion, Searching. **Application of Trees-**Evaluation of Expression.	**10**
5	**Self Study:** **Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. **Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.	**11**

Course Outcomes	Statements	Blooms Level
CO1	Interpret advance C programming techniques such as pointers, dynamic memory allocation, structures & unions to develop solutions for problems such as polynomials, sparse matrix etc.	**L2**
CO2	Analyse problem and propose solution by selecting appropriate data structures like stacks, Queues, Linked List, Trees, Graphs, Hash Tables.	**L3**
CO3	Implement linked list data structure and handle operations like searching, insertion, deletion, traversing mechanism.	**L4**
CO4	Interpret trees and graphs representations, tree traversal, Searching using BFS and DFS.	**L2**

Course Outcomes	**POs**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	3	-
CO4	1	2	2	2	-	-	-	-	-	-	-	-	2	2	-

TEXT BOOK:

1. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures in C, 2nd Edition, Universities Press, 2014. **ISBN-13:** 9780929306407 / **ISBN-10:** 0929306406
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

REFERENCE BOOKS:

1. Richard F. Gilberg and Behrouz A. Forouzan: Data Structures A Pseudocode Approach with C, Delmar Learning India Pvt 2013.
2. Robert Kruse & Bruce Leung: Data Structures & Program Design in C, Pearson Education, 2014.

SELF STUDY REFERENCES/WEBLINKS:

http://cgm.cs.mcgill.ca/~godfried/teaching/algorithms-web.html#graphs

https://www.hackerearth.com/practice/data-structures/hash-tables/basics-of-hash-tables/tutorial/

FACULTY INCHARGE:

1. Asha Rani K P
2. Vinod Kumar K P
3. Shalini N

Professor & Head
Department of Computer Science &
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SUBJECT TITLE: **DATA STRUCTURES AND ALGORITHMS LAB**		
SUBJECT CODE:18CSL36	**No. of Credits:0:0:1:0**	**No. of Lecture hours per week:2**
Exam Duration :3 hours	**Exam Marks: 50**	

Course objectives:

The objectives of this course are:

1. To Strengthen the ability to identify and apply the suitable data structure for the given real world problem by developing algorithms for manipulating stacks, queues, linked lists, trees.
2. To understand recursion concept.
3. To explore different searching techniques BFS & DFS.

1.	**(SEARCH IN SPARSE MATRIX)→**Design, develop, and execute a program in C to read a sparse matrix of integer values and to search the sparse matrix for an element specified by the user. Print the result of the search appropriately. Use the triple <row, column, value> to represent an element in the sparse matrix
2.	**(STACKS)→**Write a C Program to construct a stack of integers and to perform the following operations on it: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow, stack underflow, and stack empty.
3.	**(INFIX TO POSTFIX)→**Design, develop, and execute a program in C to convert a given valid parenthesized infix arithmetic expression to postfix expression and then to print both the expressions. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).
4.	**(EVALUATE A POSTFIX EXPRESSION)→**Design, develop, and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).
5.	**(QUEUE)→**Design, develop, and execute a program in C to simulate the working of a queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display
6.	**(CIRCULAR QUEUE)→**Write a C Program to simulate the working of a circular queue of integers using an array. Provide the following operations: a. Insert b. Delete c. Display
7.	**(STACKS USING SINGLY LINKED LIST)→**Write a C Program using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations: a. Push b. Pop c. Display The program should print appropriate messages for stack overflow and stack empty.
8.	**(QUEUES USING SINGLY LINKED LIST)→**Write a C program using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations: a. Insert b. Delete c. Display The program should print appropriate messages for queue full and queue empty.

9.	**(POLYNOMIAL ADDITION USING LINLKED LIST)→**Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
10.	**(DOUBLY LINKED LIST)→**Design, develop, and execute a program in C to implement a doubly linked list where each node consists of integers. The program should support the following operations: i. Create a doubly linked list by adding each node at the front. ii. Insert a new node to the left of the node whose key value is read as an input. iii. Delete the node of a given data if it is found, otherwise display appropriate message. iv. Display the contents of the list. (Note: Only either (a,b and d) or (a, c and d) may be asked in the examination)
11.	**(TREES)→**Write a C Program a. To construct a binary search tree of integers. b. To traverse the tree using all the methods ▪ Inorder, Preorder, Postorder. c. To display the elements in the tree.
12.	**(MAX HEAP CREATION)→**Design, develop, and execute a program in C to create a max heap of integers by accepting one element at a time and by inserting it immediately in to the heap. Use the array representation for the heap. Display the array at the end of insertion phase.
13.	**(RECURSION)→**Write recursive C Programs for a. Searching an element on a given list of integers using the Binary Search method. b. Solving the Towers of Hanoi problem.
14.	**(BFS & DFS)→** Write a C Program to a. Print all the nodes reachable from a given starting node in a digraph using BFS method. b. Check whether a given graph is connected or not using DFS method.

Course Outcomes	Statements	Bloom's Level
CO1	Analyse problem and propose solution by selecting appropriate data structures.	**L3**
CO2	Solve a problem using Recursion.	**L3**
CO3	Be able to compare different searching BFS & DFS techniques.	**L3**

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-
CO3	3	3	3	2	-	-	-	-	-	-	-	-	3	2	-

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	Course Title: WEB TECHNOLOGIES		
	Course Code: 18CS35	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To familiarize with terminologies, tools, protocols used in web. 2. Identify a valid conformed XHTML document involving a variety of Elements. 3. Apply JavaScript to design interactive web pages. 4. Design well-formed XML documents.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals**: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. **Introduction to XHTML:** Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links**.**	**8 Hours**
2	**XHTML (continued):** Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.	**8 Hours**
3	**The Basics of JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.	**8 Hours**
4	**JavaScript and XHTML**: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification. **Dynamic Document with JavaScript**: Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.	**10 Hours**
5	***Self-Study*: Introduction to XML**: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Understand terminologies, tools and protocols used in web.	L2
CO2	Design, understand and analyze static web pages.	L4
CO3	Design, understand and analyze interactive, Dynamic web pages.	L4
CO4	Design, understand and analyze data Representation , management and display.	L4

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**3**	**3**	**2**								
CO2			**3**									
CO3			**3**									
CO4			**3**	**3**	**1**							

Strong -3 **Medium -2** **Weak -1**

TEXT BOOKS:

1. Programming the World Wide Web – Robert W. Sebesta, 4thEdition, 2011, Pearson Education.

REFERENCE BOOKS:

1. Web Programming Building Internet Applications – Chris Bates, 3rd Edition, 2006, Wiley India,ISBN : 978-81-265-1290-4

2.Internet & World Wide Web How to H program – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, 2004, Pearson Education / PHI, ISBN-10: 0-130-89550-4

SELF STUDY REFERENCES/WEBLINKS:

http://www.w3schools.com

COURSE COORDINATOR:	**Harish Kumar H C** **Veena .A**

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SUBJECT TITLE: **OOP Principles and Practices using C++ Lab**		
SUBJECT CODE:18CSL47	**No. of Credits:1:0:0**	**No. of Lecture hours per week:3**
Exam Duration :3 hours	**Exam Marks: 50**	

Course Objectives:

This course will help students to achieve the following objectives:

1. Design and develop programs based on the principles of object-oriented programming concepts.
2. Apply the concepts of data encapsulation, inheritance, operator overloading and polymorphism.
3. Understand and illustrate the concepts of exception handling and STL.

1	a) Implement the following requirement: An electricity board charges the following rates to domestic users to discourage large conceptions of energy. 0 - 100 units : Rs 1.50 per unit 101 - 200 units : Rs 1.80 per unit Beyond 200 units: Rs 2.50 per unit All users are charged a minimum of Rs 50. If the total amount is more than Rs 300 then an additional surcharge of 15% is added. The program must read the names of users; number of units consumed and displays the calculated charges. b) Write a program to find mean of two numbers belonging to two different classes using friend function.
2	a) Design and implement a class STUDENT with attributes like: roll number, name, three test marks. Implement member functions a) to read student data like name and test marks, b) to compute average marks (considering best two out of three test marks) and c) to display the student information. Declare an array of STUDENT objects in the main function, use static data member to generate unique student roll number. b) Design a program to illustrate the use of objects as function arguments by performing the addition of TIME in the hour and minutes format.
3	a) Write a program to create a class called COMPLEX and implement the following overloading functions ADD that return a COMPLEX number. i. s2 = s1. add (a) – where a is an integer (real part) and s1, s2 are complex numbers. ii. s3 = s1.add (s2) – where s1 ,s2 and s3 are complex numbers b) Create a class called Account. Write a program to deposit or withdraw money in a bank account. (Assume appropriate attributes and use constructor)
4	a) Create a class called STRING using dynamic memory allocation technique and implement the following operations. Display the results after every operation by overloading the operator <<. i. STRING s1 = “Dr AIT” ii. STRING s2 = “Bangalore”

	iii. STIRNG s3 = s1 + s2. (Overload + operator and Use overloaded constructors) b) Write a program that allows class LCD_TV to inherit two classes – Product and Manufacturer. Display the complete information of LCD TV by assuming appropriate attributes for each class using multiple inheritance.
5	Create a class called Customer (doubly linked list) with member functions to insert a customer at the front of the list as well as to delete a customer from a particular position in the list. Demonstrate all the functions after creating a pointer to a customer list. (Use Destructor)
6	Create a template class called QUEUE with member functions to add an element and to delete an element from the queue. Implement a queue of integers and doubles.
7	Implement the concept of operator overloading: Create a class called DATE. Accept two valid dates in the form dd/mm/yyyy. Implement the following by overloading +, - and << operators. i. no_of_days = d1 – d2; where d1 and d2 are DATE objects, d1 >=d2 and no_of_days is an integer. ii. d2 = d1 + no_of_days; where d1 is a DATE object and no_of_days is an integer.
8	Create a class called Number which has the characteristics of a decimal number. Derive a class OCTAL, which has the characteristics of an octal number inheriting the decimal value from the Number class. Derive a class HEX, which has the characteristics of a hexadecimal number inheriting the decimal value from the Number class. Implement the following operations (using operator overloading): i. int i = j + k where I is decimal , j is hexadecimal , k is OCTAL ii. int y = h + k ; where h is an OCTAL object and k is an integer. Display the result by overloading the operator <<.
9	Design and implement a program to create an abstract class - SHAPE to represent any shape in general. The class should have two pure-virtual functions to read dimensions and to compute the area. Create three derived classes - CIRCLE, RECTANGLE, and SQUARE by inheriting the features of class SHAPE. Implement the functions to read and compute the area. Add method to display the results as required. (Assume appropriate attributes).
10	Create two files named questions and answers. Design a program that reads Questions from questions file and their matched answers from answers file. Use an appropriate exception handling mechanisms to manage file exceptions and to display the output.
11	Write a program for custom exception handling. i. Implement a function to compute factorial of a given number. ii. Create a class “InvalidDataException” that contains the details about the exception – “Invalid data: negative number entered” iii. In the main function, accept a number from the user and throw an exception of type “InvalidDataException” if entered number is a negative number, else call the factorial function to compute the result. iv. Handle the exception.
12	Write a program to create a vector of integers. Copy the vector contents into a list, sort the contents, and then copy selected items into another vector.

Note: In the examination *each* student picks one question from a lot of *all the* 12 Questions.

Course Outcomes:

On successful completion of the course, students are able to:

Course Outcomes	Statements	Blooms Level
CO1	Construct classes incorporating the object-oriented techniques to solve engineering problems.	**L2**
CO2	Identify the dynamic memory management techniques using pointers, constructors and destructors.	**L2**
CO3	Describe the concept of function overloading, operator overloading, virtual functions and polymorphism.	**L2**
CO4	Illustrate and implement STL class of containers and need for exceptions to handle errors for object oriented programs.	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO2	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO3	2	2	1	2	3	-	-	-	-	-	-	-	1	2	-
CO4	2	3	1	3	3								1	2	

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Sub Title : Algorithm Design Techniques Laboratory		
Sub Code:18CSL48	**No. of Credits:1= 0 :0 : 1 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

1. To study about various designing paradigms of algorithms for solving problems
2. To analyze run time of algorithms and understand fundamental algorithmic problems
3. Make the students imbibe the art of writing elegant and efficient programs as well as debugging skills.

Design, develop and implement the specified algorithms for the following problems using C/C++ Language in LINUX / Windows environment.

1	Sort a given set of elements using **Bubble Sort/Selection Sort** and determine the time required to sort the elements. Plot a graph of number of elements versus time taken. Specify the time efficiency class of this algorithm.The elements can be read from a file or can be generated using the random number generator.
2	Implement **Merge Sort** algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
3	Sort a given set of elements using the **Quicksort** method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.
4	From a given vertex in a weighted connected graph, find shortest paths to other vertices using **Dijkstra's algorithm.**
5	Find Minimum Cost Spanning Tree of a given undirected graph using **Kruskal's algorithm**.
6	Find Minimum Cost Spanning Tree of a given undirected graph using **Prim’s algorithm.**
7	Obtain the **Topological ordering** of vertices in a given digraph.
8	a. Implement All-Pairs Shortest Paths Problem using **Floyd's algorithm**. b. Compute the transitive closure of a given directed graph using **Warshall's algorithm**.
9	Implement **0/1 Knapsack** problem using Dynamic Programming.
10	Implement **Traveling Salesperson problem** using Dynamic programming.
11	Implement **Horspool’s algorithm** for String Matching using space & time tradeoff concept
12	Implement **N Queen's** problem using Back Tracking.
13	Find a **subset** of a given set S = {sl,s2,.....,sn} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two

	solutions{1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution.

Note :In the examination *each* student picks one question from the lot of *all* 13 questions.

Course Outcomes	Statements	Blooms Level
CO1	Design an algorithms using appropriate design techniques.	**3**
CO2	Apply and implement learned algorithm design techniques and data structures to solve real world problems	**3**
CO3	Analyze and compare the performance of algorithms.	**3**

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO 3
CO1	2	3	3	3	-	-	-	-	-	-	-	-	3	3	-
CO2	2	3	3	3	-	-	-	-	-	-	-	-	3	3	-
CO3	2	3	2	2	-	-	-	-	-	-	-	-	3	2	-

TEXT BOOK:

1. AnanyLevitin: Introduction to Design & Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran: Fundamentals of Computer Algorithms, 2nd Edition, University press, 2008. ISBN 10: 8173716129
   ISBN 13: 9788173716126

REFERENCE BOOKS/WEBLINKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2010.
2. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEMS LABORATORY		
	SUBJECT CODE: 18CSL46	**No. of Credits:0:0:1**	**No. of Lecture hours per week:2**
	Exam Duration :3 hours	**Exam Marks:50**	

Course Objectives:

This course will help students to achieve the ability to:

1. Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator
2. Conduct the experiments on an ARM7TDMI/LPC2148 or any other evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/ python compiler.

Detailed Syllabus

Expt No.	Experiment List
	PART-A
1	Write an ALP to evaluate the following expressions i) C= A+B ii)P=Q+(R*S) Assume A, B, C, P, Q, R, S as data memory locations.
2	Write an ALP to perform a simple Boolean operation to calculate the bitwise calculation of the following functions. i)F1 = A·B + C·D ii)F2=(A+B).(C+D) Assume A, B, C, D as data memory locations.
3	Assume array of 16 bit number of size N and write the program to find sum of square of numbers and store the result in internal RAM memory
4	Write an ALP to find factorial of a non-negative number.
5	Write an ALP to multiply two signed numbers which are stored in internal RAM and store the result in
6	Write an ALP to add an array of 16 bit numbers of size N and store the result in internal RAM
7	Write an ALP to count the positive and negative numbers in an array of 16 bit numbers of size N
8	Write an ALP to find the largest and smallest number in an array of 32 numbers of size N
9	Write an ALP to arrange a series of 32 bit numbers in ascending/descending order of size N.
10	Write an assembly language program to search an element in an array of 16 bit number of size N using linear search.
	PART B
1	Interface two LEDs to Raspberry Pi and Write a Python code to input a number and switch ON the LEDs depending on the following conditions

Number		LED1	LED2
Negative	Odd	OFF	OFF
Negative	Even	OFF	ON
Positive	Odd	ON	OFF
Positive	Even	ON	ON

2	Interface a Stepper motor to Raspberry Pi and Write a Python code to rotate it in clockwise and anti-clockwise direction.
3	Interface a PIR Motion Sensor to Raspberry Pi and write a Python code to detect the movement of an object.
4	Interface a temperature sensor to Raspberry Pi and write a Python code to Read and calculate the temperature in Celsius.
5	Interface a button and a speaker to Raspberry Pi and write a Python code to play .wav sound file on press of the button.

Course Outcomes	**Statements**	**Blooms Level**
CO1	Develop and test Assembly Language Program (ALP) using ARM7TDMI/LPC2148/Simulator/Emulator	**L3**
CO2	Describe the ARM7TDMI/LPC2148/Raspberry Pi Evaluation board	**L2**
CO3	Demonstrate the working of Raspberry Pi device by connecting it with different components.	**L3**
CO4	Develop the python code for the interfacing components to Raspberry Pi	**L3**
CO5	Illustrate the working of stepper motor, temperature sensor, and PIR sensor	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO3**
CO1	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
CO2	1	1	2	1	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-

FACULTY NAME:

Dr. SIDDARAJU | **SRINIVASA A.H**

Professor & Head | **Associate Professor**

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	SUBJECT TITLE: Computer Organization and Architecture		
	Sub Code:18CS45	**No. of Credits:3:0:0 (L-T-P)**	**No.of.lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:

1. Understand an overview of computer hardware and software which includes the basic functional units, interconnection, addressing techniques and instruction sequencing
2. Understand different integer and floating point arithmetic operation.
3. Understand various cache memory and I/O concepts.
4. Understand the concepts of parallel processing

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**Basic concepts and computer evolution**: Organization and Architecture- Structure and Function, A Brief History of Computers, Designing for Performance, Multicore, MICs, and GPGPUs , The Evolution of the Intel x86 Architecture Embedded Systems and the ARM , Performance Assessment . **A Top-Level View of Computer Function and Interconnection:** Computer Components, Computer Function, Interconnection Structures, Bus Interconnection, Point-To-Point Interconnect.	11
2	**Cache Memory:** Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design. **Internal Memory:** Semiconductor Main Memory, Error Correction, Advanced DRAM Organization, **External Memory:** Magnetic Disk, RAID , Solid State Drives , Optical Memory. **Input/output :** External Devices, I/O Modules Programmed I/O, Interrupt-Driven I/O, Direct Memory Access	10
3	**Computer Arithmetic :** The Arithmetic and Logic Unit, Integer Representation , Integer Arithmetic , Floating-Point Representation , Floating-Point Arithmetic **The Central Processing Unit:** Machine Instruction Characteristics , Types of Operands , Intel x86 and ARM Data Types ,Types of Operations , Addressing Modes	10
4	**Processor Structure and Function:** Processor Organization, Register Organization, Instruction Cycle, Instruction Pipelining **Reduced Instruction Set Computers:** Instruction Execution Characteristics, The Use of a Large Register File **Compiler**-Based Register Optimization **Reduced** Instruction Set Architecture **RISC** Pipelining. RISC vs CISC Controversy	10

5	**Self-Study:** **PARALLEL ORGANIZATION: Instruction-Level Parallelism and Superscalar Processors :**Overview, Design Issues, **Parallel Processing,** Multiple Processor Organizations ,Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors, Clusters , Non-uniform Memory Access	11

Text Books:

1. William Stallings, "Computer Organization and Architecture, Designing for Performance", 10^{th} Edition, Pearson, 2019

Reference Books:

1. C Hamacher, Z Vranesic, S Zaky: Computer Organization, Tata McGraw Hill, 5th Edition, 2011.
2. John L Hennessy, David A Patterson: Computer Architecture A Quantitative Approach, Elsevier, 5th Edition 2012.
3. Anrew S. Tanenbaum, Structured Computer Organization, Pearson Education Inc, 5^{th} Edition, 2006.
4. John P. Hayes, Computer Architecture and Organization, Tata McGrawHill, 3^{rd} Edition,1998

SELF STUDY REFERENCES/WEBLINKS:

1. William Stallings, "Computer Organization and Architecture, Designing for Performance", 10^{th} Edition, Pearson, 2019.

2. https://www.youtube.com/watch?v=ZGUP5nUdIyc

3. https://www.youtube.com/watch?v=-p9tfMMu1PE

Course Outcomes:

Course Outcomes	**Statements**	**Blooms Level**
CO1	Describe the architecture and functionality of central processing unit.	**L2**
CO2	Exemplify in a better way the I/O and memory organization	**L3**
CO3	Use different number systems, binary addition, subtraction, 2's complement representation, floating point representation and its operations.	**L3**
CO4	Demonstrate the execution of instruction and compare the architecture of RISC and CISC.	**L3**

	.	
CO5	Outline the concepts of parallel processing, pipelining and interprocessor communication	**L2**

CO-PO Mapping

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	2	2	1	2	-	-	-	-	-	-	-	3	2	-
CO2	3	2	2	1	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	2	1	2	-	-	-	-	-	-	-	2	2	-
CO4	3	2	2	2	2	-	-	-	-	-	-	-	2	2	-
CO5	3	3	2	2	2	-	-	-	-	-	-	-	3	2	-

3- Strong 2-Medium 1-Weak

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Associate Professor

ARATHI P
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	SUBJECT TITLE: MICROCONTROLLER AND EMBEDDED SYSTEM		
	Sub Code:18CS43	**No. of Credits:4=4:0:0 (L-T-P)**	**No.of.lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment +SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1. Differentiate between microprocessors and microcontrollers.
2. Explain the architecture of ARM processor with its instruction set.
3. Identify the applicability of the embedded system

Detailed Syllabus

Unit No.	Syllabus Content	No. of hours
1	**The History of ARM and Microcontrollers:** Introduction to Microcontrollers, the ARM Family History, **ARM Architecture and Assembly Language Programming:** The General Purpose Registers in the ARM, The ARM Memory Map, Load and Store Instructions in ARM, ARM CPSR (Current Program Status Register), ARM Data Format and Directives, Introduction to ARM Assembly Programming, Assembling an ARM Program, The Program Counter and Program ROM Space in the ARM, Some ARM Addressing Modes, RISC Architecture in ARM, Viewing Registers and Memory with ARM Keil IDE	11
2	**Arithmetic and Logic Instructions and Programs:** Arithmetic Instructions, Logic Instructions, Rotate and Barrel Shifter, Shift and Rotate Instructions in ARM Cortex, BCD and ASCII Conversion, **Branch, Call, and Looping in ARM:** Looping and Branch Instructions, Calling Subroutine with BL, ARM Time Delay and Instruction Pipeline, Conditional Execution	11
3	**Self-Study:** **Signed Numbers and IEEE 754 Floating Point:** Signed Numbers Concept, Signed Number Instructions and Operations, IEEE 754 Floating-Point Standards, **ARM Memory Map, Memory Access, and Stack:** ARM Memory Map and Memory Access, Stack and Stack Usage in ARM, ARM Bit-Addressable Memory Region, Advanced Indexed Addressing Mode, ADR, LDR, and PC Relative Addressing, **ARM Pipeline and CPU Evolution:** ARM Pipeline Evolution, Other CPU Enhancements	10

4	**Introduction to Embedded Systems:** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems, Embedded firmware design and development: Embedded firmware design approaches, embedded firmware development languages.	10
5	**Typical Embedded System: Core of the Embedded System:** General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: On board and External Communication Interfaces.	10

Text Books:

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, “ARM assembly language Programming and Architecture”, MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906

2. Shibu K V, “Introduction to Embedded Systems”, Tata McGraw Hill Education, Private Limited, 2nd Edition, 2009. ISBN 978-0070678798

Reference Books:

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. The Insider’s Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008
5. Ragunandan, An Introduction to ARM System Design, Cengage Publication

SELF STUDY REFERENCES/WEBLINKS

1. Muhammad Ali Mazidi, Sarmad Naimi, Sepher Naimi, Janice Mazidi, “ARM assembly language Programming and Architecture”, MicroDigitalEd.com, 2nd Edition, 2016. ISBN 978-0997925906
2. https://www.youtube.com/watch?v=qBHUGy1xteg

3. https://www.youtube.com/watch?v=e3YvT3WkhRs

4. https://www.youtube.com/watch?v=q4fwx3h3mdg

Course Outcomes:

Course Outcomes	Statements	Blooms Level
CO1	Describe the architecture of ARM microcontroller.	**L2**
CO2	Write the assembly language program using ARM microcontroller instructions	**L3**
CO3	Illustrate the memory concepts and data representation in ARM microcontroller	**L3**
CO4	Identify and Analyze the applications of embedded systems	**L2**
CO5	Select the best components for the design of embedded systems.	**L2**

CO-PO Mapping

Course Outcomes	POs												PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	2	2	2	2								3	3	-
CO2	3	3	3	2	3								3	3	-
CO3	2	2	2	3	2								3	3	-
CO4	2	3	2	2	2								2	3	-
CO5	2	3	2	2	2								1	2	-

FACULTY NAME:

Dr. SIDDARAJU — **Professor & Head**

SRINIVASA A.H — **Associate Professor**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Sub Title: Theoretical Foundation of Computer Science		
	Sub Code: 18CS44	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives

The objective of the course is to

1. Present fundamental concepts and techniques for designing Automata.
2. Provide necessary background for formulating real-world problems to Finite state machines, construct regular expressions and conversion between themselves.
3. Use the pumping lemma to demonstrate the non-regularity of languages.
4. Learn CFGs, Design Pushdown Automata for various context-free Grammars.
5. Know various Normal forms with Simplification of Grammar and Design Turing Machines and know its various types.

Unit No	Syllabus Content	No. of Hours
1	**Introduction to Finite Automata:** Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata An application of finite automata. **Finite Automata, Regular Expressions:** Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions.	11
2	**Regular Languages, Properties of Regular Languages:** Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata	10
3	**Context-Free Grammars And Languages :** Context–free grammars; Parse trees; Applications; Ambiguity in grammars and Languages.	10
4	**Pushdown Automata:** Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata	10
5	**Properties of Context-Free Languages:** Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFLs **Introduction To Turing Machine:** Problems that Computers cannot solve; The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines; Turing Machine and Computers.	11

Course Outcomes	Statements	Bloom's Level
CO1	Design different finite state machines for regular languages, make conversion between them, construct the regular expression and study its applications.	**6**
CO2	Obtain a minimized DFA, convert the given automata to regular expressions and vice-versa and prove languages not to be regular using pumping lemma.	**4**
CO3	Know basic definitions in Grammar, Write CFGs, Construct parse trees, find and remove ambiguity in grammars.	**3**
CO4	Study Pushdown Automata, Design NPDA and DPDA after the CFG conversion and convert PDAs to grammar.	**2**
CO5	Convert grammar to Various Normal Forms, and simplify the Grammar, Prove that languages are not context free using pumping lemma. Design Turing machines and understand the working of various types of Turing machines.	**3**

Course Outcomes	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	-	2	-	-	-	-	-	-	2	2	-
CO2	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO3	2	-	2	-	2	-	-	-	-	-	-	-	2	1	-
CO4	2	2	-	-	2	-	-	-	-	-	-	-	1	2	-
CO5	2	2	2	-	2	2	-	-	-	-	-	-	2	1	-

Text Book:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, Publisher: Pearson Education; Third edition (2011)
(Chapters: 1.1, 1.5, 2.2 to 2.5, 3.1 to 3.3, 4, 5, 6, 7, 8.1 to 8.4, 8.6)
ISBN-10: 8131762688 & ISBN-13: 978-8131762684

Reference Books:

1. K.L.P. Mishra: Theory of Computer Science, Automata, Languages and Computation, 3rd Edition, PHI, 2007. ISBN-978-81-203-2968-3
2. Raymond Greenlaw, H.James Hoover: Fundamentals of the Theory of Computation, Principles and Practice, Morgan Kaufmann, 1998. ISBN 9781558605473, 9780080948355
3. John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007. ISBN 10: 0070660484 / ISBN 13: 9780070660489
4. Kavi Mahesh: Theory of Computation, A Problem solving approach, Wiley-India. ISBN: 9788126533114

FACULTY NAME: Dr. Harish G & Veena Potdar

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	SUBJECT TITLE: **OOP Principles and Practices using C++**		
	SUBJECT CODE:18CS42	**No. of Credits:3:0:0**	**No. of Lecture hours per week:3**
	Exam Duration :3 hours	**Exam Marks: 100**	**Total No. of Lecture hours:42**

Course Objectives

The objectives of this course are to:

1. Understand the philosophy of object-oriented programming and the concepts of encapsulation, abstraction, inheritance, and polymorphism.
2. Implement the concept of constructors and destructors.
3. Design and test the implementation among objects using a class hierarchy and inheritance.
4. Identify the relationship between the run time polymorphism and compile time polymorphism.
5. Implement file I/O operations, exception handling mechanisms and STL.

Unit No	Syllabus Content	No. of Lecturer hours
1	**Introduction:** Overview of C++, Basic concepts of OOP, Sample C++ program, operators in C++, Function basics, inline functions, function overloading. **Classes and Objects:** Class Specification, Defining member functions, Static members, Friend functions and classes, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors, Templates: Generic functions and classes.	10
2	**Operator overloading:** Rules, Overloading +, - , pre-increment, post-increment, [ ], <<, >> using friend functions. **Inheritance:** Types, Inheritance and protected members, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.	08
3	**Virtual functions and Polymorphism:** Virtual functions, Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.	08
4	**I/O System Basics and File I/O:** C++ stream classes, Formatted I/O, Manipulators, fstream and the File classes, Opening and closing a File, Reading and Writing Text Files, Unformatted and Binary I/O, Random Access **Namespaces :** Fundamentals, using, options, the std namespace	08
5	**SELF-STUDY –** **Exception Handling:** Exception handling fundamentals, Handling Derived-Class Exceptions, Exception handling options **STL**: An overview, The container classes, vectors, lists, maps.	08

Course Outcomes

At the end of the course students should be able to:

Course Outcomes	Statements	Blooms Level
CO1	Identify the classes, objects, members of a class and the relationships among them to solve a specific problem.	**L2**
CO2	Illustrate the concept of constructors and destructors and describe the mechanism of overloading the operators.	**L2**
CO3	Examine the concept of data encapsulation, inheritance and function templates as used in C++ programming language.	**L3**
CO4	Discover the commonly used operations involving the file operations and manipulators.	**L3**
CO5	Interpret the concepts of exception handling and the built-in standard template library.	**L3**

Course Outcomes	**POs**												**PSOs**		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO1 2**	**PS O1**	**PS O2**	**PS O3**
CO1	2	3	2	2	1	-	-	-	-	-	-	-	1	2	-
CO2	2	3	2	2	1	-	-	-	-	-	-	-	1	2	-
CO3	2	2	3	2	1	-	-	-	-	-	-	-	2	3	-
CO4	2	2	3	2	1	-	-	-	-	-	-	-	1	2	-
CO5	2	3	3	2	1	-	-	-	-	-	-	-	2	2	-

Text Book(s)

1. Herbert Schildt, "*The Complete Reference C++, 5th Edition*", Tata McGraw Hill, 2013. **ISBN - 978-0071634809**

Reference Book(s)

1. Stanley B.Lippmann, JoseeLajore, "*C++ Primer*, *5th Edition*", Addison Wesley, 2013. **ISBN - 978-0321714114**
2. E Balagurusamy, "*Object Oriented Programming with C++*", 6th Edition, Tata McGraw Hill, 2013. **ISBN - 9781259029936**
3. Paul J Deitel, Harvey M Deitel, "*C++ for Programmers*", Pearson Education, 2009. **ISBN - 9780137018475**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: ALGORITHM DESIGN TECHNIQUES			
	Course Code:18CS41	**No. of Credits: 3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week: 3**	
	Exam Duration: 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**	
Course objectives:	**Description**			
	1. Present fundamental concepts for algorithm design and provide necessary background for writing algorithms in a formal way. 2. Identify for a problem adequate algorithm design strategies. 3. Present fundamental concepts and techniques for complexity analysis of algorithms. 4. Implement appropriate algorithm for different application problems.			

UNIT No	**Syllabus Content**	**No of Hours**
1	Introduction: what is an algorithm? Algorithm Specification, Analysis Framework, Performance Analysis: Space complexity, Time complexity. Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω),Theta notation (Q), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples	**8**
2	Divide and Conquer: General Method, Binary Search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge Sort, Quick Sort, Strassen's matrix multiplication, Advantages and Disadvantages of divide and conquer.	**9**
3	The Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm; Single Source Shortest Path problem, Optimal Tree problem: Huffman Trees and Codes.	**8**
4	Dynamic Programming: The General Method, Warshall's Algorithm, Floyd's Algorithm for All-Pairs Shortest Paths Problem, Optimal 0/1 Knapsack problem, Bellman-Ford Algorithm, Traveling Salesperson problem. Space-Time Tradeoffs: Introduction, Sorting by Counting, Sorting by Distribution method, Input Enhancement in String Matching.	**9**
5	**SELF-STUDY** Backtracking: General method, N-Queens problem, Sum of subsets problem. Branch and Bound: Assignment Problem, Travelling Sales Person problem, 0/1 Knapsack problem. Approximation Algorithms for NP-Hard Problems – Traveling Salesperson Problem, Knapsack Problem.	**8**

Course Outcomes	Description	Blooms Level
CO1	Ability to analyze the performance of algorithms using different asymptotic notations.	**L2**
CO2	Identify the design techniques for engineering problems based on Divide & conquer and Greedy methods.	**L2**
CO3	Apply the ideas of dynamic programming and backtracking to solve the engineering problems and analyze their performance.	**L3**
CO4	Determine how space and time trade off technique is used to improve the performance of algorithm.	**L3**
CO5	Estimate the approximation algorithm and analyze the benefit of using them.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-
CO5	3	3	2	2	-	-	-	-	-	-	-	-

TEXT BOOKS:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3rdEdition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2ndEdition, University press, 2008.ISBN 10: 8173716129 , ISBN 13: 9788173716126

REFERENCE BOOKS:

1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2010.
2. Gilles & Brassard, Paul Bratley , Fundamentals of Algorithms. Phi, 2013

SELF-STUDY REFERENCES/WEBLINKS:

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3ndEdition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. https://jeffe.cs.illinois.edu/teaching/algorithms/book/02-backtracking
3. https://www.codesdope.com/blog/article/backtracking-explanation-and-n-queens-problem/
4. https://www.geeksforgeeks.org/job-assignment-problem-using-branch-and-bound/

COURSE COORDINATOR:	ASHA

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: PYTHON PROGRAMMING		
	Course Code: **18CSE012**	**No. of Credits: 3: 0: 0** **(L-T-P)**	**No. of lecture hours/week:** **3**
	Exam Duration: **3 hours**	**CIE + Assignment + SEE =** **45 + 5 + 50 = 100**	**Total No. of Contact Hours: 42**

Course Objectives:	**Description**
	1. Describe the core syntax and semantics of Python programming language. 2. Discover the need for working with the strings and functions. 3. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets. 4. Indicate the use of regular expressions and built-in functions to navigate the file system. 5. Infer the Object-oriented Programming concepts in Python.

Unit No	**Syllabus Content**	**No of Hours**
1	**Parts of Python Programming Language,** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language, **Control Flow Statements,** The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elif…else Decision Control Statement, Nested if Statement, The while Loop, The for Loop, The continue and break Statements, Catching Exceptions Using try and except Statement, **Functions**, Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.	**09**
2	**Strings,** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings, **Lists,** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement.	**08**
3	**SELF-STUDY** **Dictionaries,** Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, **Tuples and Sets,** Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozenset.	**08**
4	**Files,** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules, **Regular Expression**	**08**

	Operations, Using Special Characters, Regular Expression Methods, Named Groups in Python Regular Expressions, Regular Expression with glob Module.	
5	**Object-Oriented Programming,** Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, Inheritance, The Polymorphism.	**09**

Course Outcomes	Description	RBT Levels
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	**L2**
CO2	Express proficiency in the handling of strings and functions.	**L2**
CO3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	**L3**
CO4	Identify the commonly used operations involving file systems and regular expressions.	**L2**
CO5	Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	3	-	-	-	-	-	-	-
CO2	2	2	2	1	3	-	-	-	-	-	-	-
CO3	3	3	2	2	3	-	-	-	-	-	-	-
CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	2	2	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

REFERENCE BOOKS:

1) Jake VanderPlas, **"Python Data Science Handbook: Essential Tools for Working with Data",** 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
2) Aurelien Geron, **"Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems",** 2nd Edition, O'Reilly Media, 2019. ISBN – 13: 978-9352139057.
3) Wesley J Chun, **"Core Python Applications Programming",** 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

<table>
<tr><td colspan="2">4) Miguel Grinberg, "Flask Web Development: Developing Web Applications with Python", 2nd Edition, O'Reilly Media, 2018. ISBN-13: 978-1491991732.</td></tr>
<tr><td colspan="2">SELF-STUDY REFERENCES/WEBLINKS:</td></tr>
<tr><td colspan="2">1. Dictionaries
https://www.youtube.com/watch?v=daefaLgNkw0
2. Tuples and Sets
https://www.youtube.com/watch?v=W8KRzm-HUcc</td></tr>
<tr><td>COURSE COORDINATOR:</td><td>Dr.Gowrishankar S.</td></tr>
</table>

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Subject title: UNIX AND SHELL PROGRAMMING		
	Subject code: 18CS653	**No. of Credits: 3:0:0:0**	**No. of Lecture hours per week: 3**
	Exam Duration : 3hrs	**Exam Marks: 100**	**Total No. of Lecture hours: 39**

Course Objectives:
This course will help students to achieve the following objectives:

1. **Understand the role of the shell as a command interpeter**
2. **Navigate the file system to perform different operations**
3. **Understand the behavioral pattern of the shell and its essential programming constructs using the vi editor**
4. **Understand the concept of filters**
5. **Realize the mechanism of process creation**

Unit No.	Syllabus Content	No. of hours
1.	**The UNIX operating system, architecture and command usage**-- The Operating System, The UNIX operating system, Architecture , Features of UNIX, POSIX and the Single UNIX pecification, Locating Commands, Internal and External Commands, Command structure, Understanding the man documentation, Flexibility of command usage, ***man, man –k, apropos and whatis*** **General – Purpose Utilities** – ***cal, date, echo, printf, bc, script, passwd, who, uname, tty, sty ,*** Basics of electronic mail and handling mail with ***mailx*** program	8
2.	**The File System –** Categorization of files into ***ordinary, device*** and ***directory,*** the hierarchical structure between files and directories - The Parent-Child Relationship, The home directory, HOME variable, file system navigation with ***cd*** and ***pwd*** commands, directory commands ***mkdir*** and ***rmdir*** , absolute and relative Pathnames, use of ***ls*** in different formats. **Handling Ordinary Files** – ***cat, cp, rm, mv, more, lp file, wc, cd cmp, comm, diff, dos2unix, unix2dos,*** compress and archive -- ***gzip*** and ***gunzip***, ***tar***, ***zip*** and ***unzip*** **The Shell**: The Shell's Interpretive Cycle, Pattern Matching – The wild-cards , Escaping and Quoting, Redirection: The Three Standard Files (streams) for redirection and pipelines, filters, Two Special Files ***/dev/null*** and ***/dev/tty***, Pipes, **tee**: Creating a Tee, Command Substitution, Shell Variables, Effects of quoting and escaping	8
3.	**Essential Shell Programming** --Shell Scripts, **read** and **readonly** commands, using command line arguments, **exit** and Exit Status of command, The logical Operators && and || -conditional execution, The **if** Conditional, Using **test** and **[ ]** to Evaluate Expressions, The **case** Conditional, **expr**: Computation and String Handling, $0: Calling a Script by Different names, the use of **while** and **for l**oops**, set** and **shift** statements and **trap**. **Customizing the environment** -- Environment Variables. **Basic File Attributes**: **ls – l**: Listing File Attributes, The **–d** Option: Listing Directory Attributes, File Ownership, File Permissions **,** chmod: Changing File Permissions, Directory Permissions, Changing File Ownership**.** **More file attributes** : More File Attributes : File Systems and Inodes, Hard Links,	9

	Symbolic Links and ln, The Directory, Umask.	
4.	-***Simple filters** : **pr**: Paginating Files, **head**: Displaying the Beginning of a File , **tail**: Displaying the End of a File, **cut**: Slitting a File Vertically, **paste**: Pasting Files, **sort**: Ordering a File, **uniq**: Locate Repeated and Non repeated Lines, **tr**: Translating Characters, An Example: Displaying a Word-count List, **Filters using Regular Expressions** -- grep	7
5. **Self-Study Component**	**The Process** : Process Basics, **ps**: Process Status, System Processes (-e or –a), Mechanism of Process Creation, Internal and External Commands , Running Jobs in Background, Killing Processes with Signals, Job Control, **at** and **batch**: Execute Later, **cron**: Running Jobs Periodically, **time**: Timing Processes. **Vi Editor**,: **vi** Basics, Input Mode-Entering and Replacing Text, Saving Text and Quitting – The ex Mode, Navigation, Editing Text, Undoing Last Editing Instructions(**u** and **U**), Repeating the Last Command (**.**) , Editing Text, Undoing Last Editing Instructions(**u** and **U**), Repeating the Last Command (**.**),Searching for a Pattern (**/** and **?**), Substitution – Search and Replace	7

Text Books

1. **Sumitabha Das: UNIX – Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.**

Reference Books

1. **Behrouz A. Forouzan and Richard F. Gilberg, UNIX and Shell Programming, Thomson, 2005.**
2. **M.G. Venkateshmurthy, UNIX & Shell Programming, Pearson Education, 2005.**

Course Outcomes

CO1. Analyze the role of the shell for programming in the UNIX environment

CO2. Analyze and use the different ways in which the tasks can be executed using the wide set of commands the system offers.

CO3. Develop small shell scripts using vi editor.

CO4. Analyze and Apply the use of appropriate filters in problem solving.

CO5. Analyze and Apply the mechanism of process creation

-

Leena Giri G.

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: DATABASE MANAGEMENT SYSTEM		
	Course Code: 18CS53	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

	Description
Course Objectives:	1. To understand the different issues involved in the design and implementation of a database system. 2. To study the physical and logical database designs, database modeling, relational model. 3. To understand and use data manipulation language to query, update and manage a database 4. To develop an understanding of essential DBMS concepts such as: database security, integrity and concurrency.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** Introduction, An example, Characteristics of Database approach; Advantages of using DBMS approach; Data models, schemas and instances; three schema architecture and data independence; Database languages and interfaces; Classification of Database management systems. Entity-Relationship model; using High- Level conceptual Data Models for database Design; An example Database Application; Entity types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and structural Constraints; Weak Entity types; Refining the ER Design, ER to relational schema diagram mapping	9
2	**Relational Model and Relational Algebra:** Relational Model Concepts; relational Model constraints and Relational Database Schemas; update operations, Transactions and dealing with constraint violations; Unary Relational Operations; SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations: JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra.	8
3	**SQL:** Specifying basic constraints in SQL; schema change statements in SQL; Basic queries in SQL; More complex SQL queries-Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL.	9
4	**Database Design:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Cod Normal form, Properties of Relational Decompositions; Algorithms for relational Database Schema Design; Multi-valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form	8
5	**Self study: Transaction Management:** Transaction and System Concepts, Desirable Properties of Transactions, characterizing schedules based on Recoverability, Characterizing schedules based on Serializability. Two-Phase Locking Techniques for Concurrency Control, Concurrency Control based on Timestamp ordering.	8

Course Outcomes	Description	RBT Levels
CO1	Understand the basic concepts and architecture associated with DBMS so as to employ the conceptual and relational models to design large database systems.	**L4**
CO2	Create, maintain and manipulate a relational database using SQL.	**L4**
CO3	Analyze the database design & normalize it so that the data conforms to design principles.	**L4**
CO4	Apply the characteristics of database transactions and assess how they affect database integrity and consistency.	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2								
CO2	3	3	3	3	2							
CO3	3	3	2	2								
CO4	2	2	2									

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015, **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education,2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

SELF STUDY REFERENCES / WEBLINKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015, **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

Chapter -18

COURSE COORDINATOR:	Asha Veena Potdar

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Advance Algorithm		
	Course Code: **18CS552**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week :** **04**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours :** **52**

Course Objectives:	**Description**
	1. To enable students to acquire knowledge on how to design and analyze iterative and recursive algorithms for complex applications. 2. To design optimal solutions with respect to time and space for real time problems. 3. To understand and analyze graph based algorithms and give optimal solutions. 4. To understand the significance of Modular arithmetic in designing secured applications.

Unit No	**Syllabus Content**	**No of Hours**
1	Review of Analysis Techniques: Growth of Functions: Asymptotic notations; Standard notations and common functions; Recurrences and Solution of Recurrence equations- The substitution method, The recurrence – tree method, The master method.	11
2	Graph Algorithms: Bellman - Ford Algorithm; Single source shortest paths in a DAG; Johnson's Algorithm for sparse graphs; Flow networks and Ford-Fulkerson method.	11
3	Number-Theoretic Algorithms: Elementary notions; GCD; Modular Arithmetic; Solving modular linear equations; The Chinese remainder theorem.	10
4	**Self-Study Component**: String-Matching Algorithms: Naïve string Matching; Rabin - Karp algorithm; String matching with finite automata.	10
5	Data structures: Hash Tables, direct address tables, red-black trees: properties of red-black trees, rotations and insertion.	10

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand the significance and concepts of time and space complexity analysis for designing optimal algorithms	**R2**
CO2	Analyze and solve the time complexity of iterative , recursive and graph based algorithms	**R3,R4**
CO3	Apply mathematical models to implement secured and optimal algorithms	**R4**

CO4	Familiarize with operations, suitability and optimality of data structures in a given application	**R5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**										
CO3	**3**	**3**	**2**									
CO4	**3**	**3**	**3**	**3**	**3**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. T. H Cormen, C E Leiserson, R L Rivest and C Stein: Introduction to Algorithms, 3rd Edition, Prentice-Hall of India, 2010. ISBN:9780262033848

REFERENCE BOOKS:

1. Ellis Horowitz, SartajSahni, S.Rajasekharan: Fundamentals of Computer Algorithms, 2nd Edition, Universities press, 2007, ISBN 8173716129, 9788173716126
2. Horowitz, Sahani, Dinesh Mehata, ―Fundamentals of Data Structures in C++‖, Galgotia Publisher, ISBN: 8175152788, 9788175152786.
3. M Folk, B Zoellick, G. Riccardi, ―File Structures‖, Pearson Education, ISBN:81-7758-37-5
4. Peter Brass, ―Advanced Data Structures‖, Cambridge University Press, ISBN: 978-1-107-43982-5
5. Kenneth A. Berman, Jerome L. Paul: Algorithms, Cengage Learning, 2002.

WEBLINKS:

1. **Introduction to algorithms and analysis By Prof. Sourav Mukhopadhyay | IIT Kharagpur** https://swayam.gov.in/nd1_noc20_cs93/preview
2. **Khan Academy course on advanced algorithms and data structure**

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Sub Title : Artificial Intelligence		
	Sub Code:18CS553	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :42**

Course Objectives:	**Description**
	Course objectives: The objective of the course is to: 1. To understand agent programming for different applications. 2. To learn different problem solving methods for artificial agents. 3. To learn knowledge representation using predicate logic and propositional logic. 4. To learn implementing planning in agents.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** what is AI**,** the foundations of AI,history of AI,the state of the art, **Intelligent agents:** Agents and environments, good behavior, concept of rationality, nature of environments, structure of agents.	8
2	**Problem-solving by Searching:** Problem solving agents, searching for solutions, uninformed search strategies, informed search strategies, heuristic functions, games, optimal decision in games ,alpha-beta pruning.	9
3	**Logical agents:** knowledge based agents, the wumpus world, logic, propositional logic, reasoning patterns in propositional logic, effective propositional inference ,agents based on propositional logic first order logic, syntax and semantics of first order logic, Propositional vs. Fist order inference.	8
4	Self_study:**Knowledge representation**: ontological engineering, categories and objects, actions, situations and events, mental events and mental objects .Planning: the planning problem, planning with state space search, partial order planning, planning graph.	8
5	**Making simple decisions:** combining beliefs and desires under uncertainty, the basics of utility theory, utility functions, multi attribute utility functions, decision networks, the value information ,decision theoretic expert system **,Learning from examples**: forms of learning, inductive learning, learning decision trees,	9

NOTE:
1. Include Self study component in any one of the Unit.
2. Total number of COs is decided by concerned Course Coordinator

COURSE OUTCOMES:

Course Outcomes	Description	RBT Levels
CO1	Describe and implement different types of agents for real time applications with proper understanding of agent programming	**L3**
CO2	Analyze and apply search methods of problem solving techniques in real time applications.	**L4**
CO3	Understand and derive agent's behavior and environment by applying predicate logic and propositional logic.	**L3**
CO4	Design and apply different planning methods and learning algorithms for improving agents performance	**L3**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	3	3	2								2
CO3	3	3	3									2
CO4	2	3	3	2								2

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Artificial Intelligence: A Modern Approach, by Stuart Russell and Peter Norvig, 2nd Edition, Publisher: Pearson education ltd-2013 ISBN: 978-81-7758-367-0

REFERENCE BOOKS:

1. Luger, G. F., & Stubblefield, W. A., Artificial Intelligence - Structures and Strategies for Complex Problem Solving. New York, NY: Addison Wesley, 5th edition (2005).
2. Nilsson, N. J. Artificial Intelligence - A Modern Synthesis. Palo Alto: Morgan Kaufmann. (1998).
3. Nilsson, N. J., Principles of Artificial Intelligence. Palo Alto, CA: Tioga (1981).
4. Rich, E., & Knight, K., Artificial Intelligence. New York: McGraw-Hill (1991).

SELF STUDY REFERENCES/WEBLINKS:

1. http://Nptel.ac.in/courses/106/106/106140
2. http://Nptel.ac.in/courses/106/102/102220

COURSE COORDINATOR:	ARATHI .P

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Core JAVA		
	SubjectCode: **18CS52**	**No. of Credits: 4 : 0 : 0 : (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours :52**

Course Objectives	**Description**
	CO1: Understand the fundamental features of Object-Oriented paradigm of the Java programming language. **CO2:** To learn the usage of Inheritance, Packages,Interfaces and Exception Handling. **CO3:** To create multiple threads and understand the basic Networking concepts and RMI in Java. **CO4:** Able to design Event Handling, GUI applications with advanced Java concepts.

Unit No	Syllabus Content	No of Hours
1	**Introduction to Java**: History of Java; Java Programming Environment; Fundamental Programming Structures in Java; Data Types,Variables and Constants,Operators,Strings,Input and Output;Control Flows;Arrays. **Object and Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize() Method, A Stack Class; Introducing Access Control, Understanding static, Introducing final. **Package and Interface:** Packages,Access Protection, Importing Packages, Interfaces; **Applet Fundamentals**.	11
2	**Inheritance:**Inheritance Basics;Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance; **Exception Handling**: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try statements, throw, throws, finally, Chained Exceptions.	10
3	**MultiThreaded Programming:** Thread model; The Main Thread; Creating a Threads;Using isAlive() and join();Thread priorities; Synchronization;	10

	Inter-thread communication; Deadlock. **Networking:** Networking Basics; The Networking Classes and Interfaces;TCP/IP Client Sockets;TCP/IP Server Sockets. **Java Remote Method Invocation(RMI):**Remote Method Invocation concept and technology.	
4	<u>**Self study component**</u> **Event Handling:** History of user interface toolkit; Displaying the Frames; Event Handling Mechanisms; The Delegation Event Model(DEM); Sources of events; Adapter classes; Inner classes. **Introducing GUI Programming with Swing:**Introducing Swing; **JDBC:**The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Statement Objects; ResultSet; Transaction Processing.	**11**
5	**Servlet:** The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API;Packages; Handling HTTP Requests and Responses; Handling Cookies; Session Tracking. **Java Server page (JSP)**: Overview of JSP; JSP tags; Invoking java code with Scripting Elements.	**10**

Course Outcomes	Description	RBT Levels
CO1	Design Classes and establish relationship among Classes for various applications from problem definition.	**L4**
CO2	Analyze and implement reliable object-oriented applications using Java features such as Inheritance and Exception Handling.	**L4**
CO3	Write Java programs to implement Event Handling mechanisms, Multithreaded Programming, Networking concepts, and GUI Programming.	**L3**
CO4	Demonstrate the advanced Java concepts such as Servlets, JDBC and Java Server Pages.	**L4**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**3**	**1**	**2**	-	-	-	-	-	-	-
CO2	**3**	**3**	**2**	**1**	**2**	-	-	-	-	-	-	-
CO3	**3**	**3**	**2**	**2**	**2**	-	-	-	-	-	-	-
CO4	**3**	**3**	**3**	**2**	**2**	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. **The Complete Reference - Java , Herbert Schildt 9th Edition, 2016, TMH Publications, ISBN :978-93-392-1209-4.**
(Chapters: 1, 2, 3, 4, 5, 6, 7,8,9,10,11,13,16,20,22,23,24,31,38)

2.The Complete Reference -J2EE , Jim Keogh, 3rd Edition, 2015, TataMcGRAW Hill Publications, ISBN : 9780070529120. (Chapters: 6,10,11,15)

REFERENCE BOOKS:

1. Cay S.Horstmann :Core Java volume I-Fundamental ,11th Edition, Pearson Education, 2019.

SELF STUDY REFERENCES/WEBLINKS:

1. **https://www.youtube.com/watch?v=mQj34vUhpts&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44&t=0s**
2. **https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho&index=44**

COURSE COORDINATOR:	**Dr.SMITHA SHEKAR B** **Prof.PUSHPAVENI H P** **Prof.VEENA A**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Course Title: OOPS with C++		(IDE)
Course Code: 18CSE011	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	Description
	1. Understand the philosophy of object-oriented programming and the concepts of encapsulation, abstraction, inheritance, and polymorphism. 2. Implement the concept of constructors and destructors. 3. Design and test the implementation among objects using a class hierarchy and inheritance. 4. Identify the relationship between the run time polymorphism and compile time polymorphism. 5. Implement file I/O operations, exception handling mechanisms and STL.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** Overview of C++, Basic concepts of OOP, Sample C++ program, operators in C++, Function basics, inline functions, function overloading. **Classes and Objects:** Class Specification, Defining member functions, Static members, Friend functions and classes, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors.	**10**
2	**Operator overloading:** Rules, Overloading +, - , pre-increment, post-increment, [ ], <<, >> using friend functions. **Inheritance:** Types, Inheritance and protected members, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.	**8**
3	**Virtual functions and Polymorphism:** Virtual functions, Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions, Early and late binding.	**8**
4	**I/O System Basics and File I/O:** C++ stream classes, Formatted I/O, Manipulators, fstream and the File classes, Opening and closing a File, Reading and Writing Text Files, Unformatted and Binary I/O, Random Access **Namespaces :** Fundamentals, using, options, the std namespace.	**8**
5	**SELF-STUDY –** **Exception Handling:** Exception handling fundamentals, Handling Derived-Class Exceptions, Exception handling options **STL**: An overview, The container classes, vectors, lists.	**8**

Course Outcomes	Description	RBT Levels
CO1	Identify the classes, objects, members of a class and the relationships among them to solve a specific problem.	**L2**
CO2	Illustrate the concept of constructors and destructors and describe the mechanism of overloading the operators.	**L2**
CO3	Examine the concept of data encapsulation, inheritance and polymorphism as used in C++ programming language.	**L3**
CO4	Discover the commonly used operations involving the file operations and manipulators.	**L3**
CO5	Interpret the concepts of exception handling and the built-in standard template library.	**L3**

CO-PO Mapping	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	2	3	2	2	1							
CO3	2	2	3	2	2			2				
CO4	2	2	3	2	1			1				
CO5	2	3	3	2	1							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Herbert Schildt, "*The Complete Reference C++, 5th Edition*", Tata McGraw Hill, 2013. **ISBN - 978-0071634809**

REFERENCE BOOKS:

1. Stanley B.Lippmann, JoseeLajore, "*C++ Primer, 5th Edition*", Addison Wesley, 2013. **ISBN - 978-0321714114**
2. E Balagurusamy, "*Object Oriented Programming with C++*", 6th Edition, Tata McGraw Hill, 2013. **ISBN - 9781259029936**

SELF STUDY REFERENCES/WEBLINKS:

1. https://en.wikibooks.org/wiki/C%2B%2B_Programming/Weblinks

2. https://github.com/EbookFoundation/free-programming-books/blob/master/free-programming-books.md

COURSE COORDINATOR:	**Praveena M V**

	Course Title: WEB TECHNOLOGIES		
	Course Code: 18CS551	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To familiarize with terminologies, tools, protocols used in web. 2. Identify a valid conformed XHTML document involving a variety of Elements. 3. Apply JavaScript to design interactive web pages. 4. Design well-formed XML documents.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals**: Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. **Introduction to XHTML:** Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links**.**	**8 Hours**
2	**XHTML (continued):** Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.	**8 Hours**
3	**The Basics of JavaScript:** Overview of JavaScript, Object orientation and JavaScript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples.	**8 Hours**
4	**JavaScript and XHTML**: The JavaScript execution environment, The Document Object Model, Element access in JavaScript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification. **Dynamic Document with JavaScript**: Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements.	**10 Hours**
5	***Self-Study*: Introduction to XML**: Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Understand terminologies, tools and protocols used in web.	L2
CO2	Design, understand and analyze static web pages.	L4
CO3	Design, understand and analyze interactive, Dynamic web pages.	L4
CO4	Design, understand and analyze data Representation , management and display.	L4

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**3**	**3**	**2**								
CO2			**3**									
CO3			**3**									
CO4			**3**	**3**	**1**							

Strong -3 **Medium -2** **Weak -1**

TEXT BOOKS:

1. Programming the World Wide Web – Robert W. Sebesta, 4thEdition, 2011, Pearson Education.

REFERENCE BOOKS:

1. Web Programming Building Internet Applications – Chris Bates, 3rd Edition, 2006, Wiley India,ISBN : 978-81-265-1290-4

2.Internet & World Wide Web How to H program – M. Deitel, P.J. Deitel, A. B. Goldberg, 3rd Edition, 2004, Pearson Education / PHI, ISBN-10: 0-130-89550-4

SELF STUDY REFERENCES/WEBLINKS:

http://www.w3schools.com

COURSE COORDINATOR:	**Harish Kumar H C** **Veena .A**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Computer networks and internet protocols		
	Course Code: **18CS54**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand the fundamental and advanced concepts of communication networks OSI,TCP/IP model , and simulation of computer networks in depth 2. To understand and analyze the data link layer protocols 3. To understand and analyze packet switching networks and congestion control. 4. To understand and analyze the IP protocols. 5. To create the awareness of internet routing protocols, transport layer protocols, and application layer protocols.

Unit No	Syllabus Content	No of Hours
1	**Introduction to networking:** Data Communications, Networks, Layered Tasks, The OSI model, Layers in OSI model, TCP/IP Protocol suite, simulation of computer networks	9
2	**(self study)** **Medium access:** Framing, Stop and wait ARQ, Go-back-N ARQ, Random access, Channelization,connecting devices(hubs, repeaters, bridges, switches)	9
3	**Packet-Switching Networks:** Datagram Networks, Virtual Circuit Networks, Shortest-path routing, congestion and congestion control(open loop, closed loop), techniques to improve QoS (scheduling, traffic shaping, token bucket, leaky bucket)	8
4	**IP protocols**: IPV4–addressing, header format, subnet addressing, fragmentation and reassembly; IPV6-addressing, header format.	8
5	**TCP,UDP and Internet Protocols** : User datagram protocol; Transmission control protocol; TCP congestion control; Internet routing protocols (RIP,OSPF) **Application layer :** DNS, Telnet, Electronic mail ,World wide web	8

Course Outcomes	Description	RBT Levels
CO1	Understand the concepts of communication networks, OSI, and TCP/IP model and Identify the different types of network topologies and protocol models	**L2**

CO2	Differentiate between different access control methods to the shared transmission media	**L3**
CO3	Examine routing and congestion control protocols and analyze the concepts of packet switching networks	**L4**
CO4	Investigate the functionalities and services provided by layer 3 and above and analyze application layer protocols, internet routing protocols, transport layer protocols and different protocols used to implement internetworking	**L4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**2**	**1**								
CO2	**3**	**3**	**2**	**1**								**1**
CO3	**3**	**3**	**2**	**1**								**1**
CO4	**3**	**3**	**2**	**1**								**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, *ISBN*-13, 9780073250328,2014.- units,1,2,3

2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014. Shortest-path routing, units 4, 5

REFERENCE BOOKS:

1. William Stallings: Data and Computer Communication, 10th Edition, Pearson Education, ISBN-13: 978-0133506488, 2013.

2. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 5th Edition, The Morgan Kaufmann Series, ISBN-9780123850591, 2011.

3. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th edition, Pearson, ISBN 13: 9780132126953, 2011.

4. Nader F. Mir: Computer and Communication Networks, 2nd Edition, ISBN-13: 978-0133814743, 2014.

SELF STUDY REFERENCES/WEBLINKS:

1. Behrouz A. Forouzan,: Data Communication and Networking, 5th Edition Tata McGraw-Hill, *ISBN*-13, 9780073250328,2014.

2. Alberto Leon-Garcia and Indra Widjaja: Communication Networks - Fundamental concepts and Key architectures, 2nd Edition, Tata McGraw-Hill, ISBN-13:978-0-07-0595019, 2014.

COURSE COORDINATOR:	**Dr. Mary Cherian**

	Course Title: Network programming lab using JAVA and NS		
	CourseCode: **18CSL57**	**No. of Credits: 0 : 0 :1** **(L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE+ SEE = 50+50=100**	

Course Objectives:	**Description**
	1. To understand and apply the basics of Java Programming. 2. To demonstrate some concepts of Networking using Java Programming. 3. To introduce network topologies using NS2 and check the performance of TCP and UDP protocols 4. To understand the creation of an Ethernet LAN by changing error rate and data rate to verify the throughput. 4. To understand and design wireless and wired network using NS2.

Unit No	**Syllabus Content**
	PART-A
1.	Write a Java program using synchronized threads to demonstrate producer-consumer concepts.
2.	Write a Java Swing program that consists of three tabs named Select Semester, Select Course and Select Electives. The “Select Semester” tab must contain four Buttons. The “Select Course” should contain a list of check boxes named with the courses such as Java, Compiler Design, and Machine Learning. “The Select Electives” tab should contain a drop down list of elective names of subjects. Hint: Swing application which uses, **i)** JTabbed Pane **ii)** Each tab should Jpanel which include any one component given below in each JPanel **iii)**CheckBox/List/RadioButton
3.	Design and implement a simple Client Server Application using RMI.
4.	Design and implement Client Server communication using TCP socket programming. (Client requests a file, Server responds to client with contents of that file which is then displayed on the screen by Client).
5.	Implement a JAVA Servlet Program to create a dynamic HTML web page. (user name and password should be accepted using HTML and displayed using a Servlet).
6.	Using Java JDBC and MySQL, develop a program to accept book information such as accession number, title, authors, edition and publisher from JSP web page from the stored table in the database. Perform the following: 1.Search for a book with the title specified by the user 2.Display the search results with proper headings.

PART-B	
1	Simulate a three nodes point-to-point network with duplex links between them. Set the queue size, vary the bandwidth and find the number of packets dropped.
2	Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
3	Simulate a four node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP. 3 Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput.
4	To create scenario and study the performance of Stop and Wait ARQ Protocol through simulation.
5	Simulate simple ESS and with transmitting nodes in wire-less LAN by simulation and determine the performance with respect to transmission of packets.

Course Outcomes	Description	RBT Levels
CO1	Design solutions using programming constructs in Java to create User interface.	**L4**
CO2	To Demonstrate the usage of Java networking concepts and creation of dynamic web pages.	**L5**
CO3	Apply and compare the performance of transport layer protocols.	**L4**
CO4	Analyze the working of LAN by inducing error model.	**L4**
CO5	Evaluate the parameters to be configured for wired and wireless communication.	**L5**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	1	2							
CO2	3	3	3	1	2							
CO3	3	3	3	1	1							
CO4	3	3	3	1	2							
CO5	3	3	3	1	2							

Strong -3 Medium -2 Weak -1

Instructions to Students:

Part-A: The programs formulated should be executed using Java Programming Language using eclipse IDE.

Part-B: The programs formulated should be executed using NS2 Simulation Software.

COURSE COORDINATOR:	1.Dr.Mary Cherian 2.Dr.Smitha Shekar B 3.Prof Madhu B 4.Prof.Pushpaveni H P 5.Prof.Veena A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Software Engineering		
	Course Code: 18CS51	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To provide the idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases. 2. To provide an idea of using various process models in the software industry according to given circumstances. 3. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

Unit No	**Syllabus Content**	**No of Hours**
1	**SOFTWARE AND SOFTWARE ENGINEERING:** The Nature of Software, Software Engineering, The Software Process, Software Engineering Practice. **THE SOFTWARE PROCESS and PROCESS MODELS:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, Final Word on Evolutionary Processes, Specialized Process Models: Component-Based Development, The Formal Methods Model, The Unified Process, Phases of the Unified Process, Personal and Team Process Models. **AGILE DEVELOPMENT:** What Is Agility? Agility and the Cost of Change, What Is an Agile Process? , Extreme Programming, Other Agile Process Models: Scrum, Dynamic Systems Development Method, Agile Modeling, Agile Unified Process.	**10**
2	**UNDERSTANDING REQUIREMENTS:** Definition of Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements and Validating Requirements. **REQUIREMENTS MODELING: SCENARIO-BASED METHODS:** Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case.	**8**
3	**DESIGN CONCEPTS:** Design within the Context of Software Engineering, The Design Process, Design Concepts, The Design Model. **ARCHITECTURAL DESIGN:** Software Architecture, Definition of software architecture, Architectural Genres, Architectural Styles, Architectural Design. **COMPONENT-LEVEL DESIGN:** What Is a Component? Designing Class-Based Components, Conducting Component-Level Design, Designing Traditional Components and Component-Based Development.	**8**

4	**SOFTWARE TESTING STRATEGIES:** A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging. **TESTING CONVENTIONAL APPLICATIONS:** Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, Basis Path Testing, Control Structure Testing, Black-Box Testing.	**8**
5	**SELF-STUDY –** **PROJECT MANAGEMENT CONCEPTS:** The management spectrum, People, Product, Process, Project, W^5HH principle. **PROCESS AND PROJECT METRICS:** Metrics in the process and project domains, Software measurement, metrics for Software quality, Integrating metrics within the software process, Metrics for small organizations, Establishing a software metrics program. **ESTIMATION FOR SOFTWARE PROJECTS:** Observations on estimation, The project planning process, Software scope and feasibility, Resources, Software project estimation, Decomposition techniques, Empirical estimation models.	**8**

Course Outcomes	**Description**	**RBT Levels**
CO1	Decompose the given project in various phases of a lifecycle.	Knowledge, Understand (Level1, Level2)
CO2	Choose appropriate process model depending on the user requirements.	Apply, Create (Level 2)
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	Evaluate(Level 3)
CO4	Analyze various processes used in all the phases of the product.	Analyze(Level 3)
CO5	Apply the knowledge, techniques, and skills in the development of a software product.	Apply (Level 3)

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**2**									
CO2	**3**	**2**	**1**									
CO3	**2**	**2**	**1**		**3**			**1**				
CO4	**2**	**2**		**2**		**1**		**1**			**2**	**2**
CO5	**1**	**2**										**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Software Engineering - A Practitioner's approach, Roger S. Pressman and Bruce R. Maxim, 8th Edition, Tata McGraw-Hill, 2019.

REFERENCE BOOKS:

1. Software Engineering, 10th Edition, Ian Sommerville, Pearson Education Ltd., 2017.

2. Software Engineering - A Precise Approach, Pankaj Jalote, Wiley, 2010.

SELF STUDY REFERENCES/WEBLINKS:

1. http://www.site.uottawa.ca/school/research/lloseng/weblinks.html

2. https://www.ece.rutgers.edu/~marsic/books/SE/links/

COURSE COORDINATOR:	**Praveena M V**

Professor & Head
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	Course Title: DATABASE APPLICATIONS LABORATORY		
	Course Code: 18CSL56	**No. of Credits: 0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE + SEE = 50+50=100**	

Course Objectives:	Description
	1. Provide a strong formal foundation in database concepts and technology and techniques relating to query processing by SQL. 2. Design and implement a real time database application for a given problem-domain. 3. Demonstrate the use of relational data model and systematic database design approaches covering conceptual design, logical design through the mini project. 4. Introduce MongoDB, CRUD Operations & its usage in Enterprise Applications.

COURSE CONTENTS:

Part A	1. Execution of given 3 exercises. 2. Introduction to MongoDB and CRUD Operations. 3. MongoDB Usage in Enterprise Applications.
Part B	Implementation of mini project.

PART – A

INSTRUCTIONS:

1. The exercises are to be solved in an RDBMS environment like Oracle or DB2.
2. Suitable tuples have to be entered so that queries are executed correctly.
3. Relevant queries other than the ones listed along with the exercises may also be asked in the examinations.
4. Questions must be asked based on lots.

1	**Consider the schema for Movie Database:** ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars) Write SQL queries to 1. List the titles of all movies directed by ‘Hitchcock’. 2. Find the movie names where one or more actors acted in two or more movies. 3. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). 4. Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. 5. Update rating of all movies directed by ‘Steven Spielberg’ to 5.
2	**Consider the following schema for Order Database:** SALESMAN(Salesman_id, Name, City, Commission) CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id) Write SQL queries to

	1. Count the customers with grades above Bangalore's average. 2. Find the name and numbers of all salesmen who had more than one customer. 3. List all the salesmen and indicate those who have and don't have customers in their cities (Use UNION operation.) 4. Create a view that finds the salesman who has the customer with the highest order of a day. 5. Demonstrate the DELETE operation by removing salesman with id 12345. All his orders must also be deleted.
3	**Consider the schema for College Database:** STUDENT(USN, SName, Address, Phone, Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN, SSID) SUBJECT(Subcode, Title, Sem, Credits) CIEMARKS(USN, Subcode, SSID, CIE1, CIE2, CIE3, FinalCIE) Write SQL queries to 1. List all the student details studying in fourth semester 'C' section. 2. Compute the total number of male and female students in each semester and in each section. 3. Create a view of Test1 marks of student USN '1DA15CS101' in all subjects. 4. Calculate the FinalCIE (average of best two test marks) and update the corresponding table for all students. 5. Categorize students based on the following criterion: If FinalCIE = 17 to 20 then CAT = 'Outstanding' If FinalCIE = 12 to 16 then CAT = 'Average' If FinalCIE< 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.

PART – B

A mini project should be implemented by the students in teams. The maximum size of a team can be 3 from the same batch. The students have to finalize a project topic by discussing with the faculty. The mini project must be carried out in the college only.

Design a Database application for a particular case study using Visual Basic/Java Script in visual studio /Eclipse Tool.
The tasks when implementing mini project would be:

1. Understand the complete domain knowledge of the application and derive the complete data requirement specification for the mini project.
2. Design the ER diagram for the application.
3. Design Relational Schema diagram for the application.
4. Normalization of the relational design.
5. Implement minimum 5 queries for the application.
6. Documentation & submission of report.

General guidelines:

- Database for the project - Oracle / MySQL/ DB2 / SQL Server / MongoDB etc.

Sample Mini Projects.

Inventory Control System.	Placement management system
Material Requirement Processing.	Library management system
Hospital Management System.	Web Based User Identification System.

Railway Reservation System.	Timetable Management System
Hotel Management System	Personal Information System

Note: In the examination, the marks will be evaluated based on database execution from Part A and project demonstration, project report and viva-voce from Part B.

Course Outcomes	Description	RBT Levels
CO1	Understand, analyze, and effectively explain the underlying concepts of database technologies.	**L4**
CO2	Use SQL to create, secure, populate, maintain and query a database.	**L4**
CO3	Design and implement real time applications according to design principles that balance data retrieval performance with data consistency.	**L5**
CO4	Identify the Core MongoDB Operations.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**										
CO2	**3**	**3**	**3**									
CO3	**3**	**3**	**3**	**3**	**3**				**3**			
CO4	**3**				**2**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Fundamental of Database Systems by Elmasri and Navathe, 7th Edition, Addison-Wesley, 2015 **ISBN-10:** 0133970779, **ISBN-13:** 978-0133970777

REFERENCE BOOKS:

1. Database Management Systems by Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2006.
2. An Introduction to Database Systems by C.J. Date, A. Kannan, S. Swamynathan, 8th Edition, Pearson Education, 2013.
3. Data Base system Concepts by Silberschatz, Korth and Sudharshan, 5th edition McGraw Hill, 2011.

SELF STUDY REFERENCES/WEBLINKS:

1. https://www.mongodb.com/
2. https://docs.mongodb.com/manual/crud/

COURSE COORDINATOR:	Asha Veena Potdar

	Course Title: Digital Image Processing		
	Course Code: 18CS642	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand the image fundamentals. 2. To understand the mathematical transforms necessary for image processing and to study the image enhancement techniques. 3. To understand the image degradation/restoration model and different noise models. 4. To understand the uses of pseudo colors and to study the image compression models. **5.** To understand Morphological Image Processing and the image segmentation.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Basic concepts, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System. **Digital Image Fundamentals:** Elements of visual perception, Image sensing and acquisition, Image sampling and quantization, Some basic relationships between pixels.	**9**
2	**Image Enhancement in Spatial domain:** Some Basic Intensity Transformation functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing and Sharpening Spatial Filtering. **Self Study:** **Image Enhancement In Frequency Domain:** Introduction to Fourier Transform, Smoothing and Sharpening frequency domain filters	**9**
3	**Image Restoration:** Model of image degradation/restoration process, noise models, Restoration in the Presence of Noise, Only– Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position– Invariant Degradations, inverse filtering.	**8**
4	**Color Image Processing**: Color fundamentals, color models, pseudo color Image processing, basics of full color image processing, color transformations. **Image Compression:** Fundamentals, Image compression models, Elements of Information Theory	**8**
5	**Image Segmentation** Detection of discontinuities, Edge linking and boundary detection, Thresholding, Region Based Segmentation. **Morphological image processing:** Dilation and Erosion, Opening and Closing, Some Basic Morphological Algorithms	**8**

Course Outcomes	**Description**	**RBT Levels**

CO1	**Acquire** fundamental concepts and applications of digital image processing.	**L1, L3**
CO2	**Interpret and Apply** the two categories of image enhancement techniques.	**L2, L3**
CO3	**Explain** image restoration by applying filters and analyze the use of color images.	**L1, L2**
CO4	**Apply** suitable morphological operations for the given image and understand different techniques of Image compression.	**L3**
CO5	**Develop** algorithms for segmenting the given image and explain different methods of object recognition.	**L4,L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2			2				1			1
CO2	2	2	2	2	2				1			1
CO3	2	2	2	2	2				1			1
CO4	2	2	2	2	2				1			1
CO5	2	2	2	2	2				1			1

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, Digital Image Processing, Third Edition, Prentice Hall, 2007

REFERENCE BOOKS:

1. Fundamentals of Digital Image Processing – Anil K Jain, Pearson Education/Prentice- Hall of India Pvt. Ltd., 1997.
2. S Jayaraman, S Esakkirajan, T Veerakumar; "Digital Image Processing"; Tata McGraw Hill; 2009;
3. Chris Solomon and Tony Breckon, Fundamentals of Digital Image Processing- A Practical Approach with examples in MATLAB, John Wiley & Sons Ltd., 2011

SELF STUDY REFERENCES/WEBLINKS:

1. Dr. G. Harit - Digital Image Processing (NPTEL course) – https://nptel.ac.in/courses/106105032/

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	Course Title: DISTRIBUTED OPERATING SYSTEM		
	Course Code: 18CS641	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Identify the issues involved in designing distributed systems. 2. Describe various communication mechanism involved distributed systems. 3. Analyze process migration approach and distributed deadlock management 4. Describe features distributed shared memory and file system 5. List and describe load balancing mechanisms in distributed systems.

Unit No	**Syllabus Content**	**No of Hours**
1	**Fundamentals:** What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment (DCE). **Message Passing:** Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group Communication	**9 Hours**
2	**Remote Procedure Calls:** Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance	**9 Hours**
3	**Distributed Shared Memory:** Introduction, General Architecture of DSM Systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. **Synchronization:** Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms.	**8 Hours**
4	**Resource Management:** Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach. **Process Management:** Introduction, Process Migration, Threads.	**8 Hours**
5	***Self-study*: Distributed File Systems:** Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File–Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.	**8 Hours**

Course Outcomes	Description	RBT Levels
CO1	Identify the issues involved in designing distributed systems, and their internal communication mechanism.	L2
CO2	Demonstrate message passing mechanism of distributed methods	L3
CO3	Compare various process migration approaches and distributed deadlock management approaches.	L3
CO4	Apply features distributed shared memory and file system.	L3
CO5	Examine the various resource management techniques for distributed systems.	L1

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO 7	PO8	PO9	PO10	PO11	PO12
CO1			**3**							**1**		
CO2			**3**									
CO3		**2**	**3**									
CO4		**2**	**3**		**1**							
CO5					**3**			**1**			**2**	

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Pradeep. K. Sinha: Distributed Operating Systems: Concepts and Design, PHI, 2007.

REFERENCE BOOKS:

1. Andrew S. Tanenbaum: Distributed Operating Systems, Pearson Education, 2013.
2. George Coulouris, Jean Dollimore, Tim Kindberg, Gordon Blair: Distributed System Concepts and Design. Pearson Education, 5th Edition, Pearson Education, 2012.

SELF STUDY REFERENCES/WEBLINKS:

COURSE COORDINATOR:	**Harish Kumar H C**

Sub Title : UNIX PROGRAMMING		
Sub Code:18CS63	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of ContactHours :42**

Course objectives:
1. To familiarize with Unix standards and basic commands

2. To understand standard UNIX utilities to implement shell programs.

3. To illustrate the manipulation of system resources such as files, processes and signals.

4. To Explain IPC using different methodologies.

UNIT No	Syllabus Content	No of Hours
1	**Introduction To UNIX:** The UNIX Architecture, features of UNIX, command structure, Command arguments and options, Introduction to vi editor. Basic Unix commands such as echo, printf, ln, who, date, passwd, cal, Combining commands. The root login. Becoming the super user: su command. **Unix Files:** Basic file types, Organization of files. Parent child relationship. The home directory and the HOME variable. Relative and absolute pathnames. **Directory commands** – pwd, cd, mkdir, rmdir commands. The dot (.) and double dots (..) notations to represent present and parent directories and their usage in relative path names. **File handling commands:** cat, cp, rm, mv, cmp. **File Attributes and Permissions:** The ls command with options. Changing file permissions: the relative and absolute permissions changing methods. Directory permissions. Networking and other detailed command sets to be covered are ping, telnet, ftp, ps, du,df, mount, unmount, find and tar.	8
2	**Working with the Shell**: Shell, The shells interpretive cycle, types of shell, Wild cards, pipes and i/o redirection, simple Filters: head, tail, cut, and sort. Filters using Regular Expression: The grep and egrep Typical examples involving different regular expressions **Shell programming**: shell syntax, Ordinary and environment variables, read command, Command line arguments, Logical operators for conditional execution, The if, while and for statements. Handling positional parameters, here (<<) document, Simple shell program examples.	8
3	**UNIX File APIs:** General File APIs, File and Record Locking, Directory	8

	File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. **Signals:** Signals, The UNIX Kernel Support for Signals, signal sets, Signal Mask, sigaction, The SIGCHLD Signal, Kill, and Alarm function.	
4	<u>**Self-Study Component**</u> **UNIX Processes and Process Control:** **The Environment of a UNIX Process:** Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. **Process Control:** Introduction, Process Identifiers, fork, vfork, exit, Zombie process, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, system Function.	9
5	**Interprocess Communication:** Overview of IPC Methods, Pipes, popen, pclose functions, FIFOs, Message Queues. **Introduction To Sockets:** Socket, socket connections - socket attributes, socket addresses, socket, connect, bind, listen, accept, socket communications.	9

<u>Note 1</u>: All 5 Units will have internal choice.
<u>Note 2</u>: Three assignments are evaluated for 5 marks. Assignment-1 from units 1and 2. Assignment-2 from units 3 and 4. Assignment-3 from unit 5.

Course Outcomes:

1. Apply UNIX commands to create Shell Scripts.

2. Analyze and apply the knowledge of different UNIX system calls to manipulate system resources like files and processes to create new applications.

3. Create Networking, Client-Server or Distributed Applications using any IPC techniques.

TEXT BOOK:

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999. (Chapters 7, 8.1, 9)

2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 2nd Edition, Pearson Education, 2005.(Chapters 7, 8, 14)

3. Sumitabha Das: UNIX Concepts and Applications, 4th Edition McGraw Hill Education (India)

Private Limited

REFERENCE BOOKS/WEBLINKS:

1. Marc J. Rochkind: Advanced UNIX Programming, 2nd Edition, Pearson Education, 2005.

2. UreshVahalia: UNIX Internals: The New Frontiers, Pearson Education, 2001.

3. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, (2002) UNIX Network Programming - The Sockets Networking API, 3rd edition, Volume 1, PHI Learning Private Limited India, New Delhi.
4. Yashavant Kanetkar- UNIX Shell Programming

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	Course Title: Machine Learning		
	Course Code:18CS62	**No. of Credits: 4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. Understand some basic machine learning algorithms and techniques and their applications. **2.** Able to analyze the underlying mathematical relationships among Machine Learning algorithms. **3.** Able to identify, formulate and solve machine learning problems that arise in practical applications.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias. Text Book1, Sections: 1.1 – 1.3, 2.1-2.5, 2.7	**10 hours**
2	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. Text Book1, Sections: 3.1-3.7	**10 hours**
3	**Artificial Neural Networks:** Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, important terminologies of ANN, McCulloch-Pitts Neuron, Linear Separabality, Hebb Network, Perceptron Networks, Adaptive Linear Neuron, Back propagation Network, Radial Basis function network. Text book 2, Sections: 2.1 – 2.7,3.1-3.3,3.5,3.6	**12 hours**
4	**Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS	**10 hours**

	error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks, EM algorithm Text book 1, Sections: 6.1 – 6.6, 6.9, 6.11, 6.12	
5	**Self Study** **Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. **Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, Text book 1, Sections: 5.1-5.6, 8.1-8.5	**10 hours**

Course Outcomes	**Description**	**RBT Levels**
At the End of the Course, the students should be able to		
CO1	Acquire knowledge about basic concepts of Machine Learning.	**L2**
CO2	Identify and apply machine learning techniques suitable for a given problem	**L3**
CO3	Design and implement machine learning solutions to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**			**2**							
CO2	**3**	**3**	**2**		**2**							
CO3	**3**	**3**	**3**	**3**	**3**							
CO4	**3**	**3**		**3**	**3**							

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2. S N Sivanandam, S N Deepa, Principles of Soft Computing,3rd Edition, Wiley Publication,2019.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.
3. Samir Madhavan ,Mastering python for data science, 2015, Packt Publishing, ISBN: 9781784390150
4. Sebastian Raschka, Vahid Mirjalili,Python Machine Learning - Second Edition: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow Kindle Edition.

WEBLINKS:

1. https://towardsdatascience.com/real-world-implementation-of-logistic-regression-5136cefb8125
2. https://towardsdatascience.com/linear-regression-python-implementation-ae0d95348ac4
3. https://towardsdatascience.com/decision-tree-in-machine-learning-e380942a4c96
4. https://towardsdatascience.com/basics-of-bayesian-network-79435e11ae7b
5. https://towardsdatascience.com/introduction-to-artificial-neural-networks-ann-1aea15775ef9

COURSE COORDINATOR:	**Dr. K R Shylaja** **Mrs. Asha K N**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Sub Title : INTERNET OF THINGS (IOT) LAB		
Sub Code:18CSL65	**No. of Credits:1=0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:
The objectives of this course are:

1. Provide Comprehend knowledge about the core concepts of IoT and operating systems used to build IoT applications
2. Develop hands-on IoT programming knowledge for real-world applications.
3. Implement the network and communication protocols that helps in wireless communication
4. Understand the data transfer between IoT device and cloud Platform.

List of Programs

1.	Write a program that Uses different components like Led, switch, ADC, PWM & serial communication on TM4C123 Launchpad using Energia software
2.	Write a program to connect the Launchpad with Wi-Fi network & print the dynamic IP and static IP Addresses on the Serial Monitor
3.	Write a program to connect the Launchpad with Wi-Fi & print the local IP, Subnet Mask, Gateway IP on the Serial Monitor
4.	Illustrate TCP based Client Server Communication Model.
5.	Illustrate UDP based Client Server Communication Model
6.	Write a program for HTTP based webserver to manipulate the GPIO's of WiFi Module and monitor the Sensor data connected with WiFi Module.
7.	Write a program that Uses Blynk API's and to control the Launchpad with Blynk Application
8.	Devise a program to control the Launchpad with IFTTT Application
9.	Design a Simple MQTT Based communication model to retrieve the sensor data from a cloud Storage

Course Outcomes:
At the end of this lab session, the student will

CO1: Examine the features and process of integration of Launchpad with IoT applications.
CO2: Discover the role of TCP/UDP protocols in serving as communication models for IoT.
CO3: Interpret the Sensor data collected by interfacing the sensors to the Wi-Fi module on an embedded platform.
CO4: Determine the IoT devices to work with Cloud Computing infrastructure and enable the transfer of data between IoT devices and the cloud providers

Reference:

1. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh and Priyanka Tyagi, “Getting Started for Internet of Things with Launch Pad and ESP8266”, River publisher
2. “http://www.ti.com/tool/MSP-EXP430G2”
3. “https://www.udemy.com/course/internet-of-things-iot-for-beginners-getting-started/”

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO2	**2**	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO3	**2**	**2**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
CO4	**3**	**2**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

Strong -3 Medium -2 Weak -1

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Dr. Ambedkar Institute of Technology — Aided By Govt. of Karnataka	**Course Title: Machine Learning Laboratory**		
	Course Code: 18CSL66	**No. of Credits: 0: 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
	Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

	Description
Course Objectives:	This course will enable students to 1. Implement the machine learning algorithms using the Data Set. 2. Learn to use Various python tools for Machine Learning 3. Analyze and interpret the outcomes of the machine learning algorithms.

Lab Experiments:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

NOTE:
1. The programs should be implemented in Python.
2. For Problems 1 to 6 and 10, programs are to be developed without using the built-in APIs of Python.
3.Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or (https://www.kaggle.com/datasets) or constructed by the students.

Conduction of Practical Examination:

1. All laboratory experiments are to be included for practical examination.
2. Students are allowed to pick one experiment from the lot.
3. Marks distribution: Procedure + Conduction + Viva:**10 + 30 +10 (50)**
4. **Change of experiment is allowed only once and marks allotted to the procedure part tobe made zero.**

Course Outcomes	Description	RBT Levels
The students should be able to:		
CO1	Understand and interpret the implementation procedures and python Libraries for the machine learning algorithms.	**L2**
CO2	Analyse the correctness of the data sets to apply appropriate Machine Learning algorithms.	**L3**
CO3	Design and implement Machine Learning algorithms to solve real world problems.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2		3							
CO2	3	3	3	3	3							
CO3	3	3	3	3	3	2						2
CO4	3	3		3	3							

Strong -3 Medium -2 Weak -1

COURSE COORDINATORS:	**Dr. Shylaja K R** **Mrs. Asha K N**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Wireless Sensor Networks		
	Course Code: 18CSE021	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours :42**

Course Objectives:	**Description**
	The student should be made to 1. Learn Sensor Network fundamentals. 2. Understand the different routing protocols. 3. Have an in-depth knowledge on sensor network architecture and design issues. 4. Understand the transport layer and security issues possible in Sensor networks.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction and Overview of Wireless Sensor Networks**: Introduction- Background of Sensor Network Technology, Applications of Sensor Networks, Basic Overview of the Technology- Basic Sensor Network Architectural Elements, Brief Historical Survey of Sensor Networks, Challenges and Hurdles **Applications of Wireless Sensor Networks**: Introduction, Background, Range of Applications, Examples of Category 2 WSN Applications- Home Control, Building Automation, Industrial Automation, Medical Applications, Examples of Category 1 WSN Applications- Sensor and Robots, Reconfigurable Sensor Networks, Highway Monitoring, Military Applications, Civil and Environmental Engineering Applications, Wildfire Instrumentation, Habitat Monitoring, Nanoscopic Sensor Applications, Another Taxonomy of WSN Technology	**09**
2	**Basic Wireless Sensor Technology**: Introduction, Sensor Node Technology- Overview, Hardware and Software, Sensor Taxonomy, WN Operating Environment, WN Trends Wireless Transmission Technology and Systems: Introduction, Radio Technology Primer- Propagation and Propagation Impairments, Modulation, Available Wireless Technologies- Campus Applications, MAN/WAN Applications	**09**
3	**Medium Access Control Protocols for Wireless Sensor Networks**: Introduction, Background, Fundamentals of MAC Protocols- Performance Requirements, Common Protocols, MAC Protocols for WSNs- Schedule-Based Protocols, Random Access-Based Protocols, Sensor-MAC Case Study- Protocol Overview, Periodic Listen and Sleep Operations, Schedule	**09**

	Selection and Coordination, Schedule Synchronization, Adaptive Listening, Access Control and Data Exchange, Message Passing.	
4	**Routing Protocols for Wireless Sensor Networks**: Introduction, Background, Data Dissemination and Gathering, Routing Challenges and Design Issues in Wireless Sensor Networks- Network Scale and Time-Varying Characteristics, Resource Constraints, Sensor Applications Data Models, Routing Strategies in Wireless Sensor Networks- WSN Routing Techniques, Flooding and Its Variants, Sensor Protocols for Information via Negotiation, Low-Energy Adaptive Clustering Hierarchy, Power-Efficient Gathering in Sensor Information Systems, Directed Diffusion, Geographical Routing .	**08**
5	**Self study :** **Transport control protocols for wireless sensor networks**: traditional transport control protocols, transport protocol design issues, examples of existing transport control protocols. **Operating Systems for Wireless Sensor Networks**: Introduction, Operating System Design Issues, Examples of Operating Systems- TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS, SenOS, EMERALDS, PicOS.	**07**

Course Outcomes	Description	RBT Levels
CO1	**Describe the Wireless Sensor Network architecture and applications**	**L1**
CO2	**Identify the suitable routing and transport layer algorithm based on the network and user requirement**	**L2**
CO3	**Apply the knowledge to select appropriate physical and MAC layer protocols**	**L3**
CO4	**Summarize the operating system used in Wireless Sensor Networks**	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2								
CO2	2	3	3	2								

CO3	**2**	**3**	**3**	**2**								
CO4	**2**	**3**	**2**	**2**								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. KazemSohraby, Daniel Minoli and TaiebZnati, “ Wireless Sensor Networks Technology, Protocols, and Applications“, John Wiley & Sons, 2007.

REFERENCE BOOKS:

1. Holger Karl and Andreas Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons, Ltd, 2005.
1.K. Akkaya and M. Younis, “A survey of routing protocols in wireless sensor networks”, Elsevier Ad Hoc Network Journal, Vol. 3, no. 3, pp. 325--349
2.Philip Levis, “ TinyOS Programming”
3.Anna Ha´c, “Wireless Sensor Network Designs”, John Wiley & Sons Ltd,

SELF STUDY REFERENCES/WEBLINKS:

1. KazemSohraby, Daniel Minoli and TaiebZnati, “ Wireless Sensor Networks Technology, Protocols, and Applications“, John Wiley & Sons, 2007.

COURSE COORDINATOR:	**Prof. Srinivasa A H**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Internet of Things		
	Course Code: 18CS61	**No. of Credits: 4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Aided By Govt. of Karnataka	**Exam Duration : 3 hours**	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 52**

Course Objectives:	**Description**
	1. Understand the building blocks of IOT and its characteristics and its application Area. 2. Realize the difference between M2M and IOT 3. Explore the architecture, components and working of IOT with the help of Microcontroller. 4. Comprehend the evolution of IOT in Mobile Devices, Cloud & Sensor Networks. 5. Elaborate the need for Data Analytics mechanism & tools in IoT.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction & Concepts:** Introduction to Internet of Things, Definitions and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT levels and Development Templates.	11
2	**IoT and M2M Communication** Introduction, M2M, Difference between IoT and M2M, SDN & NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF- YANG. **IoT Platform Design Methodology:** Introduction, IoT Design Methodology, Case Study: Weather Monitoring.	10
3	**Domain Specific IOTs** Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. **IoT Physical Devices and Endpoints** Basic Building blocks - The Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Controlling led.	10
4	**IoT Physical servers & Cloud Offerings** **Cloud:** introduction to cloud storage models and communication Networks, WAMP – AutoBahn for IoT, Xively cloud for IoT. **Python web application** frame work - django, Designing a RESTful web API, amazon web services for IoT, SkyNetIoT messaging platforms.	11
5	**Self Study:** **Data Analytics for IoT:** Introduction AppacheHadoop, using Hadoop MapReduce for Batch Data Analysis, Apache oozie, Apache Spark, Apache Storm, using Apache Storm for Real-time Data Analysis. **Ethics** - Characterizing the Internet of Things, Privacy, Control,	10

	Environment, Solutions	

Course Outcomes	**Description**	**RBT Levels**
CO1	**Apply** the knowledge of the internet and computer network on to IoT paradigm.	**L1, L3**
CO2	**Adequately** learn and **demonstrate** the IoT communication.	**L3**
CO3	**Apply** the knowledge of python in Raspberry PI programming.	**L2**
CO4	**Analyze** different configuration setups for connecting different types of sensors and upload the code on the board and communicate to the cloud.	**L4**
CO5	**Apply** the knowledge of data analytics and ethics behind a IoT development	**L4, L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**				**1**							**1**
CO2	**3**	**2**	**3**	**1**	**2**							**1**
CO3	**3**	**2**	**2**	**1**	**2**					**1**		**1**
CO4	**3**	**3**	**1**	**2**	**2**					**1**		**1**
CO5	**3**	**2**	**1**	**2**	**3**				**1**	**1**		**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", First Edition, VPT, 2014.

REFERENCE BOOKS:

1. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017
2. Ovidiu Vermesan, PeterFriess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems". River Publishers Series in Communication.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education

SELF STUDY REFERENCES/WEBLINKS:

1. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861

COURSE COORDINATOR:	

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Adhoc Wireless Networks		
	Course Code: **18CSE023**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	Course objectives: 1. To understand the fundamental concepts of Ad hoc Networks. 2. To understand the concepts of MAC layer protocols of Ad hoc Networks 3. To understand and analyze routing protocols of Ad hoc Networks. 4. To understand the Transport layer and security of Ad hoc Networks. 5. To create the awareness of QoS in Ad hoc Networks.

Unit No	Syllabus Content	No of Hours
1	**Ad hoc wireless Networks**: Introduction, Cellular and Ad Hoc Wireless Networks, Applications. Issues in Ad hoc wireless networks- Medium access, routing, multicasting, transport layer, pricing, Quality of service, self-organization, security, addressing, energy management, scalability, deployment. Ad hoc wireless internet.	9
2.	(self study) **MAC:** MAC Protocols for Ad hoc wireless Networks: Introduction, Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad-hoc wireless Networks, Classification of MAC protocols, Contention based protocols(MACAW,MACA-BI,MARCH)	8
3	**Routing- Routing protocols for Ad hoc wireless Networks**: Introduction, Issues in designing a routing protocol for Ad hoc wireless Networks, Classification of routing protocols, Table driven routing protocols (DSDV,WRP,CGSR), On-demand routing protocols (DSR,AODV,TORA).	9

4	**Transport Layer:** Transport layer protocols for Ad hoc wireless Networks: Introduction, Issues in designing a transport layer protocol for Ad hoc wireless Networks, Design goals of a transport layer protocol for Ad hoc wireless Networks, Classification of transport layer solutions, TCP over Ad hoc wireless Networks(TCP-F,TCP-BUS,ATCP,SPLIT-TCP). Security in ad hoc wireless networks: issues and challenges in security provisioning, network security attacks.	8
5	**QoS:** Quality of service in Ad hoc wireless Networks: Introduction, Issues and challenges in providing QoS in Ad hoc wireless Networks, Classification of QoS solutions, MAC layer solutions(cluster TDMA), network layer solutions(Ticket based, TDR, QoS enabled AODV,OQR).	8

Course Outcomes	Description	RBT Levels
CO1	Understand the characteristics, challenges and design goals of wireless ad hoc networks.	**L2**
CO2	Apply the knowledge of MAC and different routing protocols for switching of data between nodes.	**L3**
CO3	Analyze the concepts of transport protocols and security issues in Adhoc networks.	**L4**
CO4	Discuss different QOS protocols for wireless Ad-hoc networks	**L4**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**3**	**2**	**1**								
CO2	**3**	**3**	**2**	**1**								
CO3	**3**	**3**	**2**	**1**								
CO4	**3**	**3**	**2**	**1**								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. C. Siva Ram Murthy & B. S. Manoj, Ad hoc Wireless Networks Architectures and Protocols, ISBN: 978-81-317-0688-6,2014.

REFERENCE BOOKS:

1.Stefano Basagni , Marco Conti , Silvia Giordano , and Ivan Stojmenovic, Mobile ad hoc networking , ISBN: 978-0-471-65688-3,2010 .

2.C.K. Toh: Adhoc Mobile Wireless Networks- Protocols and Systems, Prentice-Hall PTR, ISBN:0130078174,2007.

3.Jonathan Loo , Jaime Lloret Mauri and Jesús Hamilton Ortiz, Mobile ad hoc networks: current status and future trends, Kindle edition, ISBN 9781439856505 - CAT# K12654, 2011.

SELF STUDY REFERENCES/WEBLINKS:

1. C. Siva Ram Murthy & B. S. Manoj, Ad hoc Wireless Networks Architectures and Protocols, ISBN: 978-81-317-0688-6, 2014.

COURSE COORDINATOR:	**Madhu B**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech
Bangalore-560 056.

	Course Title: Storage Area Network		
	Course Code: 18CSE022	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 42 Hours**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 3 hrs/Week**

Course Objectives:	**Description**
	Course Objectives: The objectives of this course are to: 1. To understand the fundamentals of storage centric and server centric systems 2. To understand the metrics used for Designing storage area networks 3. To understand the RAID concepts 4. To enable the students to understand how data centre's maintain the data with the concepts of backup mainly remote mirroring concepts for both simple and complex systems.

Unit No	Syllabus Content	No of Hours
1	Introduction: Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks; **Intelligent Disk Subsystems:** Architecture of Intelligent Disk Subsystems, Hard disks and Internal I/O Channels, JBOD, Storage virtualization using RAID, Different RAID levels, Cashing, Intelligent Disk Subsystem, Availability of Disk Subsystems.	**09**
2	**I/O Techniques:** The Physical I/O path from the CPU to the Storage System, SCSI, Fiber Channel Protocol Stack, Fiber Channel SAN, IP Storage.	**08**
3	**SELF STUDY** **Storage Virtualization:** Limitations of Non-virtualized Storage, Definition of Storage virtualization, Implementation Considerations, Storage virtualization on Block or file level, Storage virtualization on various levels of the storage Network, Symmetric and Asymmetric storage virtualization in the Network.	**09**
4	**Network Attached Storage:** The NAS Architecture, The NAS hardware architecture**,** The NAS Software Architecture, Network Connectivity, NAS as a Storage System. **Storage Area Network:** Architecture Overview; Hardware devices; Software components.	**08**
5	**Applications of Storage Networks:** Definitions of the term 'Storage Network', Storage Sharing, Availability of Data, Adaptability and Scalability of IT Systems. **Network Back-up:** General conditions for Back-up, Network Backup Services, Server Components, Back-up clients, Performance Gains as a result of Network Back-Up, Performance Bottlenecks of Network Back-up.	**08**

Course Outcomes	Description	RBT Levels
CO1	Identify key challenges in managing information and analyze different storage technologies and distinguish different channels.	**L2**
CO2	Interpret the storage virtualization and implementation considerations of virtualization.	**L2**
CO3	Explain components and the working of NAS and SAN	**L3**
CO4	Illustrate the applications and storage infrastructures.	**L2**

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	2	2								
CO2	2	3	2	2								
CO3	2	3	2	2								
CO4	2	3	2	2								

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

TEXT BOOKS:

1. Ulf Troppens, Rainer Erkens and Wolfgang Muller: Storage Networks Explained, Wiley India,2013. ISBN 978-81-265-1832-6
2. Robert Spalding: “Storage Networks The Complete Reference”, Tata McGraw-Hill, 2011. ISBN 978-0-07-053292-2

REFERENCE BOOKS:

1. Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2011. ISBN-10: 1-58705-162-1ISBN-13: 978-1-58705-162-3
2. Richard Barker and Paul Massiglia: “Storage Area Network Essentials “A Complete Guide to understanding and Implementing SANs”, Wiley India, 2012. ISBN: 978-0-471-03445-2
3. EMC Education Services, “Information Storage and Management”, Wiley India Publications, 2009. ISBN: 9781118094839

COURSE COORDINATOR:	**Suresha. D**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: PRINCIPLES OF ECONOMICS		
	Course Code: 18CS644	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Choose the concept of scarcity to explain economic trade-offs, opportunity costs, and rational behavior. 2. Interpret measures of elasticity and investigate the production and costs of the firm. 3. Demonstrate how markets function and what happens in the presence of market failures. 4. Analyze the different types of market structures such as monopoly and a competitive market. 5. Determine how economic growth, unemployment and inflation macroeconomics affects the economy of the nation in the short and long-run. 6. Discover the determinants of foreign trade flows and exchange rates, and their effects on the domestic economy.

Unit No	**Syllabus Content**	**No of Hours**
1	**Welcome to Economics,** What Is Economics, and Why Is It Important? Microeconomics and Macroeconomics, How Economists Use Theories and Models to Understand Economic Issues, How To Organize Economies: An Overview of Economic Systems, **Choice in a World of Scarcity**, How Individuals Make Choices Based on Their Budget Constraint , The Production Possibilities Frontier and Social Choices, Confronting Objections to the Economic Approach, **Demand and Supply**: Demand, Supply, and Equilibrium in Markets for Goods and Services, Shifts in Demand and Supply for Goods and Services, Changes in Equilibrium Price and Quantity: The Four-Step Process, Price Ceilings and Price Floors, Demand, Supply, and Efficiency, **Labor and Financial Markets,** Demand and Supply at Work in Labor Markets, Demand and Supply in Financial Markets, The Market System as an Efficient Mechanism for Information.	**09**
2	**Elasticity,** Price Elasticity of Demand and Price Elasticity of Supply, Polar Cases of Elasticity and Constant Elasticity, Elasticity and Pricing, Elasticity in Areas Other Than Price, **Consumer Choices**, Consumption Choices, How Changes in Income and Prices Affect Consumption Choices, Behavioral Economics: An Alternative Framework for Consumer Choice, **Production, Costs, and Industry Structure**, Explicit and Implicit Costs, and Accounting and Economic Profit, Production in the Short Run, Costs in the Short Run, Production in the Long Run, Costs in the Long Run.	**08**

3	**Self-Study** **Perfect Competition,** Perfect Competition and Why It Matters, How Perfectly Competitive Firms Make Output Decisions, Entry and Exit Decisions in the Long Run, Efficiency in Perfectly Competitive Markets. **Monopoly,** How Monopolies Form: Barriers to Entry, How a Profit-Maximizing Monopoly Chooses Output and Price, **Monopolistic Competition and Oligopoly**, Monopolistic Competition, Oligopoly.	**08**
4	**The Macroeconomic Perspective,** Measuring the Size of the Economy: Gross Domestic Product, Adjusting Nominal Values to Real Values, Tracking Real GDP over Time, Comparing GDP among Countries, How Well GDP Measures the Well-Being of Society, **Economic Growth,** The Relatively Recent Arrival of Economic Growth, Labor Productivity and Economic Growth, Components of Economic Growth, Economic Convergence, **Unemployment,** How Economists Define and Compute Unemployment Rate, Patterns of Unemployment, What Causes Changes in Unemployment over the Short Run, What Causes Changes in Unemployment over the Long Run.	**09**
5	**Inflation,** Tracking Inflation, How to Measure Changes in the Cost of Living, How the U.S. and Other Countries Experience Inflation, The Confusion Over Inflation, Indexing and Its Limitations. **The International Trade and Capital Flows**, Measuring Trade Balances, Trade Balances in Historical and International Context, Trade Balances and Flows of Financial Capital, The National Saving and Investment Identity, The Pros and Cons of Trade Deficits and Surpluses, The Difference between Level of Trade and the Trade Balance.	**08**

Course Outcomes	**Description**	**RBT Levels**
CO1	Identify the determinants of supply and demand; demonstrate the impact of shifts in both market supply and demand curves on equilibrium price and output.	**L2**
CO2	Determine the roles that prices and markets play in organizing and directing economic activity.	**L3**
CO3	Calculate and graph the short-run and long-run costs of production, supply and demand elasticities.	**L3**
CO4	Describe governmental efforts to address market failure such as monopoly power, externalities, and public goods.	**L2**
CO5	Examine and interpret a nation's economic performance indicators such as economic growth, unemployment and inflation from a macroeconomic perspective.	**L3**
CO6	Articulate the mechanics and institutions of international trade and their impact on the macro economy.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	3	2	3	2	-	-	-	-	-	-	-
CO2	3	3	2	2	2	-	-	-	-	-	-	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-
CO4	2	3	2	2	2	-	-	-	-	-	-	-
CO5	3	3	2	3	1	-	-	-	-	-	-	-
CO6	3	3	2	2	1	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1) Steven A. Greenlaw, David Shapiro, **"Principles of Economics",** 2nd Edition, Rice University - OpenStax, 2020. ISBN-13: 978-1947172371 (Available under CC-BY license at https://openstax.org/details/books/principles-economics-2e)

REFERENCE BOOKS:

1) N. Gregory Mankiw, **"Principles of Economics",** 8th Edition, Cengage Learning, 2016. ISBN-13: 978-0357038314
2) Niall Kishtainy, **"The Economics Book: Big Ideas Simply Explained",** 1st Edition, DK Publishers, 2012. ISBN-13: 978-0756698270
3) Yves Hilpisch, **"Python for Finance: Mastering Data-Driven Finance",** 2nd Edition, O'Reilly Media, 2018 ISBN-13: 978-1492024330
4) Quentin Batista, Thomas Sargent and Jesse Perla, **"QuantEcon DataScience: Introduction to Economic Modeling and Data Science",** Center for Innovative Data in Economics, Vancouver School of Economics, UBC, 2020.

SELF STUDY REFERENCES/WEBLINKS:

1. Perfect Competition
https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section8

2. Monopoly
https://mru.org/teacher-resources/university-video-mappings/openstax-microeconomics-textbook-video-mapped-syllabus#section9

3. Monopolistic Competition and Oligopoly
https://www.khanacademy.org/economics-finance-domain/ap-microeconomics/imperfect-competition/monopolistic-competition/v/oligopolies-and-monopolisitc-competition

COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Compiler Design		
	Course Code: 18CS643	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1.Present fundamental concepts and techniques for the design of a compiler. 2. Identify the methods and strategies for parsing techniques along with its construction. 3. To enrich the knowledge of storage management and allocation strategies. 4. Optimize the intermediate code and generate its target language code.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction :** Language Processors, The Structure of a Compiler, The Evolution of Programming Languages, The Science of Building a Compiler, Applications of Compiler Technology, Programming Language Basics.	**8**
2	**Self study /Online class** **Lexical Analysis :** The Role Of Lexical Analyzer, Input Buffering, Specifications Of Tokens, Recognition Of Tokens. **Syntax Analysis I :** Introduction, Context Free Grammars.	**8**
3	**Syntax Analysis II :** Writing a Grammar, Top Down Parsing. Bottom Up Parsing, Operator precedence Parsing, Precedence Functions	**9**
4	**Syntax Analysis III :** Introduction to LR Parsing, Simple LR Parser, More Powerful LR Parsers, Using Ambiguous Grammars.	**8**
5	**Run-Time Environments :** Storage Organization, Storage Allocation of Space, Access to Non Local Data on the Stack, Heap Management, Introduction to Garbage Collection. **Code Generation :** Issues In The Design Of Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks And Flow Graphs, Next-Use Information, Optimization of Basic Blocks, A Simple Code Generator.	**9**

Self study component

1.

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand the various phases of compiler and design the lexical analyzer. Demonstrate the phases of the compilation process and be able to describe the purpose and operation of each phase.	**L2**
CO2	Acquire the working principles of parser with its types and extend the knowledge by parsing LL parser and Operator Precedence parser.	**L4**

CO3	Design and describe the various LR parsers for a given CFG.	**L4**
CO4	Describe the storage organization of compiler's run time environment and demonstrate the algorithms to perform code optimization and code generation.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**	**3**	**2**								
CO2	**3**	**2**	**2**	**2**								
CO3	**2**	**2**	**2**									
CO4	**3**	**3**	**3**	**2**								

Strong -3 Medium -2 Weak -1

TEXT BOOK:

Alfred W Aho, Monica S Lam, Ravi Sethi, and Jeffrey D Ullman, "**Compilers-Principles, Techniques and Tools**" Publisher: Pearson Education; Second edition (1 January 2011)

ISBN-10: 8131759024
ISBN-13: 978-8131759028

REFERENCE BOOKS:

1. Kenneth C Louden, "**Compiler Construction Principles & Practice**", Thomson Education, 2003.
2. Charles N Fischer, Richard J LeBlanc, "**Crafting a Compiler with C**", Benjamin Cummings, 2003.
3. Allen I. Holub "**Compiler Design in C**", Prentice Hall of India, 2003.

SELF STUDY REFERENCES/WEBLINKS:

1.Lecture Notes
2.http://sgbm.in/ebooks/cs/Compiler.pdf

COURSE COORDINATOR:	**Dr. Harish G**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Artificial Intelligence and Prolog Programming		
	Course Code: 18CSE031	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To Implement non-trivial AI techniques in a relatively large system 2. To understand uncertainty and Problem solving techniques. 3. To understand various symbolic knowledge representation to specify domains and reasoning tasks of a situated software agent. 4. To understand different logical systems for inference over formal domain representations, and trace how a particular inference algorithm works on a given problem specification. 5. To understand how to write a Prolog programs for Artificial Intelligence 6. Analyzing and Solving Artificial Intelligence programs by using Backtracking methods

Unit No	**Syllabus Content**	**No of Hours**
1	What is Artificial Intelligence: The AI Problems, The Underlying assumption, What is an AI Technique?, The Level of the model, Criteria for success, real world Problems, problem spaces and search: Defining, the problem as a state space search, Production systems, Problem characteristics, Production system characteristics, Issues in the design of search programs. **Intelligent Agents**: Agents and Environments, The nature of environments, The structure of agents. *(Text Book 1: Chapter 1 & 2 Text Book 2: Chapter 2)*	**8**
2	**Problem-solving by Searching:** Problem solving agents, example problems, searching for solutions, uninformed search strategies, informed search strategies, heuristic search-a*algorithm, adversarial search-minimax algorithm, of game playing, alpha-beta pruning.*(Text book2:chapter 3.1,3.2,3.3,3.4,3.5,5.1,5.2,5.3)*	**8**
3	Knowledge representation issues: Representations and mappings, Approaches to knowledge representation, Issues in knowledge representation, The frame problem. Using predicate logic: Representing simple facts in logic, representing instance and ISA relationships, Computable functions and predicates. Self study:Logical Agents: Knowledge –based agents, the Wumpus world, Logic-Propositional logic, Propositional theorem proving, syntax and semantics of first order logic, propositional and first order inference *(Text Book 1: chapter 3 ,4. Text book2: chapter 7.1,7.2,7.3,7.4,7.5,8.1.8.2,9.1)*	**8**
4	Prolog Programming for Artificial Intelligence, An Overview of Prolog, An example program: defining family relations, Extending the example program by rules, A recursive rule definition, How Prolog answers	**9**

	questions, Declarative and procedural meaning of programs; Syntax and Meaning of Prolog Programs, Data objects, Matching Declarative meaning of Prolog programs, Procedural meaning, Example: monkey and banana, Order of clauses and goals, Remarks on the relation between Prolog and logic. *(Text Book 3: Chapters 1 & 2)*	
5	Lists, Operators, Arithmetic, Representation of lists, Some operations on lists, Operator notation, Arithmetic, Using Structures: Example Programs, Retrieving structured information from a database, Doing data abstraction, Simulating a non-deterministic automaton, Backtracking, Preventing backtracking, Examples using cut, Negation as failure, Problems with cut and negation, Input and Output, Communication with files. *(Text Book 3: Chapter 3, 4 ,5 & 6)*	**9**

Course Outcomes	**Description**	**RBT Levels**
CO1	Understanding intelligent agents design for general intelligence tasks	R1, R2,R3
CO2	Apply AI technique on current applications for Problem solving, knowledge representation, searching, reasoning and learning.	R4 and R5
CO3	Write prolog codes for implementing Artificial Intelligence problems	R4
CO4	Analyze and Solve real-time AI problems using function of prolog programming	R5

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**	**2**									
CO3	**3**	**3**		**2**	**2**							**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**	**2**					**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, Pearson 3rd edition 2019, ISBN: 978-93-325-4351-5
2. Ivan Bratko Prolog Programming for Artificial Intelligence , (International Computer Science Series) 4th Edition, Publisher**:** Pearson Education Canada; 4th edition, 2011, ISBN-10: 0321417461; ISBN-13: 978-0321417466

REFERENCE BOOKS:

1. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, ISBN-13: 9780934613101

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Machine Learning		
	Course Code: **18CSE032**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Understand some basic machine learning algorithms and techniques and their applications. **2.** Able to analyse the underlying mathematical relationships among Machine Learning algorithms. **3.** Able to identify formulate and solve machine learning problems that arise in practical applications.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** Well posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.	**9 hours**
2	**Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm, hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning. Text Book1, Sections: 3.1-3.7	**8 hours**
3	**Artificial Neural Networks-Basics:** Fundamental Concepts, Evolution of Neural Network, Basic Model of ANN, important terminoligies of ANN, McCulloch-Pitts Neuron, Linear Separabality, Hebb Network. Text book 2, Sections: 2.1 – 2.7	**8 hours**
4	**Bayesian Learning:** Introduction, Bayes theorem, Bayes theorem and concept learning, ML and LS error hypothesis, ML for predicting probabilities, MDL principle, Naive Bayes classifier, Bayesian belief networks. Text book 1, Sections: 6.1 – 6.6, 6.9, 6.11	**9 hours**
5	**SELF STUDY** **Evaluating Hypothesis:** Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms. **Instance Based Learning:** Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning,	**8 hours**

	Text book 1, Sections: 5.1-5.6, 8.1-8.5	

Course Outcomes	**Description**	**RBT Levels**
At the End of the Course, the students should be able to		
CO1	Acquire knowledge about basic concepts of Machine Learning.	**L2**
CO2	Identify and apply machine learning techniques suitable for a given problem	**L3**
CO3	Design and implement machine learning solutions to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.	**L4**
CO4	Evaluate and interpret the results of the machine learning algorithms.	**L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**2**			**2**							
CO2	**3**	**3**	**2**		**2**							
CO3	**3**	**3**	**3**	**3**	**3**							
CO4	**3**	**3**		**3**	**3**							

Strong -3 **Medium -2** **Weak -1**

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2. S N Sivanandam, S N Deepa, Principles of Soft Computing,3rd Edition, Wiley Publication,2019.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

SELF STUDY REFERENCES/WEBLINKS:

1. https://machinelearningmastery.com/statistics-for-evaluating-machine-learning-models/
2. https://towardsdatascience.com/ml-algorithms-one-sd-%CF%83-instance-based-algorithms-4349224ed4f3

COURSE COORDINATOR:	**Mrs. Asha K N** **Mrs. Asha Rani K P**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Sub Title :Android Programming		
	Sub Code: 18CS71	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 42**

Course objectives: 1. To understand the Mobile-Android OS architecture and Features. 2. Understand how Android application works, their life cycle, manifestation,intents and using external resources. 3. Design and use appropriate tools for android development including IDE, device emulator, and profiling tools. 4. To build user interface, text inputs, lists and study database. 5. To understand windows Mobile Programming for Smartphone's.

UNIT No	Syllabus Content	No of Hours
1	**Introduction To Android:** A Little Background; J2ME to Android; What is Android?; An Open-Platform for Mobile Development; Introducing the open handset alliance; Android Architecture (Layers of Android), Android SDK Features; Why Develop for Mobile?; Variants of Android ;Types of Application developed using Android; Native Android Applications and Hybrid Application; Dalvik Virtual Machine; **Android Application Manifestation:** What is a .dex files; What is an .apk file; Basic Building Blocks of Android (Activities, Intents, Content Providers, Services Broadcast Receivers); Structure of Android Project; What Makes an Android Application? Introducing the Application Manifest; Drawable Resources; Resolution and Density Independence;	08
2	**Android Application Life Cycle:** Introducing the Android Application Class; Activity Life Cycle; Creating User Interfaces; The Android Application Life Cycle; Layout Managers (Linear Layout and Relative Layout); Hello World Android Application; View Click Handling; Let's Make a Toast; Fundamental Android UI Design, Introducing Views, Creating and Using Menus; Introducing Intents, Types of Intents; Creating Dialogs; Bundle, Working with Adapters.	09
3	**Data Storage, Retrieval, and Sharing:**Shared Preferences; Types of Preferences; Storing and Retrieving Data from Shared Preferences. Working with Files (Reading and Writing Files). **Introduction to Android Databases:** Introducing Android Databases: SQLite, Working with SQLite Databases, OnCreate() and onUpgrade() methods. Cursors and Content Values, Creating a New Content Provider, Using Content Providers, Creating and Using an Earthquake Content	09

	Provider, Accessing Android Content Providers.	
4	**Background processing:**Asynchronous Tasks, Working with Threads; **Android Services:**Services in Android; Types of Services; Local Service; Remote Service; Intent Service. Broadcast Receivers; Types of Broadcasts; Creating a Broadcast Receivers;Introducing Notifications, Using Alarms;	08
5	**Self-Study Component:** **Location Based Services**: Using Location-Based Services, Configuring the Emulator to Test Location-Based Services, Updating Locations in Emulator Location Providers, Selecting a Location Provider, Finding Your Location, Using Proximity Alerts, Using the Geocoder, Creating Map-Based Activities. **Multimedia and Sensors:** Playing Audio and Video, Recording Audio, Using the Camera and Taking Pictures, Telephony, Introducing SMS and MMS; Android Development Best Practices in designing and developing Android application, Static code Analysis-Lint, Develop your own Android Applications and Publish them on **Google play**.	08

Note 1:Three assignments are evaluated for 5 marks:

Assignment - 1 from units 1 and 2.
Assignment - 2 from units 3 and 4.
Assignment - 3 from unit 5.

Course Outcomes:	
CO1	Understand the basic history, structure, software components of Android OS
CO2	Apply the knowledge of Android application, Activity classes, UI elements, Intents and Adapters to create robust Android applications.
CO3	Apply the knowledge of Native Android libraries to **Store, Retrieve, and Share** the data within the application that created them and between applications.
CO4	Analyze and apply the knowledge of **Thread**s and **Services** to implement an Android application that runs in the background.
CO5	Create location based, Multimedia and other Applications that provide low-level access to the hardware available on mobile devices using appropriate Application Frameworks.

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-

CO3	3	1	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

TEXT BOOK:

1. Professional Android 2 Application Development by Reto Meier, Wiley Publishing, 2010.
2. Pro Android by Sayed Y. Hashimi, SatyaKomatineni, Apress, 2009.
3. Professional Android Application Development by Reto Meier, Wiley Publishing, 20009.

REFERENCE BOOKS

1. Beginning Android by Mark Murphy, Apress, 2009.
2. The Android Developer's Cookbook: Building Applications with the Android SDK by James Steele, Nelson To, Addison-Wesley Professional; 2010.
3. The Busy Coders guide to Android development by Mark L Murphy, COMMONSWARE, 2009.
4. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference", Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link).

SELF STUDY REFERENCES / WEBLINKS:

1. Beginning Android 4 Application Development by Wei-Meng Lee, Worx Wiley Publishing, 2014. http://www3.ul.ie/ictlc/Android.pdf
2. Android Tutorial Simply Easy Learning, https://www.tutorialspoint.com//android/android_tutorial.pdf
3. https://www.coursera.org/learn/posacontent\
4. https://www.edx.org/xseries/java-android-beginners
5. https://medium.com/@intelia/getting-the-most-out-of-android-lint-6df05a7ab054
6. JAVA CODING STANDARDS (nea.gov.bh)

FACULTY INCHARGE:

Prof. UMA K M

Prof. LAVANYA SANTHOSH

Prof. VEENA A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Internet of Things		
	Course Code: 18CSE033	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. Understand the building blocks of IOT and its characteristics and its application Area. 2. Realize the difference between M2M and IOT 3. Explore the architecture, components and working of IOT with the help of Microcontroller. 4. Comprehend the evolution of IOT in Mobile Devices, Cloud & Sensor Networks. 5. Elaborate the need for Data Analytics mechanism & tools in IoT.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction & Concepts:** Introduction to Internet of Things, Definitions and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT levels and Development Templates.	08
2	**IoT and M2M Communication** Introduction, M2M, Difference between IoT and M2M, SDN & NFV for IoT, Need for IoT Systems Management, Simple Network Management Protocol, Network Operator Requirements, NETCONF- YANG. **IoT Platform Design Methodology:** Introduction, IoT Design Methodology, Case Study: Weather Monitoring.	09
3	**Domain Specific IOTs** Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style. **IoT Physical Devices and Endpoints** Basic Building blocks - The Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python – Controlling led.	09
4	**IoT Physical servers & Cloud Offerings** **Cloud:** introduction to cloud storage models and communication Networks, WAMP – AutoBahn for IoT, Xively cloud for IoT. **Python web application** frame work - django, Designing a RESTful web API, amazon web services for IoT, SkyNetIoT messaging platforms.	09
5	**Self Study:** **Data Analytics for IoT:** Introduction AppacheHadoop, using Hadoop MapReduce for Batch Data Analysis, Apache oozie, Apache Spark, Apache Storm, using Apache Storm for Real-time Data Analysis. **Ethics -** Characterizing the Internet of Things, Privacy, Control, Environment, Solutions	07

Course Outcomes	**Description**	**RBT Levels**
CO1	**Apply** the knowledge of the internet and computer network on to IoT paradigm.	**L1, L3**

CO2	**Adequately** learn and **demonstrate** the IoT communication.	**L3**
CO3	**Apply** the knowledge of python in Raspberry PI programming.	**L2**
CO4	**Analyze** different configuration setups for connecting different types of sensors and upload the code on the board and communicate to the cloud.	**L4**
CO5	**Apply** the knowledge of data analytics and ethics behind a IoT development	**L4, L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**				**1**							**1**
CO2	**3**	**2**	**3**	**1**	**2**							**1**
CO3	**3**	**2**	**2**	**1**	**2**					**1**		**1**
CO4	**3**	**3**	**1**	**2**	**2**					**1**		**1**
CO5	**3**	**2**	**1**	**2**	**3**				**1**	**1**		**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", First Edition, VPT, 2014.

REFERENCE BOOKS:

1. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1st Edition, McGraw Hill Education, 2017
2. Ovidiu Vermesan, PeterFriess, "Internet of Things: Converging Technologies for Smart Environments and Integrated Ecosystems". River Publishers Series in Communication.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1st Edition, Pearson Education

SELF STUDY REFERENCES/WEBLINKS:

1. Designing the Internet of Things – Adrian McEwen & Hakim Cassimality Wiley India, ISBN: 9788126556861

COURSE COORDINATOR:	**Dr.Smitha Shekar B** **Lavanya Santhosh**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Introduction to Robotics		
	Course Code: **18CS752**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week :** **03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand how to build basic robots 2. To understand how to use robot architectures to build robots in realtime 3. To distinguish differences between various architectures and apply in realtime 4. To program the AI robots for various behaviours of different complexity

Unit No	**Syllabus Content**	**No of Hours**
1	From Teleoperation To Autonomy: Overview, How Can a Machine Be Intelligent? What Can Robots Be Used For? Social implications of robotics, A Brief History of Robotics, Industrial manipulators , Space robotics and the AI approach, Teleoperation , telepresence, Semi-autonomous control, The Seven Areas of AI	**8**
2	The Hierarchical Paradigm: Overview, Attributes of the Hierarchical Paradigm, Strips, More realistic Strips example, Strips summary, Closed World Assumption and the Frame Problem, Representative Architectures, Nested Hierarchical Controller, NIST RCS, Evaluation of hierarchical architectures, Advantages and Disadvantages.	**8**
3	Biological Foundations of the Reactive Paradigm: Overview, Why explore the biological sciences? Agency and computational theory, What Are Animal Behaviors? Reflexive behaviours, Coordination and Control of Behaviors, Innate releasing mechanisms, Concurrent behaviours, Perception in Behaviors, Action-perception cycle, Two functions of perception, Gibson: Ecological approach, Neisser: Two perceptual systems, Schema Theory, Behaviors and schema theory, Principles and Issues in Transferring Insights to Robots	**8**
4	The Reactive Paradigm : Overview 105 4.2 Attributes of Reactive Paradigm, Characteristics and connotations of reactive behaviours, Advantages of programming by behaviour, Representative architectures, Subsumption Architecture, Example, Subsumption summary, Potential Fields Methodologies, Visualizing potential fields, Magnitude profiles, Potential fields and perception, Programming a single potential field, Combination of fields and behaviours, Example using one behavior per sensor, Pfields compared with subsumption, Advantages and disadvantages , Evaluation of	**9**

	Reactive Architectures	
5	Designing a Reactive Implementation: Overview, Behaviors as Objects in OOP, Example: A primitive move-to-goal behaviour, Example: An abstract follow-corridor behaviour, Where do releasers go in OOP? Steps in Designing a Reactive Behavioral System , Case Study: Unmanned Ground Robotics Competition, Assemblages of Behaviors, Finite state automata, A Pick Up the Trash FSA, Implementation examples , Abstract behaviors , Scripts	**9**

Course Outcomes	**Description**	**RBT Levels**
CO1	Understand basic operations of robots and their sub-components involved in designing.	R1, R2,R3
CO2	To interpret the biological behaviours of human or animal and mapping them to different robot behaviours	R4 and R5
CO3	To Analyze and design the robot behaviours using different robot architectures that work in real-time environments.	R4
CO4	To use appropriate programming approaches to design and build the robot behaviours	R5

CO-PO Mapping	**PO 1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO12**
CO1	**3**	**3**										
CO2	**3**	**3**	**2**									
CO3	**3**	**3**		**2**	**2**							**2**
CO4	**3**	**3**	**3**	**3**	**3**	**2**	**2**					**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Robin R Murphy, 2000, Introduction to AI Robotics, 2nd Edition, MIT Press, Cambidge, MA, USA, ISBN:978-0-262-13383-8

REFERENCE BOOKS:

1. Kathy Ceceri, Making Simple Robots: Exploring Cutting-Edge Robotics with Everyday Stuff, Make Community, LLC; 1st edition (March 2, 2015), ISBN-10 : 9781457183638; ISBN-13 : 978-1457183638

EXTERNAL REFERENCES/WEBLINKS:	
COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	SUBJECT TITLE: CLOUD COMPUTING LABORATORY		
	SUBJECT CODE: 18CSL77	No. of Credits:0:0:1	No. of Lecture hours per week:3
	Exam Duration :3 hours	Exam Marks:50	

Course Objectives:

This course will help students to achieve the ability to:

1. Develop web applications in cloud
2. Learn the design and development process involved in creating a cloud-based application
3. Use cloud simulator and analyze the working of data centers using simulator

Note: Use Cloud Analyst Simulator for Simulation

<table>
<tr><th colspan="2">Exp. No</th><th>Experiment List</th></tr>
<tr><th colspan="3">PART-A</th></tr>
<tr><td>1</td><td>a)</td><td>Creation of web applications on Salesforce cloud Platform.</td></tr>
<tr><td></td><td>b)</td><td>Use the following userbase configuration to simulate following scenarios for the given data centre and virtual machine configuration and answer to the following questions.
Scenario-1: Nearest data center with round robin policies
Scenario-2: Optimize response time with round robin policies
<table>
<tr><td>User base</td><td>Region</td><td>Data center</td><td>Peak-hour users</td><td>Off-peak hour users</td><td>Virtual machines</td></tr>
<tr><td>UB1</td><td>North America</td><td>--</td><td>1000</td><td>500</td><td rowspan="6">DC1-50</td></tr>
<tr><td>UB2</td><td>South America</td><td>--</td><td>800</td><td>1200</td></tr>
<tr><td>UB3</td><td>Europe</td><td>DC1</td><td>2000</td><td>1000</td></tr>
<tr><td>UB4</td><td>Africa</td><td>--</td><td>500</td><td>300</td></tr>
<tr><td>UB5</td><td>Asia</td><td></td><td>3000</td><td>300</td></tr>
<tr><td>UB6</td><td>Ocenia</td><td></td><td>1500</td><td>150</td></tr>
</table>
i) Tabulate the overall response time of all the scenarios and plot a line graph
ii) Plot a bar graph for the data processing time of all the scenarios
iii) Compare average response time by regions of all scenarios by plotting line graph
iv) Using Pie chart show the total cost spent for each scenario</td></tr>
<tr><td></td><td></td><td></td></tr>
<tr><td>2</td><td>a)</td><td>Install Virtualbox/VMware Workstation with different flavours of linux and execute some C programs</td></tr>
</table>

b) Simulate the following scenarios for the given userbase, data centre and virtual machine configuration and answer to the given questions

Scenario	**Scenario Description**	**Load Balancing algorithm**	**Service broker policy**
1	One data center with 50 Virtual Machines for UB1	Nearest Data Centre	Round robin
2	Two data centers with 25 and 50 Virtual Machines respectively for UB1		
3	Three data centers with 100,75 and 25 Virtual Machines respectively for UB1		

i) Tabulate the overall response time and data processing of all the scenarios and plot the bar graph
ii) Plot a line graph of data center request servicing time of all the data centers for all the scenarios
iii) Compare average response time by regions of all scenarios by plotting line graph
iv) Mention the data centers used by the UB2,UB3, UB4 and UB5

3 a) Install Google App Engine. Create hello world app and other simple web applications using python/java.

b) Simulate the following scenarios for given data centre, data centre and virtual machine configuration and answer the following questions
Scenario 1: closest data center and round robin policies
Scenario 2: optimize response time and round robin policies
Use the following userbase configuration for all the scenarios

User base	Region	Data center	Peak-hour users	Off-peak hour users	Virtual machines
UB1	North America	DC1, DC3	1000	500	DC1-50 DC3-100
UB2	South America	---	800	1200	
UB3	Europe	DC4	2000	1000	DC4-150
UB4	Africa	--	500	300	

i) Tabulate and compare the Average response time and data processing time of all the scenarios by plotting the line graph
ii) Tabulate the response time of user bases in all scenarios and compare these by plotting bar graph. Which user base is taking maximum time among three scenarios? Why
iii) Calculate the data transmission time from DC1 to UB2
iv) Plot the bar graph for data center cost of all scenarios

4	a)	Create a RDS and launch in your custom VPC network.
	b)	Analyze the various service broker policies for the following configuration and answer the following questions.

Parameter	Value Used
UB Name	UB1
Region	2
Request Per User Per Hour	60
Data Size Per Request	100
Peak hour start(GMT)	3
Peak hour end (GMT)	9
Avg Peak Users	40000
Avg Off Peak Users	4000
DC 1 – No Of VM	75
DC 2 – No Of VM	50
DC 3 – No Of VM	25
VM Image Size	10000 MB
VM Memory	512 MB
VM Bandwidth	1000 bps
DC 1 – No Of Physical Machine	2
DC 2 – No Of Physical Machine	2
DC 3 – No Of Physical Machine	2
DC – Memory Per Machine	204800 Mb
DC – Storage Per Machine	100000000 Mb
DC – Available BW Per Machine	1000000
DC – No Of Processors Per Machine	4
DC – Processor Speed	10000 MIPS
DC – VM Policy	Time Shared
User Grouping Factor	1000
Request Grouping Factor	100
Executable Instruction Length	500
Load Balancing Policy	Throttled

a) Tabulate and compare the data processing time of service broker policies by plotting the line graph
b) Tabulate and compare response time of service broker policies by plotting the bar graph
c) Tabulate the cost for service broker policies and represent it using pie chart
d) Which service broker policy is best and why?

5	a)	Create a file in one virtual machine and transfer it another virtual machine files from one virtual machine.
	b)	Analyze the various load balancing algorithms for the given userbase, data centre and virtual machine configuration and answer the following questions. Consider the following userbase configuration for all load balancing algorithms

Number of User bases	06
Region for the userbases	UB1-South America, UB2-Asia, UB3-North America, UB4-Europe, UB5-Africa, UB6-Ocenia
Average peak users for all the user bases	10000

		Average off-peak users for all the user bases | 100 Peak hours' time | Depends on the region Data centers in each user base | UB1-1, UB2-2, UB3-1, UB4-3, UB5-2, UB6-1 Virtual machines in each data center | 6 Simulation time | 10 mins Service broker policy | Nearest data center

Average off-peak users for all the user bases	100
Peak hours' time	Depends on the region
Data centers in each user base	UB1-1, UB2-2, UB3-1, UB4-3, UB5-2, UB6-1
Virtual machines in each data center	6
Simulation time	10 mins
Service broker policy	Nearest data center

a) Tabulate and compare the data processing time of load balancing algorithms by plotting the line graph
b) Tabulate the response time of load balancing algorithms by plotting the bar graph
c) Tabulate the response time by region for load balancing algorithms and plot bar graph
d) Which load balancing algorithm is best and why?

PART-B

Mini Project: Design and implementation of mini projects using concepts of cloud computing.

Course Outcomes	Statements	Blooms Level
CO1	Develop applications on different cloud platforms Use various services of AWS	**L3**
CO2	Describe the working of Cloud Analyst simulator	**L2**
CO3	Demonstrate the working of datacenters using simulator	**L3**
CO4	Illustrate the working virtualization using Virtualbox/VMware	**L3**
CO5	Implement mini project using cloud services	**L4**

Course Outcomes	POs												PSOs		
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO3**
CO1	3	2	3	2	3	-	-	-	-	-	-	-	3	3	-
CO2	1	1	2	1	2	-	-	-	-	-	-	-	2	3	-
CO3	2	2	3	2	2	-	-	-	-	-	-	-	1	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-	3	3	-
Strong -3 Medium -2 Weak -1															

COURSE COORDINATOR:	**Dr.Siddaraju** **Mr.Srinivasa A. H.**

	SUBJECT TITLE: ANDROID PROGRAMMING LAB		
	SUBJECT CODE:18CSL76	**No. of Credits:0:0:1:0**	**No. of Lecture hours per week:3**
	Exam Duration :3 hours	**Exam Marks: 50**	

Course objectives:

1) To learn and acquire art of Android programming.
2) To configure initial application, run in emulator.
3) Understand and implement Android's advanced User interface functions, audio video applications
4) Create, modify and query on SQlite database.
5) Present different ways of sharing data through the use of services.

1.	i) Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in Capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed. Insert a horizontal line between the job title and the phone number. ii) Develop a simple application with one EditText so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.
2.	Write a program to create an Activity to read Employee Details (EmpId, Name, Age, Address) from user and store to database and create a menu with menu item (Show Details) on pressing menu details it must go to another activity with employee id search box and search button and display the employee details on the screen.
3.	Write a program to create an activity with a text box and three buttons (save, open and create) open must allow to browse the text file from sdcard and must display the contents of the file on textbox, save button must save the contents of text box to file, create button must allow file user to create a new file and save the entered contents of the textbox.
4.	Write a program to create an activity with two text boxes (date /time and note contents). Create a content provider to store the date and time and note contents to the database. Create another program with a Button (Fetch Today Notes) on press must access the note provider and display the notes stored for today's date.
5.	Write a program to create an activity with two buttons start and stop. On pressing start

	button the program must start the counter and must keep on counting until stop button is pressed.
6.	Create a program to receive the incoming SMS to the phone and put a notification on screen, on clicking the notification it must display sender number and message content on screen.
7.	Write a program to create a service that will put a notification on the screen every 5 seconds.
8.	Create an .aidl service to do add, subtraction and multiplication and create another application with two buttons to read the inputs and three button add,subtract and multiply to call add, subtract and multiply operation on .aidl service.
9.	Create an activity like a phone dialer with (1,2,3,4,5,6,7,8,9,0,*,#) buttons including call, save and delete buttons. On pressing the call button, it must call the phone number and on pressing the save button it must save the number to the phone contacts.
10.	Create a file of JSON type with values for city_name, Latitude, Longitude, Temperature and Humidity. Develop an application to create an activity with button to parse the JSON file which when clicked should display the data in the textview.

At the end of the course the student will be able to

Course Outcomes:

CO1: Create, test and debug Android application by setting up Android development environment.
CO2: Implement adaptive, responsive user interfaces that work across a wide range of devices.
CO3: Infer long running tasks and background work in Android applications.
CO4: Demonstrate methods in storing, sharing and retrieving data in Android applications.
CO5: Infer the role of permissions and security for Android applications.

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	P06	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	-	-	-	-	-	-	-	-
CO2	3	3	3	3	3	-	-	-	-	-	-	-
CO3	3	1	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	-	3	-	-	-	-	-	-	-

Text Books

1. Google Developer Training, **"Android Developer Fundamentals Course – Concept Reference",**

Google Developer Training Team, 2017. https://www.gitbook.com/book/google-developer-training/android-developer-fundamentals-course-concepts/details (Download pdf file from the above link)

Reference Books

1. Erik Hellman, **"Android Programming – Pushing the Limits",** 1st Edition, Wiley India Pvt Ltd, 2014. ISBN-13: 978-8126547197
2. Dawn Griffiths and David Griffiths, **"Head First Android Development",** 1st Edition, O'Reilly SPD Publishers, 2015. ISBN-13: 978-9352131341
3. Bill Phillips, Chris Stewart and Kristin Marsicano, **"Android Programming: The Big Nerd Ranch Guide",** 3rd Edition, Big Nerd Ranch Guides, 2017. ISBN-13: 978-0134706054

Lab Incharge

1 Uma K M
2 Lavanya Santhosh
3 Veena A

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY, ESTD : 1980, PANCHAJANYA VIDYA PEETHA WELFARE TRUST (REGD.), Aided By Govt. of Karnataka	**Course Title: Soft Computing**		
	Course Code: **18CS753**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week :** **03**
	Exam Duration : **3 hours**	**CIE+ Assignment + SEE** **= 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To learn the key aspects of Soft computing 2. To know about the components and building block hypothesis of Genetic algorithm. 3. To gain insight onto Neuro Fuzzy modeling and control. 4. To gain knowledge in machine learning through Support vector machines

Unit No	**Syllabus Content**	**No of Hours**
1	Introduction to Soft computing: Neural networks, Fuzzy logic, Genetic algorithms, Hybrid systems and its applications. Fundamental concept of ANN, Evolution, basic Model of ANN, Terminologies used in ANN, MP model, linear separability, Hebb Network.	**11**
2	Supervised Learning: Perceptual Network, Adaptive linear neuron, Multiple adaptive linear neurons, Back propagation Network,Associative Memory Network: introduction, training algorithms for pattern association, associative memory network,	**10**
3	Classical sets and Fuzzy Sets – classical and Fuzzy Relations – Features of membership functions, Fuzzification and methods of membership value assignment. Defuzzification lambda cuts for fuzzy relations and fuzzy sets.	**10**
4	Fuzzy Decision Making: introduction, individual decision making, multiperson Decision making, multiobjective decision making, multiattribute decision making, fuzzy Bayesian decision making, Fuzzy logic control systems: introduction, control system design, architecture and operation of FLC systems, FLC system Models, Applications of FLC systems	**11**
5	**Self Study Component** Genetic algorithms: Introduction - Basic operations - Traditional optimization and search techniques. Genetic algorithms and search space, Operators of genetic algorithms – Genetic programming	**10**

Course Outcomes	**Description**	**RBT Levels**

CO1	Understand the basics of soft computing, ANN and Terminologies to relate and understand the real time problems	**R2 R3**
CO2	Solve the real-time problems using ANN representations	**R3 R4**
CO3	Analyze and adopt fuzzy logic in designing and implementing soft computing applications.	**R3 R4**
CO4	Analyze and apply genetic algorithms to solve the optimization problems	**R3 R4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO 7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**3**	**3**									
CO2	**3**	**3**	**2**									
CO3	**3**	**3**	**3**									**2**
CO4	**3**	**3**	**3**	**2**	**2**							**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Principles of Soft computing, S N Sivanandam, and S N Deepa, Wiley India, 3rd edition ISBN 13: 978812658744-5, 2019

REFERENCE BOOKS:

1. Neuro-fuzzy and soft computing, J.S.R. Jang, C.T. Sun, E. Mizutani, Phi (EEE edition), 2012, ISBN 0-13-261066-3
2. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", Third Edition

WEBLINKS:

1. **Introduction to Soft Computing by Prof. Debasis Samanta NPTEL course**
2. **L. A. Zadeh, "Fuzzy Algorithms", Information and Control, vol. 12, pp. 94-102, 1968. CrossRef Google Scholar**
3. **2. L. A. Zadeh, "A Rationale for Fuzzy Control", J.Dynamic Systems Measurement and Control, vol. 94, pp. 3-4, 1972. CrossRef Google Scholar**
4. **3. L. A. Zadeh, "Outline of a New Approach to the Analysis of Complex Systems and Decision Processes", IEEE Trans. Systems Man and Cybernetics, vol. SMC-3, pp. 28-44, 1973**

COURSE COORDINATOR:	**Dr. K R Shylaja**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Computer Vision		
	Course Code: **18CS751**	**No. of Credits: 3 : 0 : 0** **(L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	1. To understand the basics of computer vision and image processing. 2. To understand the different kinds of detectors and matching applications. 3. To understand the need of motion and its techniques. 4. To understand the importance of detection and recognition. **5.** To understand the basics of motion estimation and image stitching.

Unit No	**Syllabus Content**	**No of Hours**
1	**Introduction:** What is computer vision? , A brief history, overview. **Image formation**: Geometric primitives and transformations, Photometric image formation, The digital camera. **Image processing:** Steps in image processing, filtering, Fourier transformation, neighborhood operation.	**8**
2	**Feature detection and matching**:-Points and patches , Feature detectors , Feature descriptors ,Feature matching , Feature tracking ,Application: Performance-driven animation ,Edges- Edge detection, Edge linking ,Application: Edge editing and enhancement, Lines- Successive approximation , Hough transforms , Vanishing points	**9**
3	**Structure from motion:** Triangulation, Two-frame structure from motion, Projective (uncalibrated) reconstruction ,Self-calibration Application: View morphing, Factorization ,Perspective and projective factorization , Application: Sparse 3D model extraction ,Bundle adjustment ,Exploiting sparsity ,Application: Match move, and augmented reality ,Uncertainty and ambiguities ,Application: Reconstruction from Internet photos ,Constrained structure and motion ,Line-based techniques Plane-based techniques.	**9**
4	**Recognition:** object detection, face detection, face recognition, instance recognition, category recognition, context and scene understanding, recognition databases and test sets.	**9**
5	**Self study: Dense motion estimation:** translational alignment, parametric motion, Spline based motion, optical flow, layered motion, **Image Stitching**: motion models, global alignment, compositing and blending.	**7**

Course Outcomes	**Description**	**RBT Levels**
CO1	**Acquire** fundamental concepts and applications of computer vision and image processing.	**L1, L3**
CO2	**Interpret and Apply** the various detectors and matching applications.	**L2, L3**
CO3	**Explain** the importance motion and usage of its techniques.	**L1, L2**

CO4	**Apply** the analysis on scene and recognizing all of its constituent objects.	**L3**
CO5	**Develop** motion estimation algorithms that can be used for wide variety of applications.	**L4,L5**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**2**	**3**			**2**	**3**			**1**			**3**
CO2	**3**	**3**	**2**	**2**	**2**	**3**			**1**			**3**
CO3	**3**	**3**	**2**	**2**	**2**	**3**			**2**			**3**
CO4	**3**	**3**	**2**	**2**	**2**	**3**			**1**			**3**
CO5	**2**	**2**	**2**	**2**	**2**	**3**			**2**			**3**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Computer vision: algorithms and applications by Richard Szelski 2010 Springer.

REFERENCE BOOKS:

1. Forsyth A. David and Ponce Jean, Computer Vision, A Modern Approach. 2nd ed., 2011.
2. Trucco and Verri, Introductory Techniques for 3D Computer Vision, 1998.

SELF STUDY REFERENCES/WEBLINKS:

1. http://szeliski.org/Book/.
2. **http://www.amazon.com/Computer-Vision-Models-Learning-Inference/product-reviews/1107011795/ref=dp_top_cm_cr_acr_txt?showViewpoints=1**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Software Project Management		
	Course Code: 18CS743	No. of Credits: 3 : 0 : 0 (L-T-P)	No. of lecture hours/week : 3
	Exam Duration : 3 hours	CIE+ Assignment + SEE = 45+5+50=100	Total No. of Contact Hours : 42

Course Objectives:	Description
	1. To understand the Software Project Planning and Evaluation techniques. 2. To plan and manage projects at each stage of the software development life cycle (SDLC). 3. To learn about the activity planning and risk management principles. 4. To manage software projects and control software deliverables. 5. To develop skills to manage the various phases involved in project management and people management.

Unit No	Syllabus Content	No of Hours
1	**Project Evaluation and Project Planning :** Importance of Software Project Management, Activities, Methodologies, Categorization of Software Projects, Setting objectives, Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation, Strategic program Management, Stepwise Project Planning.	9
2	**Project Life Cycle and Effort Estimation :** Software process and Process Model, Choice of Process models, Rapid Application development, Agile methods, Dynamic System Development Method, Extreme Programming, Managing interactive processes, Basics of Software estimation, Effort and Cost estimation techniques - COSMIC Full function points, COCOMO II - a Parametric Productivity Model.	8
3	**Activity Planning and Risk Management :** Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Formulating Network Model, Forward Pass and Backward Pass techniques - Critical path (CRM) method, Risk identification, Assessment, Risk Planning, Risk Management, PERT technique, Monte Carlo simulation, Resource Allocation, Creation of critical paths, Cost schedules.	9
4	**Project Management and Control:** Framework for Management and control, Collection of data, Visualizing progress, Cost monitoring, Earned Value Analysis, Prioritizing Monitoring, Project tracking, Change control, Software Configuration Management, Managing contracts, Contract Management.	9
5	**SELF-STUDY –** **Staffing in Software Projects:** Managing people, Organizational behavior, Best methods of staff selection, Motivation, The Oldham, Hackman job characteristic model, Stress, Health and Safety, Ethical and Professional concerns, Working in teams, Decision making, Organizational structures, Dispersed and Virtual teams, Communications genres, Communication plans, Leadership.	7

Course Outcomes	Description	RBT Levels
CO1	Understand Project Management principles while developing software.	Level1, Level2
CO2	Gain extensive knowledge about the basic project management concepts, framework and the process models.	Level 2
CO3	Obtain adequate knowledge about software process models and software effort estimation techniques.	Level 3
CO4	Estimate the risks involved in various project activities.	Level 3
CO5	Learn staff selection process and the issues related to people management	Level 3

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**3**	**2**	**2**								**2**	**2**
CO2	**3**	**2**	**1**								**2**	**2**
CO3	**2**	**2**	**1**		**3**			**1**				
CO4	**2**	**2**		**2**		**1**		**1**			**2**	**2**
CO5	**1**	**2**										**2**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Software Project Management, Bob Hughes, Mike Cotterell and Rajib Mall*, Fifth Edition, Tata McGraw Hill, New Delhi, 2012.*

REFERENCE BOOKS:

1. Effective Software Project Management, Robert K. Wysocki, Wiley Publication, 2011.
2**. Managing Global Software Projects, Gopalaswamy Ramesh,** McGraw Hill Education (India), Fourteenth Reprint 2013.

SELF STUDY REFERENCES/WEBLINKS:

1. https://mopinion.com/top-20-best-project-management-software-an-overview/

2. https://www.thebalancesmb.com/best-project-management-software-4175032

COURSE COORDINATOR:	**Praveena M V**

	Course Title: Cyber Forensics		
	Course Code: 18CS742	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	This course will enable students to: 1. Define and classify cybercrimes and further understand the associated Cyber laws in India 2. Explore various Cyber forensic concepts and Forensic examination processes. 3. Learn the acquisition, analysis and validation of forensics data. 4. Get familiarized with existing forensics tools.

Unit No	Syllabus Content	No of Hours
1	**Introduction to Cybercrime** Cybercrime: Introduction, Role of Electronic Communication devices and Information and Communication Technologies in Cyber crime, Types of Cyber crime, Classification of Cybercriminals, Cybercrime, The Present and the Future: Cryptocurrency characteristics and types, Deep web and Dark web	8
2	**Introduction to Cyber forensics** Interrelation among Cybercrime, Cyber Forensics and Cyber Security, Cyber Forensics: Definition, Need, Objectives, Computer Forensics Investigations, Steps in Forensic Investigation, Forensic Examination Process, Methods employed in Forensic Analysis, Classification of Cyber Forensics:Disk, Network, Wirelesss, Database, Malware, Mobile, GPS, Email and Memory Forensics	8
3	**Digital Evidence Analysis using Forensics tools and techniques** Digital evidence: Sources, Collection procedure, Preliminaries of Digital evidence; Digital evidence acquisition and seizure, Acquisition of evidence from : Computer and Electronic device, Mobile phone and PDA, Optical and removable media ; Chain of Custody ; Forensic Tools, types and categories, Cyber Forensic Suite; Forensic tools for: Drive Imaging and Validation, Integrity verification and Hashing, Data recovery, RAM analysis, Encryption/Decryption, Password recovery, Analyzing network, Metadata	9

	processing, Forensic auditing, Antiforensics ; Analysis of Digital Evidence: Capturing Forensic copy of memory and hard drive with Toolkit Forensic imager, RAM analysis with Volitility, Analysing hard drive with Win Hex, Working with Autopsy, email tracing and tracking ; Admissibility of Digital Evidence : Introduction, Digital evidence electronic record	
4	**Cyber security: Organizational Implications** Introduction , Cost of Cybercrimes and IPR issues, Web threats for organizations, Security and privacy implications from Cloud computing Social media marketing: security risks, Protecting people's privacy in organization, Organizational guidelines for internet usage, safe computing and computer usage policy, Incident Handling : essential component of cyber security, Forensics best practices for organizations, Media and asset protection. Importance of end-point security	9
5	**Cyber Forensics case studies and Cyber Laws** Cyber breaches examples and case studies discussion: New zealand's Waikato District Health Board cyber attack, Colonial pipeline cyber attack (ransomware case study) etc. ; Introduction to Cyber laws: need, legal issues; Cyber laws in India and case studies: Cyber laws in India, Information Technology Act 2000; Cyber Laws associated to Cyber crime against Individual, Property and Nation, Cyber laws for Cyber security	8

NOTE:
1. Unit 5 will be the Self study component

Course Outcomes	**Description**	**RBT Levels**
CO1	Discuss the various types of cyber crimes and Cyber Laws applicable to them	**L1, L2**
CO2	Apply Forensic examination process	**L1,L2,L3, L4**
CO3	Analyze and validate forensics data	**L1,L2,L3,L4**
CO4	Use forensics tools	**L1, L2, L3**
CO5	Identify the best practices followed in the organization with respect to cyber security	**L1, L2**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	**3**	**2**										
CO2	**3**	**3**	**1**	**3**								**2**
CO3	**3**	**3**	**2**	**3**								**1**
CO4	**3**	**2**	**1**	**2**	**3**							**2**
CO5	**3**	**2**	**2**									**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1.Dejey, S Murugan, “**Cyber Forensics**”, Oxford University Press, 2018.

2.Nina Godbole, SunitBelapure, “**Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives**”,Wiley Publications, 2017.

REFERENCE BOOKS:

1. John R.Vacca, “**Computer Forensics**”, Cengage Learning, 2005

3. Marjie T.Britz, “**Computer Forensics and Cyber Crime”: An Introduction**”, 3rd Edition, Prentice Hall, 2013.

SELF STUDY REFERENCES/WEBLINKS:

Dejey, S Murugan, “**Cyber Forensics**”, Oxford University Press, 2018.

COURSE COORDINATOR:	**Vinutha H**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: BUSINESS INTELLIGENCE		
	Course Code: 18CS741	**No. of Credits:** 3: 0: 0 (L-T-P)	**No. of Lecture Hours/Week:** 3
	Exam Duration: 3 Hours	**CIE + Assignment + SEE =** 45 + 5 + 50 = 100	**Total No. of Contact Hours:** 42

Course Objectives:	Description
	1. Describe the concepts and components of Business Intelligence. 2. Understand the technological architecture that underpins the Business Intelligence systems. 3. Determine how dimensional modeling fits in an enterprise. 4. Examine the data integration techniques to discover previously hidden insights that can profoundly impact the success of any business. 5. Develop Business Intelligence systems using data analytics tools to aid the decision making process.

Unit No	Syllabus Content	No of Hours
1.	**The Business Demand for Data, Information, and Analytics,** Just One Word: Data. Welcome to the Data Deluge, Taming the Analytics Deluge, Too Much Data, Too Little Information, Data Capture versus Information Analysis, The Five Cs of Data, Common Terminology from our Perspective, **Justifying BI: Building the Business and Technical Case,** Why Justification is Needed, Building the Business Case, Building the Technical Case, Assessing Readiness, Creating a BI Road Map, Developing Scope, Preliminary Plan, and Budget, Obtaining Approval, Common Justification Pitfalls, **Defining Requirements -** Business, Data and Quality, The Purpose of Defining Requirements, Goals Deliverables, Roles, Defining Requirements Workflow, Interviewing, Documenting Requirements.	08
2.	**Architecture Framework,** The Need for Architectural Blueprints, Architectural Framework, Information Architecture, Data Architecture, Technical Architecture, Product Architecture, Metadata, Security and Privacy, Avoiding Accidents with Architectural Planning, Do Not Obsess over the Architecture, **Information Architecture,** The Purpose of an Information Architecture, Data Integration Framework, DIF Information Architecture, Operational BI versus Analytical BI, Master Data Management, **Data Architecture,** The Purpose of a Data Architecture, History, Data Architectural Choices, Data Integration Workflow, Data Workflow - Rise of EDW Again, Operational Data Store.	09
3.	**SELF-STUDY** **Foundational Data Modeling,** The Purpose of Data Modeling, Definitions - The Difference Between a Data Model and Data Modeling, Three Levels of Data Models, Data Modeling Workflow, Where Data Models Are Used, Entity-Relationship (ER) Modeling Overview, Normalization, Limits and Purpose of Normalization, **Dimensional Modeling,** Introduction to Dimensional Modeling,	09

	High-Level View of a Dimensional Model, Facts Dimensions, Schemas, Entity Relationship versus Dimensional Modeling, Purpose of Dimensional Modeling Fact Tables, Achieving Consistency, Advanced Dimensions and Facts, Dimensional Modeling Recap, **Business Intelligence Dimensional Modeling,** Introduction, Hierarchies, Outrigger Tables, Slowly Changing Dimensions, Causal Dimension, Multivalued Dimensions, Junk Dimensions, Value Band Reporting, Heterogeneous Products, Alternate Dimensions, Too Few or Too Many Dimensions.	
4.	**Data Integration Design and Development,** Getting Started with Data Integration, Data Integration Architecture, Data Integration Requirements, Data Integration Design, Data Integration Standards, Loading Historical Data, Data Integration Prototyping, Data Integration Testing, **Data Integration Processes,** Introduction: Manual Coding versus Tool-Based Data Integration, Data Integration Services.	**08**
5.	**Business Intelligence Applications,** BI Content Specifications, Revise BI Applications List, BI Personas, BI Design Layout - Best Practices, Data Design for Self-Service BI, Matching Types of Analysis to Visualizations, **BI Design and Development,** BI Design, BI Development, BI Application Testing, **Advanced Analytics,** Advanced Analytics Overview and Background, Predictive Analytics and Data Mining, Analytical Sandboxes and Hubs, Big Data Analytics, Data Visualization.	**08**

Course Outcomes	**Description**	**RBT Levels**
CO1	Establish Business Intelligence in the enterprise by defining the requirements for businesses that demand information.	**L3**
CO2	Employ a well architected foundation that provides information that helps in aligning the company's data with its business strategies.	**L3**
CO3	Articulate how the data and dimensional models are considered the cornerstone to building Business Intelligence applications.	**L3**
CO4	Illustrate the Data Integration workflow of source data as it is transformed to become actionable information.	**L3**
CO5	Develop Business Intelligence applications with user interfaces and standards that resonate with the intended audience and employ analytics for forecasting.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	1	2	2	-	-	-	-	-	-	-
CO2	2	3	3	3	3	-	-	-	-	-	-	-
CO3	1	2	2	2	3	-	-	-	-	-	-	-

CO4	2	2	2	2	3	-	-	-	-	-	-	-
CO5	3	3	3	3	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Rick Sherman, **"Business Intelligence Guidebook: From Data Integration to Analytics",** 1st Edition, Morgan Kaufmann Publishers/Elsevier Publishers Pvt Ltd., 2014. ISBN-13: 978-0124114616.

REFERENCE BOOKS:

1. R N Prasad and Seema Acharya, **"Fundamentals of Business Analytics",** 2nd Edition, Wiley Publications, 2016. ISBN-13: 978-8126563791.
2. U Dinesh Kumar, **"Business Analytics: The Science of Data - Driven Decision Making",** 1st Edition, Wiley Publications, 2017. ISBN-13: 978-8126568772.
3. Foster Provost and Tom Fawcett, **"Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking",** 1st Edition, O'Reilly Publications/Shroff Publishers and Distributors Pvt. Ltd., 2013. ISBN-13: 978-9351102670.
4. Ramesh Sharda, Dursun Delen and Efraim Turban, **"Business Intelligence, Analytics, and Data Science: A Managerial Perspective",** 1st Edition, Pearson Education, 2019, ISBN-13: 978-9353067021.
5. Carolo Vercellis, **"Business Intelligence: Data Mining and Optimization for Decision Making",** 1st Edition, Wiley Publications, 2013. ISBN-13: 978-8126541881.

SELF-STUDY REFERENCES/WEBLINKS:

1. **Foundational Data Modeling**
   https://www.youtube.com/watch?v=CyP8UfeXVWg
2. **Dimensional Modeling**
   https://www.youtube.com/watch?v=lWPiSZf7-uQ
3. **Business Intelligence Dimensional Modeling**
   https://www.youtube.com/watch?v=rcpM0MZX-qc

COURSE COORDINATOR:	**Dr.Gowrishankar S.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

	Course Title: Introduction To Big Data Analytics		
	Course Code: 18CS73	**No. of Credits: 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 03**
	Exam Duration : 3 hours	**CIE+ Assignment + SEE = 45+5+50=100**	**Total No. of Contact Hours : 42**

Course Objectives:	**Description**
	This course will enable students to: • Understand fundamentals process of adopting Big Data analytics • Learn the Hadoop framework and NOSQL concepts • Learn to use Spark APIs, write SQL queries, Streaming concepts • Design distributed Machine Learning models with Spark's MLlib • Get exposed to case studies of complex real world problems

Unit No	Syllabus Content	No of Hours
1	**Introduction to Big Data Analytics:** Big data and its characteristics, Market and Business Drivers for Big Data Analytics, Business Problems Suited to Big Data Analytics, Developing a Strategy for Integrating Big Data Analytics into the Enterprise, Introduction to High-Performance Appliances for Big Data Management, NoSQL Data Management for Big Data	8
2	**Introduction to Hadoop:** Introduction, Hadoop and its Ecosystem, Hadoop Distributed File System, MapReduce Framework and Programming Model, Hadoop Yarn, Hadoop Ecosystem Tools **Introduction to Apache Spark:** The genesis of Spark, Hadoop at Yahoo and Spark early years, What is Apache Spark, Unified Analytics, Apache Spark's Distributed Execution, Spark Application and Spark session, Spark Jobs, Spark stages , Spark tasks, Transformation, Actions and Lazy Evaluation, Narrow and wide transformation, The Spark UI, Your first Standalone application.	9
3	**Adding structure to Apache Spark:** Apache Spark's structured APIs : The Dataframe API, The dataset API, Spark SQL and the underlying engine, Using Spark SQL in Spark Applications, SQL Tables and Views, Data sources for Data frames and SQL Tables, Common Data frames and Spark SQL operations, Structured Streaming, Programming model of Structured streaming, The fundamentals of Structured Streaming query, Streaming data sources and sinks : Apache Kafka.	9
4	**Reliable Storage solutions with Apache Spark:** Importance of Optimal storage solutions, Databases, Data lakes, Data houses, Apache Hudi, Apache Iceberg, Delta lake **Machine Learning with MLlib:**Supervised and Unpervised Machine	8

	Learning, Designing machine Learning pipelines, Hyperparameter Tuning, Model Management using MLflow	
5	**Advanced analytics with Spark, Case studies**: Exploring key machine learning algorithms on Spark for Recommender engines, Anomaly detection in network, Latent Semantic analysis in Natural language processing, Geospatial and temporal data Analysis, Image data analysis	**8**

Course Outcomes	**Description**	**RBT Levels**
CO1	Explore the fundamentals and process of adopting Big Data analytics	**L1, L2**
CO2	Explore Hadoop framework and NOSQL Data Management for Big Data	**L1, L2, L3**
CO3	Use Spark to process structured data to perform data engineering tasks	**L1,L2, L3, L4**
CO4	Build distributed Machine Learning models with Spark's MLlib	**L1, L2, L3**
CO5	Create complex analytics on large datasets using Machine learning tools by building and evaluating models	**L1,L2, L3, L4**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**P06**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**1**	**2**	**1**	**2**								**2**
CO2	**1**	**2**	**2**									
CO3	**3**	**2**	**2**		**2**							
CO4	**3**	**3**	**2**	**2**								
CO5	**3**	**2**	**2**	**2**	**2**							**1**

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

2. Holden Karau, Andy Konwinski, Patrick WendellMatei Zaharia, "Learning Spark: Lightning-Fast Big Data Analysis", O'Reilly, 2015, Edition 1.

3. Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills,"Advanced Analytics with Spark by Sandy Ryza, Uri Laserson, Sean Owen, and Josh Wills (O'Reilly). Copyright 2015 .

REFERENCE BOOKS:

1. Raj Kamal and Preeti Saxena, "**Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning",** McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966 2. Douglas Eadline, **"Hadoop 2 Quick-Start Guide: Learn the Essentials of Big Data Computing in the Apache Hadoop 2 Ecosystem",** 1st Edition, Pearson Education, 2016. ISBN-13: 978-9332570351 3. Raj Kamal and Preeti Saxena, "**Big Data Analytics Introduction to Hadoop, Spark, and Machine-Learning",** McGraw Hill Education, 2018 ISBN: 9789353164966, 9353164966	
SELF STUDY REFERENCES/WEBLINKS:	
COURSE COORDINATOR:	**Vinutha H**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Course Title: CLOUD COMPUTING		
Course Code: 18CS72	**No. of Credits: 4: 0: 0 (L-T-P)**	**No. of Lecture Hours/Week: 4**
Exam Duration: 3 Hours	**CIE + Assignment + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours: 52**

Course Objectives:	**Description**
	1. Explain the fundamentals of cloud computing. 2. Illustrate the cloud applications and services. 3. Compare the different cloud platforms used in the industry.

Unit No	**Syllabus Content**	**No of Hours**
1.	**Scalable Computing Over the Internet:** The Age of Internet Computing, Scalable Computing Trends and New Paradigms, Virtual Machines and Virtualization Middleware, Data Center Virtualization for Cloud Computing, **System Models for Distributed and Cloud Computing:** Clusters of Cooperative Computers, Grid Computing Infrastructures, Peer-to-Peer Network Families, Cloud Computing over the Internet, **Software Environments for Distributed Systems and Clouds:** Service-Oriented Architecture (SOA), **Performance, Security and Energy Efficiency:** Performance Metrics and Scalability Analysis, Fault Tolerance and System Availability, Network Threats and Data Integrity, Energy Efficiency in Distributed Computing	**10**
2.	**Implementation of Virtualization:** Levels of Virtualization Implementation, VMM Design Requirements and Providers, Virtualization Support at the OS Level, Middleware Support for Virtualization, **Virtualization Structures/Tools and Mechanisms:** Hypervisor and Xen Architecture, Binary Translation with Full Virtualization, Para-Virtualization with Compiler Support, **Virtualization of CPU, Memory and I/O Devices:** Hardware Support for Virtualization, CPU Virtualization, Memory Virtualization, I/O Virtualization, **Virtual Clusters and Resource Management:** Physical versus Virtual Clusters, Migration of Memory, Files, and Network Resources, Dynamic Deployment of Virtual Clusters, **Virtualization for Data-Center Automation:** Server Consolidation in Data Centers, Virtual Storage Management, Cloud OS for Virtualized Data Centers.	**10**
3.	**Cloud Computing and Service Models:** Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS), **Data-Center Design and Interconnection Networks:** Warehouse-Scale Data-Center Design, Data-Center Interconnection Networks, Modular Data Center in Shipping Containers, Interconnection of Modular Data Centers, Data-Center Management Issues, **Architectural Design of Compute and Storage Clouds:** A Generic Cloud Architecture Design, Layered Cloud Architectural Development, Virtualization	**12**

	Support and Disaster Recovery, Architectural Design Challenges, **Public Cloud Platforms: GAE, AWS, AND AZURE:** Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Services (AWS), Microsoft Windows Azure, **Inter-Cloud Resource Management:** Extended Cloud Computing Services, Resource Provisioning and Platform Deployment, , Virtual Machine Creation and Management, Global Exchange of Cloud Resources, **Cloud Security and Trust Management:** Cloud Security Defense Strategies, Distributed Intrusion/Anomaly Detection, Data and Software Protection Techniques.	
4.	**Features of Cloud and Grid Platforms:** Cloud Capabilities and Platform Features, Traditional Features Common to Grids and Clouds, Data Features and Databases, Programming and Runtime Support, **Programming Support of Google APP Engine:** Programming the Google App Engine, Google File System (GFS), BigTable, Google's NOSQL System, Chubby, Google's Distributed Lock Service, **Programming on Amazon AWS and Microsoft AZURE:** Programming on Amazon EC2, Amazon Simple Storage Service (S3), Amazon Elastic Block Store (EBS) and SimpleDB, Microsoft Azure Programming Support, **Emerging Cloud Software Environments:** Open Source Eucalyptus and Nimbus, OpenNebula, Sector/Sphere, and OpenStack, Manjrasoft Aneka Cloud and Appliances.	**10**
5.	**SELF-STUDY** **Cloud Trends in Supporting Ubiquitous Computing:** Use of Clouds for HPC/HTC and Ubiquitous Computing, Large-Scale Private Clouds at NASA and CERN, Cloud Mashups for Agility and Scalability, Cloudlets for Mobile Cloud Computing, **Performance of Distributed Systems and the Cloud:** Review of Science and Research Clouds, Data-Intensive Scalable Computing (DISC), Quality of Service in Cloud Computing, Benchmarking MPI, Azure, EC2, MapReduce, and Hadoop, Communities and Applications of Social Networks, Twitter for Microblogging, News, and Alert Services.	**10**

Course Outcomes	**Description**	**RBT Levels**
CO1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.	**L2**
CO2	Discuss virtualization and outline its role in enabling the cloud computing system model.	**L2**
CO3	Identify the architecture and infrastructure of cloud computing and explain the core issues of cloud computing such as security and privacy.	**L3**
CO4	Determine the appropriate cloud computing solutions and provide recommendations according to the applications used.	**L3**
CO5	Compute the performance of cloud systems under different scenarios.	**L3**

CO-PO Mapping	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	2	1	2	1	-	-	-	-	-	-	-
CO2	3	2	3	3	2	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	3	2	2	3	-	-	-	-	-	-	-
CO5	2	2	3	3	3	-	-	-	-	-	-	-

Strong -3 Medium -2 Weak -1

TEXT BOOKS:

1. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, **"Distributed and Cloud Computing: From Parallel Processing to the Internet of Things",** 1st Edition, Morgan Kaufmann/Elsevier Publications, 2012, ISBN-13: 978-0123858801.

REFERENCE BOOKS:

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, **"Mastering Cloud Computing",** 1st Edition, McGraw Hill Education, 2013, ISBN-13: 978-1259029950.
2. Dan C. Marinescu, "Cloud Computing - Theory and Practice", 1st Edition, Morgan Kaufmann/Elsevier Publications, 2013, ISBN-13: 978-9351070948.
3. Dinkar Sitaram and Geetha Manjunath, "Moving to the Cloud - Developing Apps in the New World of Cloud Computing", 1st Edition, Syngress/Elsevier Publications, 2012, ISBN-13: 978-9381269251

SELF-STUDY REFERENCES/WEBLINKS:

1. https://www.youtube.com/watch?v=PE-zbhDgf1c
2. https://www.youtube.com/watch?v=sS7fyW_qDrg

COURSE COORDINATOR:	**Dr.Siddaraju** **Mr.Srinivasa A. H.**

Professor & Head
Department of Computer Science &
Dr. Ambedkar Institute of Tech.
Bangalore-560 056.

Syllabus for 2018-19 Batch UG (CV)

Semester: VII / VIII	
Course Title: OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)	
Course Code: **18HS72 / 82**	Evaluation Procedure:
Credits: **02**	CIE + Assignment + Group Activity + SEE Marks = 40 + 5 + 5 + 50 = 100
Teaching Hours: 26 Hrs. (L:T:P:S) - 2:0:0:0	SEE Duration: 2 Hrs

Course Learning Objectives:	
1	To gain an historical, economic, and organizational perspective of occupational safety and health.
2	To investigate current occupational safety and health problems and solutions.
3	To identify the forces that influence occupational safety and health.
4	To demonstrate the knowledge and skills needed to identify work place problems and safe work practice.

UNIT - I	
OCCUPATIONAL HAZARD AND CONTROL PRINCIPLES: Safety, History and development, National Safety Policy. Occupational safety and Health Act (OSHA), Occupational Health and Safety administration - Laws governing OSHA and right to know. Accident – causation, investigation, investigation plan, Methods of acquiring accident facts, Supervisory role in accident investigation.	**6 Hrs**
UNIT - II	
ERGONOMICS AT WORK PLACE: Ergonomics Task analysis, Preventing Ergonomic Hazards, Work space Envelops, Visual Ergonomics, Ergonomic Standards, Ergonomic Programs. Emergency Response - Decision for action – purpose and considerations.	**5 Hrs**
UNIT - III	
FIRE PREVENTION AND PROTECTION: Fire Triangle, Fire Development and its severity, Effect of Enclosures, early detection of Fire, Classification of fire and Fire Extinguishers. Electrical Safety.	**5 Hrs**
UNIT – IV (Blended Learning)	
HEALTH CONSIDERATIONS AT WORK PLACE: Types of diseases and their spread, Health Emergency. Personal Protective Equipment (PPE) – types and advantages, effects of exposure and treatment for engineering industries, municipal solid waste. Environment management plans (EMP) for safety and sustainability.	**5 Hrs**
UNIT - V	
OCCUPATIONAL HEALTH AND SAFETY CONSIDERATIONS: Handling of chemicals and safety measures in water and wastewater treatment plants and labs, Construction material manufacturing industries like cement plants, RMC Plants, precast plants and construction sites. Policies, roles and responsibilities of workers, supervisors and managers.	**5 Hrs**

Course Outcomes: The students will be able to	
1	Acquire knowledge on OSHA policies, Laws and regulations.
2	Identify hazards in the workplace that pose a danger or threat to the safety or health, or that of others.
3	Control unsafe or unhealthy hazards and propose methods to eliminate the hazards.
4	Discuss the role of health and safety in the workplace and effects of industries on environment.
5	Identify workplace hazards, safety considerations and roles and responsibilities of workers, supervisors and managers.

Question paper pattern:
• Each unit has two full questions with internal choice. • Each full question will have a maximum of two sub question. • Each full question will be for 10 Marks. • Students will have to answer five full questions, selecting one full question from each unit.

Text Books:	
1	S Sharma, Vineet Kumar, "Safety, Occupational Health and Environmental Management in Construction". Khanna Publisher, 2013.
2	R K Jain, Sunil S Rao, "Industrial Safety, Health and Environment Management Systems". Createspace Independent Publishing Flat form, 2000.
3	Charles D Reese, "Occupational Safety and Health Fundamental principles and Philosophies", Tailor and Francis Ltd, 2017.
4	Sudhakar Paul T Rani, "Occupational Safety and Health", Createspace Independent Publishing Platform, 2018.
5	Akhil Kumar Das, "Principles of Fire Safety Engineering-Understanding Fire and Fire Protection-", PHI Learning Pvt. Ltd, 2019.
6	Lakhwinder Pal Singh, "Work study and Ergonomics", Cambridge University Press, 2018.
7	Industrial safety Sectional Committee CHD8, IS-14489:2018; Occupational Health and Safety Audit- Code' of Practice (First Revision) Bureau of Indian Standards.

Reference Books:	
1	Mishra R K, "Safety Management", AITBS Publisher.
2	Rana S P, Goswami P K, and Indu Rathee, "Handbook of Occupational Safety and Industrial Psychology". S. Chand and Company Ltd, 2014.
3	Narayanaraju G (Secretary to GOI), "The Occupational Safety, Health and Working Conditions Code, 2020", NO. 37 OF 2020, Govt. of India, Ministry of Law and Justice.
4	Goetsch D. L., "Occupational Safety and Health for Technologists, Engineers and Managers", Prentice Hall Publishers, 2010.

CO-PO Mapping

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓											
CO2					✓							
CO3					✓							
CO4							✓					
CO5									✓			✓

2021 Syllabus

Dr. Ambedkar Institute of technology, Bengaluru-56

Department of Computer Science & Engineering

The enclosed documents are verified & approved.

Prof & Head

Dr. Siddaraju

Department of Computer Science & Engineering

Professor & Head
Department of Computer Science & Engineerir
Dr. Ambedkar Institute of Technology
Bangalore-560 056.

OFFICE OF THE DEAN (ACADEMICS)

Credit breakdown/distribution for all Semesters B.E. programme	
Semester	**Credits**
I & II	**20 + 20 = 40**
III	**18**
IV	**22**
V	**18**
VI	**22**
VII	**24**
VIII	**16**
Total	**160**

Dr. Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)(As per NEP 2020)
B.E. Computer Science and Engineering
Tentative Scheme of Teaching and Examination effective from the Academic Year 2022-23

III Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department (TD)/ Paper setting Board(PSB)	Teaching Hrs/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	BSC	21MAT301CS	**Mathematics Course**	Mathematics	3	0	0	0	03	03	50	50	100	3
2	IPCC	21**CS**T302	**Data Structures & Applications**	**CSE**	3	0	2	0	05	03	50	50	100	4
3	IPCC	21**CS**T303	**Digital Logic Design**	**CSE**	3	0	2	0	05	03	50	50	100	4
4	PCC	21**CS**T304	**Computer Organization and Architecture**	**CSE**	3	0	0	0	03	03	50	50	100	3

5	PCC	21**CS**L305	**Object Oriented Programming with C++laboratory**	**CSE**	0	0	2	0	02	03	50	50	100	1
6	UHV	21**HST**306	**Social Connect and Responsibility**	Any Department	0	0	1	0	01	01	50	50	100	1
7	HSSC	21HST3S07 21HST3B07 OR 21HST307	Samskrutika / Balake Kannada OR Constitution of India & Professional Ethics(CIP)		1	0	0	1	02	01	50	50	100	1
8	AEC	21**CS**T308X	**Ability Enhancement Course – III**	TD: Concerned department PSB: Concerned Board	If offered as Theory Course 1 If offered as Lab. Course 0	 0 0	 0 2	 0 0	01 02	01 02	50	50	100	1
9	HSSC	21HSN309	Professional skills	HSS	1	0	1	0		02	50	---	PP/NP	0
										Total	**400**	**400**	**800**	**18**
10	Scheduled activities for III to VIII semesters	21HSNS803	National Service Scheme (NSS)	NSS	All students have to register for any one of the courses namely National Service Scheme, Physical Education(PE)(Sports and Athletics), and Yoga with the concerned coordinator of the course during the first week of III semester. The activities shall be carried out between III semesters to VIII semester (for 5 semesters). SEE in the above courses shall be conducted during VIII semester examinations and the accumulated CIE marks shall be added to the SEE marks. Success full completion of the registered course is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities.									

		21HSN803	Physical Education(PE) (Sports and Athletics)	PE									
		21HSN803	Yoga	Yoga									
Course prescribed to lateral entry Diploma holders admitted to III semester B.E. programs													
11	21MAD310		Additional Mathematics–I	Maths	02	02	--	--	--	50	---	50	PP/NP

Note: BSC: Basic Science Course, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course, **INT**–Internship, **HSSC:** Humanity and Social Science Courses,
AEC–Ability Enhancement Courses .**UHV:** Universal Human Value Course.
L–Lecture, **T**–Tutorial, P-Practical/Drawing, **S**–Self Study Component, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Examination.
TD-Teaching Department, **PSB**: Paper Setting department.

21HST307/407 Samskrutika Kannada is for students who speak , read and write Kannada/Balake Kannada is for non-Kannada speaking, reading, and writing students.

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L:T:P) can be considered as (3:0:2)or(2:2:2).The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be Included in these question paper.

21XXI413 Inter/Intra Institutional Internship: All the students admitted to engineering programs under the lateral entry category shall have to undergo a mandatory **21XXI413** Inter/Intra Institutional Internship of **03 weeks** during the intervening period of III and IV semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the IV semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up /complete the internship shall be declared fail and shall have to complete during subsequently after satisfying the internship requirements. The faculty coordinator or mentor shall monitor the students 'internship progress and interact with them for the successful completion of the internship.

Non–credit mandatory courses(NCMC):
(A) Additional Mathematics I and II:

(1) These courses are prescribed for III and IV semesters respectively to lateral entry Diploma holders admitted to III semester of B.E./B.Tech., programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

(2) Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

(3) Successful completion of the courses Additional Mathematics I and II shall be indicated as **NP/PP** in the grade card. Non-completion of the courses Additional Mathematics I and II shall be indicated as unsatisfactory.

(B)Placement Training: These courses are prescribed for I and VI semesters respectively to the students of B.E. programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have secured an **NP (not pass)** grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

National Service Scheme/Physical Education(Sport and Athletics)/Yoga:

(1) Securing 40% or more in CIE, 35% or more marks in SEE and 40% or more in the sum total of CIE+ SEE leads to successful completion of the registered course.

(2) In case, students fail to secure35%marks in SEE, they have to appear for SEE during the subsequent examinations conducted by the University.

(3) In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have not completed the requirements of the course. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks.

(4) Successful completion of the course shall be indicated as satisfactory in the grade card. Non-completion of the course shall be indicated as Unsatisfactory.

(5) These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall Be mandatory for the award of degree.

Ability Enhancement Course–III			
21CST3091	**Mastering Office**	**21CST3093**	
21CST3092	**Hardware & Networking**	**21CST3094**	

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IV Semester

Sl. No	**Course Category**	**Course Code**	**Course Title**	**Teaching Department(TD)/ Paper setting Board(PSB)**	**Teaching Hrs/ Week**					**Examination**				**Credits**
					L	**T**	**P**	**S**	**Total**	**Duration (Hrs)**	**CIE Marks**	**SEE Marks**	**Total Marks**	
1	BSC	21MAT401CS	**Mathematics Course (Content of the**	Mathematics	3	0	0	0	03	03	50	50	100	3

			Mathematics course may be decided in consultation with concerned BOS)											
2	IPCC	21**C**ST402	**Design and Analysis of Algorithms**	**CSE**	3	0	2	0	05	03	50	50	100	4
3	IPCC	21**C**ST403	**Microcontroller and Embedded System**	**CSE**	3	0	2	0	05	03	50	50	100	4
4	PCC	21**C**ST404	**Operating System**	**CSE**	3	0	0	0	03	03	50	50	100	3
5	PCC	21**C**SL405	**Python Programming Laboratory**	**CSE**						03	50	50	100	1
6	AEC	21**C**ST406	**Biology for Engineers**	CHE, PHY	2	0	0	0	02	02	50	50	100	2
7	HSSC	21HSTS407 21HST4B07	Samskrutika Kannada/ Balake Kannada		1	0	0	0	02	01	50	50	100	1
		OR												
		21HST407	Constitution of India, Professional Ethics(CIP)											
8	AEC	21**C**ST408X	Ability Enhancement Course – IV	TD: Concerned department PSB: Concerned Board	If offered as Theory Course					01	50	50	100	1
					1	0	0							
					If offered as Lab. Course					02				
					0	0	2							
9	UHV	21**C**ST409	Universal Human Values	Any Department						01	50	50	100	1
10	INT	21**C**SI410	Inter/Intra Institutional Internship	Evaluation by the appropriate authorities	Completed during the intervening period of II and III semesters by students					3	100	-	100	02

					admitted to first year of BE./B.Tech and during the intervening period of III and IV semesters by Lateral entry students admitted to III semester.									
11	HSSC	21HSN411	Professional skills	HSS	1	0	1	0		02	50	-	PP/NP	0
								Total			**550**	**450**	**1000**	**22**

Course prescribed to lateral entry Diploma holders admitted to III semester B.E programs

11	21MAN411	Additional Mathematics–I	Maths	02	02	--	--	--	100	PP/NP	100	0

Note: BSC: Basic Science Course, IPCC: Integrated Professional Core Course, PCC: Professional Core Course, AEC–Ability Enhancement Courses **HSSC:** Humanity and Social Science Courses, UHV- Universal Human Value Courses.
L–Lecture, T–Tutorial, P-Practical/Drawing, S–Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

21HST307/407 Samskrutika Kannada is for students who speak ,read and write Kannada and 21KBK37/47 Balake Kannada is for non-Kannada speaking, reading, and writing students.

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L:T:P)can be considered as(3:0:2)or(2:2:2).The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

Non–credit mandatory course(NCMC):

(A)Additional Mathematics –II:

(1) Lateral entry Diploma holders admitted to III semester of B.E./B.Tech.., shall attend the classes during the IV semester to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40% of the prescribed CIE marks, he/she shall be deemed to have secured an F grade. In such a case, the student has to fulfill the course requirements during

subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.
(2) Additional Mathematics I and II shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

(3) Successful completion of the course Additional Mathematics-II shall be indicated as satisfactory in the grade card. Non-completion of the courses Additional Mathematics-II shall be indicated as Unsatisfactory.
(B)Placement Training: These courses are prescribed for I and VI semesters respectively to the students of all B.E. programs. They shall attend the classes during the respective semesters to complete all the formalities of the course and appear for the Continuous Internal Evaluation (CIE). In case, any student fails to register for the said course/fails to secure the minimum 40 % of the prescribed CIE marks , he/she shall be deemed to have secured an **NP(not pass)** grade. In such a case, the student has to fulfill the course requirements during subsequent semester/s to earn the qualifying CIE marks. These courses are slated for CIE only and have no SEE.

Internship of 04 weeks during the intervening period of IV and V semesters; 21XXI413 **Innovation/Entrepreneurship/Societal based Internship.**
(1) All the students shall have to undergo a mandatory internship of **04 weeks** during the intervening period of IV and V semesters. The internship shall be slated for CIE only and will not have SEE. The letter grade earned through CIE shall be included in the VI semester grade card. The internship shall be considered as a head of passing and shall be considered for vertical progression and for the award of degree. Those, who do not take up /complete the internship shall be considered under F (fail) grade and shall have to complete during subsequently after satisfying the internship requirements

(2) Innovation/ Entrepreneurship Internship shall be carried out at industry, State and Central Government /Non-government organizations (NGOs), micro, small and medium enterprises (MSME), Innovation centers, or Incubation centers. Innovation need not be a single major breakthrough; it can also be a series of small or incremental changes. Innovation of any kind can also happen outside of the business world.
Entrepreneurship internships offer a chance to gain hands-on experience in the world of entrepreneurship and helps to learn what it takes to run a small entrepreneurial business by performing intern duties with an established company. This experience can then be applied to future business endeavors. Start-ups and small companies are a preferred place to learn the business tack ticks or future entrepreneurs as earning how a small business operates will serve the intern well when he/she manages his/her own company. Entrepreneurship acts as a catalyst to open the minds to creativity and innovation. Entrepreneurship internships can be from several sectors, including technology, small and medium-sized, and the service sector.

(3) **Societal or social internship:** Urbanization is increasing on a global scale; and yet, half the world’s population still resides in rural areas and is devoid of many things that urban population enjoys. The rural internship is a work-based activity in which students will have a chance to solve/reduce the problems of the rural place for better living.

Ability Enhancement Course–IV			
21CST4081	**Unix Shell Programming**	**21CST4083**	**Web Programming**
21CST4082	**R Programming**	**21CST4084**	**JAVA Programming**

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V Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department (TD) / Paper setting Board(PSB)	Teaching Hrs/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	PCC	21**CS**T501	**Automata Theory and compiler Design**	**CSE**	3	0	0	0	03	03	50	50	100	3
2	IPCC	21**CS**T502	**Computer Network**	**CSE**	3	0	2	0	05	03	50	50	100	4
3	PCC	21**CS**T503	**Database Management**	**CSE**	3	0	0	0	03	03	50	50	100	3

			Systems											
4	PCC	21**CST**504	**Artificial Intelligence and Machine Learning**	**CSE**	3	0	0	0	03	03	50	50	100	3
5	PCC	21**CSL**505	**Database Management Systems Laboratory with Mini Project Lab**	**CSE**	0	0	2	0	02	03	50	50	100	1
6	AEC	21**CST**506	**Research Methodology &Intellectual property rights**	TD: Any department PSB: As identified by the Institute	2	0	0	0	02	02	50	50	100	2
7	HSSC	21CV507	**Environmental Studies**	TD: Civil/Chemistry PSB: Civil Engg.	1	0	0	0	01	01	50	50	100	1
8	AEC	21**CST**508 X	**Ability enhancement course – V**	Concerned Board	If offered as Theory courses 1 If offered as Lab Courses 0	0 0	0 2			01 02	50	50	100	1
9	HSSC	21HSN509	**Aptitude and Verbal ability skills**		1	0	1	0		02	50	--	PP/ NP	0
										Total	450	400	800	18

Ability Enhancement Course-V			
Code	Course title	Code	Course title
21CST5081	**Angular and React JS**	21CST5083	**Cloud Infrastructure Service**
21CST5082	**C# and Dot Net Framework**	21CST5084	**Cloud Computing**

Note: BSC: Basic Science Course, PCC: Professional Core Course, IPCC: Integrated Professional Core Course, AEC –Ability Enhancement Course INT –Internship, **HSSC:** Humanity and Social Science Courses.
L–Lecture, T –Tutorial,P-Practical/Drawing,S–SelfStudyComponent,CIE:Continuous Internal Evaluation, SEE: Semester End Examination.

Integrated Professional Core Course (IPCC): refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L:T:P) can be considered as (3:0:2) or (2:2:2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE.
For more details the regulation governing the Degree of Bachelor of Engineering/Technology (BE/B.Tech.)2021-22 may be referred.

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VI Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs / Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	HSSC	21CST601	Software Engineering and Project Management	Any department	3	0	0	0	03	03	50	50	100	3
2	IPCC	21CST602	Full-stack Development	CSE	3	0	2	0	05	03	50	50	100	4
3	PCC	21CST603	Computer Graphics and Introduction to Image Processing	CSE	3	0	0	0	03	03	50	50	100	3
4	PEC	21CSE604X	Professional Elective course –I	CSE	3	0	0	0	03	03	50	50	100	3
5	OEC	21CSE605X	Open Elective course - I	Concerned department	3	0	0	0	03	03	50	50	100	3
6	PCC	21CSL606	Computer Graphics and Image Processing Laboratory	CSE	1	0	0	0	01	03	50	50	100	1
7	MP	21CSM607	Mini Project	CSE	Two contact hours/week for interaction between the faculty and students					----	100	---	100	2
8	INT	21CSI608	Innovation/ Entrepreneurship/ Societal internship	Completed during the intervening period of IV and V semesters.						----	100	----	100	3
9	HSSC	21HSN609	Analytical and reasoning skills	Placement cell	2	0	0	-	02	---	50	--	PP/ NP	0

Total			550	300	800	22

Note: HSSC: Humanity and Social Science Courses, **IPCC:** Integrated Professional Core Course, **PCC:** Professional Core Course,
EC: Professional Elective Courses, O**EC**–Open Elective Course, **MP**–Mini Project, INT –Internship.
cture, **T**–Tutorial, **P**-Practical/Drawing, **S**–Self Study Component, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Examination.

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L:T:P) can be considered as(3:0:2) or (2:2:2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE. **For more details, there gelation governing the Degree of Bachelor of Engineering/Technology (BE/) 2021-22 may be referred.**

Professional Elective Courses(PEC):
A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course out of five courses. The minimum students strength for offering professional electives is 10. However, this conditional shall not be applicable to cases where the admission to the programme is less than10.

Open Elective Courses:
Students belonging to a particular stream of Engineering and Technology are noted titled for the open electives offered by their parent Department. However, they can opt an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/Advisor/Mentor.

Selection of an open elective shall **not be allowed** if,

- **(i)** The candidate has studied the same course during the previous semesters of the program.
- **(ii)** The syllabus content of open electives is similar to that of the Departmental core courses or professional electives.
- **(iii)** A similar course under any category, is prescribed in the higher semester of the program.

In case, any college is desirous of offering a course (not included in the Open Elective List of the University) from streams such as Law, Business(MBA), Medicine, Arts, Commerce, etc., can seek permission, at least one month before the commencement of the semester, from the University by submitting a copy of the syllabus along with the details of expertise available to teach the same in the college.

The minimum students' strength for offering open electives is10.However, this conditional shall not be applicable to cases where the admission to The programme is less than 10.

Mini-project work: Mini Project is a laboratory-oriented course which will provide a platform to students to enhance the practical knowledge and skills by the development of small systems/applications.
Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini-project can be assigned to an individual student or to a group having not morethan4 students.

CIE procedure for Mini-project:

(i) **Single discipline:** The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(ii) **Interdisciplinary:** Continuous Internal Evaluation shall be group-wiseatthecollegelevelwiththeparticipationofalltheguidesoftheproject.
The CIE marks awarded for the Mini-project, shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.

No SEE component for Mini-Project.

VII semester Classwork and Research Internship / Industry Internship(21XXI802)

Swapping Facility:

(1) Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate research internship/industry internship after the
VI semester**.**

(2) Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.

Elucidation:

At the beginning of IV year of the programme i.e., after VI semester, VII semester classwork and VIII semester Research Internship /Industrial Internship shall be permitted to be operated simultaneously by the University so that students have ample opportunity for internship. In other words, a good percentage of the class shall attend VII semester classwork and a similar percentage of others shall attend to Research Internship or Industrial Internship.

Research/Industrial Internship shall be carried out at an Industry, NGO, MSME, Innovation centre, Incubation centre, Start-up, Centers of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations / institutes. The internship can also be rural internship. The mandatory Research internship /Industry internship is for **24 weeks**. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared fail and shall have to complete during the subsequent Institute/University examination after satisfying the internship requirements.

21XXI802 Research Internship/Industry Internship/Rural Internship:

Research internship: A research internship is intended to offer the flavor of current research going on in the research field. It helps students get familiarized with the field and imparts the skill required for carrying out research.

Industry internship : Is an extended period of work experience undertaken by students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints.

The faculty coordinator or mentor has to monitor the students ‘internship progress and interact with them to guide for the successful completion of the internship. The students are permitted to carry out the internship anywhere in India or abroad. University shall not be are annex pansies in corroding respect of internship.

Professional Elective Courses-I		Open Elective Courses-I	
Subject Code	**Title**	**Subject Code**	**Title**
21CSTE6041	Agile Technology	21CSTE6051	Introduction to Data Structure
21CSTE6042	Advanced JAVA Programming	21CSTE6052	Introduction to Database Management Systems
21CSTE6043	Advanced Computer Architecture	21CSTE6053	Introduction to Cyber Security
21CSTE6044	Data science and Visualization	21CSTE6054	Programming in JAVA

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Swappable VII and VIII SEMESTER

VII Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	PCC	21CST701	Big Data Analytics	CSE	3	0	0	0	03	3	50	50	100	3
2	PCC	21CST702	Cloud Computing	CSE	3	0	0	0	03	3	50	50	100	3
3	PEC	21CST703X	Professional elective Course-II	CSE	3	0	0	0	03	3	50	50	100	3
4	PEC	21CST704X	Professional elective Course-III	CSE	3	0	0	0	03	3	50	50	100	3
5	OEC	21CST705X	Open elective Course-II	Concerned department	3	0	0	0	03	3	50	50	100	3
6	Project	21CSP706	Project work	CSE	Two contact hours/week for Interaction between the faculty and students.					3	100	100	200	10
								Total			350	350	700	24

Professional Elective Courses-II	Professional Elective Courses-III	Open Elective Courses-II

Course Code	Title	Course Code	Title	Course Code	Title
21CSTE7031	Object oriented Modelling and Design	**21CSTE7041**	Software Architecture and Design Patterns	**21CSTE7051**	Programming in Python
21CSTE7032	Digital Image Processing	**21CSTE7042**	Multiagent Systems	**21CSTE7052**	Introduction to AI and ML
21CSTE7033	Cryptography and Network Security	**21CSTE7043**	Deep Learning	**21CSTE7052**	Introduction to Big Data
21CSTE7034	Blockchain Technology	**21CSTE7044**	Robotic Process Automation Design and Development	**21CSTE7052**	Introduction to Data Science
21CSTE7035	Internet of Things	**21CSTE7045**	NoSQL Data Base		

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VIII Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs/ Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	Seminar	21CSS801	Technical Seminar	CSE	One contact hour/week for interaction between the faculty and students.					---	100	---	100	01
2	Internship	21CSI802	Research internship/ Industry Internship	CSE	Two contact hours /week for interaction between the faculty and students.					03 (Batch wise)	100	100	200	15
3	NCMC	21CS803	National Service Scheme(NSS)	NSS	Completed during the intervening period of III semester to VIII semester.					--	50	50	100	
		21CS803	Physical Education(PE) (Sports And Athletics)	PE										
		21CS803	Yoga	Yoga										
Total											250	150	400	16

Note: PCC: Professional Core Course, PEC: Professional Elective Courses, OEC–Open Elective Course, AEC –Ability Enhancement Courses.
L –Lecture, T – Tutorial, P- Practical / Drawing, S – Self Study Component, CIE: Continuous Internal Evaluation, SEE: Semester End

Examination.

Note: VII and VIII semesters of IV year of the programme

(1) Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate research internship/ industry internship after the VI semester.

(2) Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.

PROJECT WORK (21XXP706): The objective of the Project work is

(i) To encourage independent learning and the innovative attitude of the students.

(ii) To develop interactive attitude, communication skills, organization, time management, and presentation skills.

(iii) To impart flexibility and adaptability.

(iv) To inspire team working.

(v) To expand intellectual capacity, credibility, judgment and intuition.

(vi) To adhere to punctuality, setting and meeting deadlines.

(vii) To install responsibilities to oneself and others.

(viii) To train students to present the topic of project work in a seminar without any fear, face the audience confidently, enhance communication skills, involve in group discussion to present and exchange ideas.

CIE procedure for Project Work:

(1) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two senior faculty members of the Department, one of whom shall be the Guide.

The CIE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(2) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all guides of the college. Participation of external guide/s, if any, is desirable. The CIE marks awarded for the project work, shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

SEE procedure for Project Work: SEE for project work will be conducted by the two examiners appointed by the University. The SEE marks awarded for the project work shall be based on the evaluation of project work Report, project presentation skill, and question and answer session in the ratio

50:25:25.

TECHNICAL SEMINAR (21XXS801): The objective of the seminar is to inculcate self-learning, present the seminar topic confidently, enhance communication skill, involve in group discussion for exchange of ideas. Each student, under the guidance of a Faculty, shall choose, preferably, a recent topic of his/her interest relevant to the programme of Specialization.

(i) Carry out literature survey, systematically organize the content.

(ii) Prepare the report with own sentences, avoiding a cut and paste act.

(iii) Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities.

(iv) Present the seminar topic orally and/or through PowerPoint slides.

(v) Answer the queries and involve in debate/discussion.

(vi) Submit a typed report with a list of references.

The participants shall take part in the discussion to foster a friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Evaluation Procedure:

The CIE marks for the seminar shall be awarded (based on the relevance of the topic, presentation skill, participation in the question and answer session, and quality of report) by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three teachers from the department with the senior-most acting as the Chairman.

Marks distribution for CIE of the course:

Seminar Report:50 marks Presentation skill:25 marks

Question and Answer: 25 marks. No SEE component for Technical Seminar

Non – credit mandatory courses (NCMC):

National Service Scheme/Physical Education (Sport and Athletics)/ Yoga:

Securing 40% or more in CIE,35 % or more marks in SEE and 40 % or more in the sum total of CIE + SEE leads to successful completion of the registered course.

In case, students fail to secure 35 % marks in SEE, they have to appear for SEE during the subsequent examinations conducted by the University. (3)In case, any student fails to register for NSS, PE or Yoga/fails to secure the minimum 40 % of the prescribed CIE marks, he/she shall be deemed to have not completed the requirements of the course. In such a case, the student has to fulfill the course requirements during subsequently to earn the qualifying CIE marks subject to the maximum program period.

Successful completion of the course shall be indicated as pass (PP) in the grade card. Non-completion of the course (NP) shall be indicated as Unsatisfactory.

These course shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

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Department of Computer Science & Engineering
Scheme and Syllabus - CBCS – 2021 -2022

Course Title	**PROBLEM SOLVING THROUGH PROGRAMMING**						
Course Code	**21CST103/203**						
Category	Engineering Science Course (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	**SEE Marks: 50**	**Total Max. marks=100**		**Duration of SEE: 03 Hours**			

COURSE OBJECTIVES:

1. Elucidate the basic architecture and functionalities of a Computer.
2. Apply programming constructs of C language to solve the real-world problems.
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures.

UNIT I	10 hours
Fundamentals of Problem Solving: Art of programming through Algorithm and Flowchart, Designing solutions to various problems. **Overview of C:** Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions ***Self-Study Component: Introduction to Computer: Computer generations, computer types, CPU, Primary memory, Secondary memory, input devices, And output devices.***	
UNIT II	**10 hours**
Managing Input and output operations: Conditional Branching and Loops: Example programs, finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascal's triangle. ***Self-Study Component: Hardware and Software: Computers in a network, Network hardware, Software basics, And software types.***	
UNIT III	**11 hours**
Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching and Sorting Algorithms (Linear search, Binary search, Bubble sort and Selection sort). ***Self-Study Component: Programming Examples***	
UNIT IV	**10 hours**
User Defined Functions and Recursion. Example programs: Finding Factorial of a positive integer, GCD of two numbers and Fibonacci sequence. ***Self-Study Component:*** Storage classes: auto, extern, static, register.	
UNIT V	**11 hours**
Structures, Unions and Pointers, Programs like Addition of two complex numbers using structures, compute the sum, mean and standard deviation of all elements stored in an array of N real numbers using pointers. ***Self-Study Component: Case Study related to Functions and Structures :***	

<u>Example:</u> Implement structures to read, write and compute average marks and the students scoring above and below average marks for a class of 'N' students with the structure definition as

```
struct student
{
        char name[20];
        int rollno;
        int m1, m2, m3;
        int avg;
}
```

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

At the end of the course the student will be able to:

CO1: Apply logical skills to design and develop algorithms/flow charts to solve real-world problem**s.**

CO2: Apply programming constructs of C language to solve the real world problem

CO3: Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting

CO4: Explore user-defined data structures like structures, unions and pointers in implementing solutions

CO5: Design and Develop Solutions to problems using modular programming construct Using functions

TEXT BOOKS

1. E. Balaguruswamy, "Programming in ANSI C", 7th Edition, Tata McGraw-Hill

2. Brian W. Kernighan and Dennis M. Ritchie, "The 'C' Programming Language", Prentice Hall of India.

REFERENCE BOOKS

1. "Programming in C" by Reema Thereja, , Cengage publication.
2. "C- Programming Techniques" by A.M. Padma Reddy, Sri Nandi Publications

ONLINE RESOURCES

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/

   MOOC courses can be adopted for more clarity in understanding the topics and varieties of problem solving methods.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

1. Answer ANY ONE from Question No. 1 and 2

2. Answer ANY ONE from Question No. 3 and 4

3. Answer ANY ONE from Question No. 5 and 6

4. Answer ANY ONE from Question No. 7 and 8

5. Answer ANY ONE from Question No. 9 and 10

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2		2	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-
Strength of correlation: Low-1, Medium- 2, High-3												

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Department of Computer Science and Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td></td><td colspan="7">COMPUTER PROGRAMMING LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21CSL107/207</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>0</td><td>2</td><td>26</td><td>1</td></tr>
<tr><td>CIE Marks: 50</td><td>SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="4">Duration of SEE: 03 Hours</td></tr>
</table>

Course objectives to:

- Explain problem statements and identify appropriate solutions
- Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
- Development of algorithms and programs using constructs of C programming language
- Reporting the observations

Practice Programs	
1.	To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) (SI = P*T*R/100).
2.	To print the ASCII value of the given input.
3.	To find largest of three numbers.
4.	To perform simple calculator using switch case statement.
5.	To find factorial of a number.
6.	To print even and odd numbers using looping Construct.
7.	To find sum of N natural Numbers
8.	Write a C Program to search for the given key element with the help of Linear search Technique.
9.	Develop a c program to implement selection sort technique.
10.	Develop a C program to swap two numbers using pointers (Call by Reference).

<table>
<tr><th colspan="3">Lab Programs</th></tr>
<tr><td rowspan="2">1</td><td>a</td><td>Write a C program to find the roots of a quadratic equation.</td></tr>
<tr><td>b</td><td>Write a C program to print the numbers in triangular form
1
1 2
1 2 3
1 2 3 4</td></tr>
<tr><td>2</td><td>a</td><td>Write a C program to check whether the given four digit number is palindrome or not.</td></tr>
</table>

<table>
<tr><td></td><td>b</td><td>Write a C program using function to sort the given array elements using bubble sort technique.</td></tr>
<tr><td>3</td><td>a</td><td>Develop a C program to Store age of n students and perform the following operations
i. Find minimum age of student in the list
ii. Find maximum age of a student in the list</td></tr>
<tr><td></td><td>b</td><td>Develop a C Program to compute Sin(x) using Taylor series approximation. Compare your Result With the built- in Library function. Print both the results with appropriate messages.</td></tr>
<tr><td>4</td><td>a</td><td>If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss and determine how much profit or Loss incurred in percentage.</td></tr>
<tr><td></td><td>b.</td><td>Write a C program to implement Recursive functions for Binary to Decimal Conversion.</td></tr>
<tr><td>5</td><td>a</td><td>Write a C program to generate N Fibonacci series.</td></tr>
<tr><td></td><td>b</td><td>Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.</td></tr>
<tr><td>6</td><td>a</td><td>Write a C program to check whether the given number is prime or not.</td></tr>
<tr><td></td><td>b</td><td>Write a C program to
i. read N Bank Employees name
ii. Search for an employee in the list using Binary Search Technique.
Note: Use 2-D character array to store Bank employees names</td></tr>
<tr><td>7</td><td>a</td><td>Develop a C program to calculate tax based on given yearly salary and tax percentages. Read monthly salary of an employee as an input from the user.
Conditions to calculate tax, if yearly salary is:
<table>
<tr><th>Income Range</th><th>Tax Charges</th></tr>
<tr><td><=1,50,000</td><td>No tax</td></tr>
<tr><td>1,50,001 to 3,00,000</td><td>10%</td></tr>
<tr><td>3,00,001 to 5,00,000</td><td>20%</td></tr>
<tr><td>5,00,001 and above</td><td>30%</td></tr>
</table></td></tr>
<tr><td></td><td>b</td><td>Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.</td></tr>
<tr><td>8</td><td></td><td>Develop a program to concatenate two strings and determine the length of the concatenated string without using string-built in function.</td></tr>
<tr><td>9</td><td></td><td>Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each ofthem needs these commodities in differing amounts and can buy them in two shops S1, S2. Whichshop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:</td></tr>
</table>

<table>
<tr><td></td><td></td><td>
Demanded quantity of foodstuff:
<table>
<tr><th></th><th>roll</th><th>bun</th><th>cake</th><th>bread</th></tr>
<tr><td>P_1</td><td>6</td><td>5</td><td>3</td><td>1</td></tr>
<tr><td>P_2</td><td>3</td><td>6</td><td>2</td><td>2</td></tr>
<tr><td>P_3</td><td>3</td><td>4</td><td>3</td><td>1</td></tr>
</table>
Prices in shops S_1 and S_2:
<table>
<tr><th></th><th>S_1</th><th>S_2</th></tr>
<tr><td>roll</td><td>1.50</td><td>1.00</td></tr>
<tr><td>bun</td><td>2.00</td><td>2.50</td></tr>
<tr><td>cake</td><td>5.00</td><td>4.50</td></tr>
<tr><td>bread</td><td>16.00</td><td>17.00</td></tr>
</table>
MATRIX MULTIPLICATION
Write a C program by considering 2 matrices A (M x N) and B (P x Q) that uses functions to perform the following: i. Reading data to p1, p2, p3 (Matrix A) ii. Reading data to s1, s2 (Matrix B) iii. Multiplication of Two Matrices(C=AXB)
</td></tr>
<tr><td>10</td><td></td><td>Write a C Program To maintain a record of bank customer's with four fields (Customer ID, Customer Name, Address and ACC-Num). Read and display the bank customer details.
Note: Using array of structures.</td></tr>
</table>

Note: In the practical examination the student need to select one question and both a, b (if present) should be executed. All the questions listed in the syllabus have to be included in the lots. The change of question has to be considered by deducting marks (20% of execution), provided the request is made for the same, within half an hour from the start of the examination.

Course Outcomes:

At the end of the course the student will be able to:

CO1: Define the problem statement and identify the need for computer programming
CO2: Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming
CO3: Develop algorithm, flowchart and write programs to solve the given problem
CO4: Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.

Suggested Learning Resources:

1. Yashavanth Kanetkar, Let us C, Authentic Guide to C Programming Langauge, bpb publisher, 17th Edition, 2020.
2. Herbert Schildt, C: The complete reference, Mc Graw Hill, 4th Edition, 2017
   Programming in C, Reema Theraja, Cengage publication.

Weblinks and Video Lectures (e-Resources):

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171/

MAPPING of COs with POs

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2		3	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-
CO	3	3	3	2	3	-	-	-	-	-	-	-

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Department of Computer Science & Engineering

Scheme and Syllabus - NEP – 2021 -2021

Course Title	**DATA STRUCTURES AND APPLICATIONS**						
Course Code	**21CST302**						
Category	Engineering Science Course (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	60	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

1. Explain fundamentals of data structures and their applications essential for implementing solutions to problems.
2. Illustrate representation of data structures: Stack, Queues, Linked Lists and Trees.
3. Design and Develop Solutions to problems using Arrays, Structures, Stack, Queues, Linked Lists, and Trees.
4. Find suitable data structure for application development.

Unit 1

Algorithm Specification: Algorithms for sorting and searching.

Introduction: Data Structures, Classifications (Primitive & Non-Primitive), Data structure operations (Traversing, inserting, deleting, searching, and sorting).

Arrays and Structures: Arrays, Dynamically Allocated Arrays, Structures and Unions, Demonstration of representation of Polynomials and Sparse Matrices.

Dynamic Memory Allocation along with its Functions.

Laboratory Component:

1. Write a C program to perform the below operations on an unordered list of integers
   a. Selection sort
   b. Linear search
2. Design, develop, and execute a program in C to read a sparse matrix of integer values and to search the sparse matrix for an element specified by the user. Print the result of the search appropriately. Use the triple <row, column, value> to represent an element in the sparse matrix

Unit 2

Recursion: Recursive Definition and Processes, Recursion in C, The Towers of Hanoi Problem

Stacks: Definition, System stack, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays. Different representation of expression. Stack Applications with Infix to postfix conversion and evaluation of postfix expression.

1. Write recursive C Programs for
   a. Searching an element on a given list of integers using the Binary Search method.
   b. Solving the Towers of Hanoi problem.
2. Write a C Program to construct a stack of integers and to perform the following operations on it:
   a. Push b. Pop c. Display

The program should print appropriate messages for stack overflow, stack underflow, and stack empty.

3. Design, develop, and execute a program in C to convert a given valid parenthesized infix arithmetic expression to postfix expression and then to print both the expressions. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) and / (divide).
4. Design, develop, and execute a program in C to evaluate a valid postfix expression using stack. Assume that the postfix expression is read as a single line consisting of non-negative single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide).

Unit 3

Queues: Definition, Kinds of Queues, Array Representation of Queues, Queue Operations, Circular Queues, Queues and Circular queues using Dynamic arrays.

Linked Lists: Definition, classification of linked lists. Representation of different types of linked lists in Memory, Traversing, Insertion, Deletion, Searching, Sorting, and Concatenation Operations on Singly linked list, Linked Stacks and Queues.

Laboratory Component:

1. Design, develop, and execute a program in C to simulate the working of a queue of integers using an array. Provide the following operations:
   a. Insert b. Delete c. Display
2. Write a C Program to simulate the working of a circular queue of integers using an array. Provide the following operations:
   a. Insert b. Delete c. Display
3. Write a C Program using dynamic variables and pointers to construct a stack of integers using singly linked list and to perform the following operations:
   a. Push
   b. Pop
   c. Display

The program should print appropriate messages for stack overflow and stack empty.

4. Write a C program using dynamic variables and pointers to construct a queue of integers using singly linked list and to perform the following operations:
   a. Insert
   b. Delete
   c. Display

The program should print appropriate messages for queue full and queue empty.

Unit 4

Header linked lists and Circular linked lists with basic operations.

Applications of Linked lists – Polynomials, Programming Examples.

Doubly Linked lists and Circular Doubly linked lists, Programming Examples Miscellaneous problems on Linked List

Laboratory Component:

1. Using circular representation for a polynomial, design, develop, and execute a program in C to accept two polynomials, add them, and then print the resulting polynomial.
2. Design, develop, and execute a program in C to implement a doubly linked list where each node consists of integers. The program should support the following operations:
   a. Create a doubly linked list by adding each node at the front.
   b. Insert a new node to the left of the node whose key value is read as an input.

c. Delete the node of a given data if it is found, otherwise display appropriate message. Display the contents of the list.

Unit 5

Trees 1: Terminologies, Representation of Trees, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, Postorder, Preorder; Level-order
Binary Search Trees – Definition, Insertion, Deletion, Traversal, and Searching operation on Binary search tree.

Trees 2: Application of Trees-Evaluation of Expression, Threaded binary trees, Heaps: Definition, Insertion into max heap

Laboratory Component:

1. Write a C Program
   a. To construct a binary search tree of integers.
   b. To traverse the tree using the methods
      - Inorder, Preorder and Postorder
2. Design, develop, and execute a program in C to create a max heap of integers by accepting one element at a time and by inserting it immediately in to the heap. Use the array representation for the heap. Display the array at the end of insertion phase.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: At the end of the course the student will be able to:

CO1. Identify different data structures and their applications.

CO2. Apply stack and queues in solving problems.

CO3. Demonstrate applications of linked list.

CO4. Explore the applications of trees to model and solve the real-world problem.

TEXT BOOKS

1. Horowitz, Sahni, Anderson-Freed, Fundamentals of Data Structures in C, 2nd Ed, Universities Press,

2. Y Langsam, M J Augenstein, A M Tenenbaum, Data Structures using C and C++, 2nd Ed, PHI

REFERENCE BOOKS

1. Gilberg and Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning,2014.

2. Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.

3. Jean-Paul Tremblay & Paul G. Sorenson, An Introduction to Data Structures with Applications,2nd Ed, McGraw Hill, 2013

ONLINE RESOURCES

1. http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html
2. https://nptel.ac.in/courses/106/105/106105171/
3. http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-

CO3	3	3	3	3	-	-	-	-	-	-	-	-
CO4	3	3	3	3	-	-	-	-	-	-	-	-
Strength of correlation: Low-1, Medium- 2, High-3												

Faculty Incharge

1. **Dr. Harish G**

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Dr. Ambedkar Institute of Technology, Bengaluru-56

Department of Computer Science & Engineering Scheme and Syllabus-CBCS – 2021 -2022

CourseTitle	**Operating System**						
CourseCode	**21CST404**						
Category	Engineering Science Course (ES)						
Scheme andCredits	No.of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	42	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE:03 Hours**		

Course objectives:

1. To introduce the basics of computer system organization and different structures of operating system design.
2. To explain process management and CPU scheduling, along with the concept of multithreading.
3. To illustrate process Synchronization and concept of Deadlock by solving problems.
4. To explain Main Memory and Virtual memory management, File system and Mass storage structures with problem solving

.UNIT I	8 hours
Introduction: What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Resource Management, Virtualization, Distributed Systems **Operating-System Structures**: Operating-System Services, System Calls, Operating-System Design and Implementation, Operating-System Structure.	
UNIT II	**8 hours**
Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication, IPC in Shared-Memory Systems, IPC in Message-Passing Systems, Examples of IPC Systems. **CPU Scheduling:** Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multi-Processor Scheduling.	
UNIT III	**9 hours**
Process Synchronization: Synchronization Tools, Background, The Critical-Section Problem, Peterson's Solution, Hardware Support for Synchronization, Mutex Locks, Semaphores, Monitors, Synchronization Examples: Classic Problems of Synchronization. **Deadlocks**: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance,, Deadlock Detection, Recovery from Deadlock.	

UNIT IV	8 hours
Main Memory: Background, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation. **Virtual Memory:** Background, Demand Paging, Page Replacement, Allocation of Frames, Introduction to Thrashing,	
UNIT V	**9 hours**
File system: File concept; Access methods; Directory structure; File system mounting; File sharing, Memory Compression. **Storage Management: Mass storage structures** - Disk structure, Disk attachment, Disk scheduling, Disk management, Swap space management.	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations and videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:	Illustrate the role of an operating system with respect to resource management, interfaces and system calls
CO2:	Apply process scheduling algorithms to select the processes for execution and compare their performances.
CO3:	Interpret the requirements for process synchronization and understand the state of deadlock in a computing environment and the methods to detect and overcome it
CO4:	Describe and analyze the memory management and its allocation methods.
CO5:	Identify the storage management methods with respect to different storage management techniques.

TEXT BOOK:

1. **Operating System Concepts -** Tenth Edition, Avi Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons, Inc. **ISBN 978-1-118-06333-0**

REFERENCE BOOKS/WEBLINKS:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012. **ISBN13: 9781259005589**
2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010. **ISBN-10: 9788120348363**
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011. **ISBN**: **9788131712894**

SELF STUDY REFERENCES/WEB LINKS:

1. https://www.os-book.com/OS10/slide-dir/index.html
2. https://www.booksfree.org/pages/book-downloading-page/?dlm-dp-dl=24807
3. https://archive.nptel.ac.in/courses/106/105/106105214/

MAPPING of Cos with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2		2	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-
Strengthofcorrelation: Low-1, Medium-2, High-3												

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Department of Computer Science & Engineering

Scheme and Syllabus - NEP – 2022 -2023

<table>
<tr><td>Course Title</td><td colspan="7">Object Oriented Programming with C++ Laboratory</td></tr>
<tr><td>Course Code</td><td colspan="7">21CSL305</td></tr>
<tr><td>Category</td><td colspan="7">Professional Core Course (PCC) Lab</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total teaching hours</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>00</td><td>00</td><td>02</td><td>00</td><td>02</td><td>24</td><td>01</td></tr>
<tr><td>CIE Marks: 50</td><td colspan="2">SEE Marks: 50</td><td colspan="2">Total Max. marks=100</td><td colspan="3">Duration of SEE: 03 Hours</td></tr>
</table>

COURSE OBJECTIVES:

1. Design and develop programs based on the principles of object-oriented programming concepts.
2. Apply the concepts of data encapsulation, inheritance, operator overloading and polymorphism.
3. Understand and illustrate the concepts of files, STL and exception handling in C++.

	Lab Programs
Sl. No.	**PART A – List of problems for which student should develop program and execute in the Laboratory.**
1	Aim: Introduce the C++ fundamentals, Basic concepts of OOP, data types, operators, Function basics in C++. Program: Write a program to define a class employee having members Emp-id, Emp-name, Emp-dept, basic salary and functions accept (), calculate () and display (). Read data of N employee and computer net salary of each employee. Display the payslip using appropriate output format. (DA=45% of basic salary, HRA=27% of basic salary, Income-tax=15% of gross salary)
2	Aim: Demonstrate the use of friend function, static data member and Arrays of objects Concepts. Program: a) Write a program to find mean of two numbers belonging to two different classes using friend function. b) Design and implement a class STUDENT with attributes like: roll number, name, three test marks. Implement member functions i) to read student data like name and test marks, ii) to compute average marks (considering best two out of three test marks) iii) to display the student information. Declare an array of STUDENT objects in the main function and use static data member to generate unique student roll number.
3	Aim: Illustration of Passing objects as arguments, Returning objects and Concepts. Program: Design a program to illustrate the use of objects as function arguments by

	performing the addition of TIME in the hour and minutes format.
4	Aim: Demonstration of Function Overloading Concept. Program: Write a program to create a class called COMPLEX and implement the following overloading functions ADD that return a COMPLEX number. i) s2 = s1. add (a) – where a is an integer (real part) and s1, s2 are complex numbers. ii) s3 = s1.add (s2) – where s1 , s2 and s3 are complex numbers.
5	Aim: Demonstrate the use of constructors. Program: a) Create a class called Account. Write a program to deposit or withdraw money in a bank account. (Assume appropriate attributes and use constructor) b) Write a program that uses dynamic constructor to allocate memory to an array. Count the number of even and odd elements.
6	Aim: Illustration of Generic programming concept using Template. Program: Create a template class called QUEUE with member functions to add an element and to delete an element from the queue. Implement a queue of integers and doubles.
7	Aim: Demonstration of Operator Overloading Concept. Program: Create a class called DATE. Accept two valid dates in the form dd/mm/yyyy. Implement the following by overloading +, - and << operators. i) no_of_days = d1 – d2; where d1 and d2 are DATE objects, d1 >=d2 and no_of_days is an integer. ii) d2 = d1 + no_of_days; where d1 is a DATE object and no_of_days is an integer.
8	Aim: Demonstration of virtual functions. Program: Design and implement a program to create an abstract class - SHAPE to represent any shape in general. The class should have two pure-virtual functions to read dimensions and to compute the area. Create three derived classes - CIRCLE, RECTANGLE, and SQUARE by inheriting the features of class SHAPE. Implement the functions to read and compute the area. Add method to display the results as required. (Assume appropriate attributes).
9	Aim: Demonstration of Inheritance concept. Program: Write a program that allows class LCD_TV to inherit two classes – Product and Manufacturer. Display the complete information of LCD TV by assuming appropriate attributes for each class using multiple inheritance.
10	Aim: Demonstration of File I/O. Program: Create two files named questions and answers. Design a program that reads Questions from questions file and their matched answers from answers file. Use an appropriate exception handling mechanisms to manage file exceptions and to display the output.
11	Aim: Demonstration of exception handling mechanism.

	Program: Write a program for custom exception handling. i) Implement a function to compute factorial of a given number. ii) Create a class “InvalidDataException” that contains the details about the exception – “Invalid data: negative number entered” iii) In the main function, accept a number from the user and throw an exception of type “InvalidDataException” if entered number is a negative number, else call the factorial function to compute the result. iv) Handle the exception.
12	Aim: Introduce the Standard Template Library (STL). Program: Write a program to create a vector of integers. Copy the vector contents into a list, sort the contents, and then copy selected items into another vector.
	PART B – Practical Based Learning
1	A problem statement for each batch is to be generated in consultation with the co-examiner and student should develop an algorithm, program and execute the program for the given problem with appropriate outputs.

Note: Students can pick one experiment from the questions lot of PART A with equal choice to all the students in a batch. For PART B examiners should frame a question for each batch, student should develop an algorithm, program, execute and demonstrate the results with appropriate output for the given problem. Weightage of marks for PART A is 80% and for PART B is 20%. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero (Not allowed for Part B).

Course Outcomes:

At the end of the course the student will be able to:

CO1: Construct classes incorporating the object-oriented techniques to solve engineering problems.

CO2: Demonstrate the ability to design and develop C++ programs, analyze, and interpret object oriented data and document results.

CO3: Apply the concept of function overloading, operator overloading, virtual functions and polymorphism.

CO4: Develop user friendly applications using File I/O, STL and exception handling mechanism.

Suggested Learning Resources:

1. Herbert Schildt, “The Complete Reference C++, 5th Edition”, Tata McGraw Hill, 2013. ISBN - 978-0071634809
2. Stanley B.Lippmann, JoseeLajore, “C++ Primer, 5th Edition”, Addison Wesley, 2013. ISBN - 978-0321714114

MAPPING of COs with POs

Course Outcomes	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO2	2	2	1	2	3	-	-	-	-	-	-	-	2	2	-
CO3	2	2	1	2	3	-	-	-	-	-	-	-	1	2	-
CO4	2	3	1	3	3								1	2	

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Department of Computer Science & Engineering

Scheme and Syllabus - NEP – 2022 -2023

Course Title	**DESIGN AND ANALYSIS OF ALGORITHMS**						
Course Code	**21CST402**						
Category	Engineering Science Course (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	60	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

1. Explain the methods of analyzing the algorithms and to analyze performance of algorithms.
2. State algorithm's efficiencies using asymptotic notations.
3. Solve problems using algorithm design methods such as the brute force method, greedy method, divide and conquer, decrease and conquer, dynamic programming, backtracking and branch and bound.
4. Choose the appropriate data structure and algorithm design method for a specified application.

Unit 1
Introduction: What is an Algorithm? It's Properties. Fundamentals of Algorithmic Problem solving, Analysis Framework-Time efficiency and space efficiency, Worst-case, Best-case and Average case efficiency. Performance Analysis: Estimating Space complexity and Time complexity of algorithms. Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ) with examples, Basic efficiency classes, Mathematical analysis of Non-Recursive and Recursive Algorithms with Examples.
Laboratory Component: 1. Sort a given set of n integer elements using Selection Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C/C++ how the brute force method works along with its time complexity analysis: worst case, average case and best case.
Unit 2
Divide and Conquer: General method, Recurrence equation for divide and conquer, Divide and Conquer algorithms and complexity Analysis of Binary search, Merge sort, Quick sort. MaxMin problem
Laboratory Component: 1. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C/C++ how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case. 2. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n> 5000, and record the time taken to sort. Plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator. Demonstrate using C/C++ how the divide-and-conquer method works along with its time complexity analysis: worst case, average case and best case.

Unit 3

Greedy Method: General method, Knapsack Problem, solving Job sequencing with deadlines Problems. Minimum cost spanning trees: Prim’s Algorithm, Kruskal’s Algorithm with performance analysis. Single source shortest paths: Dijkstra's Algorithm.

Laboratory Component:

Write & Execute C/C++ Program

1. To find shortest paths to other vertices from a given vertex in a weighted connected graph, using Dijkstra's algorithm.
2. To find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. Use Union-Find algorithms in your program.
3. To find Minimum Cost Spanning Tree of a given connected undirected graph using Prim's algorithm.

Unit 4

Dynamic Programming: General method with Examples, Transitive Closure: Warshall’s Algorithm. All Pairs Shortest Paths: Floyd's Algorithm, Knapsack problem.
Space-Time Tradeoffs: Introduction, Sorting by Counting, Input Enhancement in String Matching Harspool’s algorithm.

Laboratory Component:

Write C/ C++ programs to

1. Solve All-Pairs Shortest Paths problem using Floyd's algorithm.
2. Solve 0/1 Knapsack problem using Dynamic Programming method.

Unit 5

Backtracking: General method, solution using back tracking to N-Queens problem, Sum of subsets problem,
Branch and Bound: Assignment Problem, Travelling Sales Person problem.

Laboratory Component:

1. Design and implement C/C++ Program to find a subset of a given set S = {Sl, S2,…, Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S = {1, 2, 5, 6, 8} and d= 9, there are two solutions {1, 2, 6} and {1, 8}. Display a suitable message, if the given problem instance doesn't have a solution.
2. Implement N Queen's problem using Back Tracking.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: At the end of the course the student will be able to:

CO1. Analyze the running times of algorithms and state the performance using asymptotic notations and mathematically analyze the complexity of the algorithm.

CO2. Apply divide and conquer approaches in solving the problems. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.

CO3. Able to choose the appropriate algorithmic design technique like greedy method and compare the efficiency of algorithms to solve the given problem.

CO4. Apply and analyze dynamic programming approaches and improve an algorithm time efficiency over space.

CO5. Apply and analyze backtracking and branch and bound technique in solving the problem.

TEXT BOOKS

1. Anany Levitin: Introduction to Design & Analysis of Algorithms, 3rd Edition, Pearson Education, 2012.ISBN 10: 0-13-231681-1, ISBN 13: 978-0-13-231681-1
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Fundamentals of Computer Algorithms, 2nd Edition, University press, 2008.ISBN 10: 8173716129 , ISBN 13: 9788173716126

REFERENCE BOOKS

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI.
2. Design and Analysis of Algorithms, 2014, S. Sridhar, Oxford (Higher Education),ISBN: 0198093691.

ONLINE RESOURCES

1. http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS43.html
2. https://nptel.ac.in/courses/106/101/106101060/
3. http://elearning.vtu.ac.in/econtent/courses/video/FEP/ADA.html
4. http://cse01-iiith.vlabs.ac.in/

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-
Strength of correlation: Low-1, Medium- 2, High-3												

Faculty Incharge

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Department of Computer Science & Engineering
Scheme and Syllabus - NEP – 2022 -2023

Course Title	**MICROCONTROLLER AND EMBEDDED SYSTEMS**						
Course Code	**21CST403**						
Category	Engineering Science Course (ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	02	00	05	60	04
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

1: Understand the fundamentals of ARM-based systems, including programming modules with registers and the CPSR.
2: Use the various instructions to program the ARM controller.
3: Program various embedded components using the embedded C program.
4: Identify various components, their purpose, and their application to the embedded system's applicability.
5: Understand the embedded system's real-time operating system and its application in IoT.

UNIT I

Microprocessors versus Microcontrollers, ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software.
ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extensions

Laboratory Component:

1. Using Keil software, observe the various registers, dump, CPSR, with a simple ALP programs.
2. Demonstration of registers, memory access, and CPSR in a program

UNIT II

Introduction to the ARM Instruction Set: Data Processing Instructions , Branch Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants
C Compilers and Optimization: Basic C Data Types, C Looping Structures, Register Allocation, Function Calls, Pointer Aliasing,

Laboratory Component:

1. Write a program to find the sum of the first 10 integer numbers.
2. Write a program to find the factorial of a number.
3. Write a program to add an array of 16 bit numbers and store the 32 bit result in internal RAM.
4. Write a program to find the square of a number (1 to 10) using a look-up table.
5. Write a program to find the largest or smallest number in an array of 32 numbers.

UNIT III

C Compilers and Optimization : Structure Arrangement, Bit-fields, Unaligned Data and Endianness, Division, Floating Point, Inline Functions and Inline Assembly, Portability Issues.
ARM programming using Assembly language: Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation, Conditional Execution, Looping Constructs

Laboratory Component:

1. Write a program to arrange a series of 32 bit numbers in ascending/descending order.
2. Write a program to count the number of ones and zeros in two consecutive memory locations.
3. Display “Hello World” message using Internal UART

UNIT IV

Embedded System Components: Embedded Vs General computing system, History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems. Core of an Embedded System including all types of processor/controller, Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components.

Laboratory Component:

1. Interface and Control a DC Motor.
2. Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.
3. Determine Digital output for a given Analog input using Internal ADC of ARM controller.
4. Interface a DAC and generate Triangular and Square waveforms.
5. Interface a 4x4 keyboard and display the key code on an LCD.
6. Demonstrate the use of an external interrupt to toggle an LED On/Off.
7. Display the Hex digits 0 to F on a 7-segment LED interface, with an appropriate delay in between.

UNIT V

RTOS and IDE for Embedded System Design: Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program), Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan.

Laboratory Component:

Demonstration of IoT applications by using Arduino and Raspberry Pi

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO 1: Describe the ARM microcontroller's architectural features and program module.
CO 2: Apply the knowledge of C and assembly language programming of ARM to different applications.
CO 3: Program the basic hardware components and their application selection method.
CO 4: Demonstrate the need for a real-time operating system for embedded system applications.

TEXT BOOKS

1. Andrew N Sloss, Dominic Symes and Chris Wright, ARM system developers guide, Elsevier, Morgan Kaufman publishers, 2008.
2. Shibu K V, “Introduction to Embedded Systems”, Tata McGraw Hill Education, Private Limited, 2nd Edition.

REFERENCE BOOKS

1. Raghunandan. G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019
2. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005.
3. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
4. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

ONLINE RESOURCES

1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/
3. MOOC courses can be adopted for more clarity in understanding the topics and varieties of problem solving methods.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:

1. Answer ANY ONE from Question No. 1 and 2
2. Answer ANY ONE from Question No. 3 and 4
3. Answer ANY ONE from Question No. 5 and 6
4. Answer ANY ONE from Question No. 7 and 8
5. Answer ANY ONE from Question No. 9 and 10

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	2	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-
CO4	3	3	2	3	2	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-
Strength of correlation: Low-1, Medium- 2, High-3												

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Department of Computer Science & Engineering Scheme and Syllabus-CBCS – 2021 -2022

CourseTitle	**Operating System**						
CourseCode	**21CST404**						
Category	Engineering Science Course (ES)						
Scheme andCredits	No.of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	42	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE:03 Hours**		

Course objectives:

1. To introduce the basics of computer system organization and different structures of operating system design.
2. To explain process management and CPU scheduling, along with the concept of multithreading.
3. To illustrate process Synchronization and concept of Deadlock by solving problems.
4. To explain Main Memory and Virtual memory management, File system and Mass storage structures with problem solving

.UNIT I **8 hours**

Introduction: What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Resource Management, Virtualization, Distributed Systems

Operating-System Structures: Operating-System Services, System Calls, Operating-System Design and Implementation, Operating-System Structure.

UNIT II **8 hours**

Process Management: Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication, IPC in Shared-Memory Systems, IPC in Message-Passing Systems, Examples of IPC Systems.

CPU Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multi-Processor Scheduling.

UNIT III **9 hours**

Process Synchronization: Synchronization Tools, Background, The Critical-Section Problem, Peterson's Solution, Hardware Support for Synchronization, Mutex Locks, Semaphores, Monitors, Synchronization Examples: Classic Problems of Synchronization.

Deadlocks: System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance,, Deadlock Detection, Recovery from Deadlock.

UNIT IV	8 hours
Main Memory: Background, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation. **Virtual Memory:** Background, Demand Paging, Page Replacement, Allocation of Frames, Introduction to Thrashing,	
UNIT V	**9 hours**
File system: File concept; Access methods; Directory structure; File system mounting; File sharing, Memory Compression. **Storage Management: Mass storage structures** - Disk structure, Disk attachment, Disk scheduling, Disk management, Swap space management.	

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations and videos

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1:	Illustrate the role of an operating system with respect to resource management, interfaces and system calls
CO2:	Apply process scheduling algorithms to select the processes for execution and compare their performances.
CO3:	Interpret the requirements for process synchronization and understand the state of deadlock in a computing environment and the methods to detect and overcome it
CO4:	Describe and analyze the memory management and its allocation methods.
CO5:	Identify the storage management methods with respect to different storage management techniques.

TEXT BOOK:

1. **Operating System Concepts -** Tenth Edition, Avi Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons, Inc. **ISBN 978-1-118-06333-0**

REFERENCE BOOKS/WEBLINKS:

1. D.M Dhamdhere: Operating systems - A concept based Approach, 3rd Edition, Tata McGraw- Hill, 2012. **ISBN13: 9781259005589**
2. P.C.P. Bhatt: Introduction to Operating Systems Concepts and Practice, 3rd Edition, PHI, 2010. **ISBN-10: 9788120348363**
3. Harvey M Deital: Operating systems, 3rd Edition, Pearson Education, 2011. **ISBN**: **9788131712894**

SELF STUDY REFERENCES/WEB LINKS:

1. https://www.os-book.com/OS10/slide-dir/index.html
2. https://www.booksfree.org/pages/book-downloading-page/?dlm-dp-dl=24807
3. https://archive.nptel.ac.in/courses/106/105/106105214/

MAPPING of Cos with Pos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	2		2	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	3	3	-	-	-	-	-	-	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-
Strengthofcorrelation: Low-1, Medium-2, High-3												

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Department of Computer Science and Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<tr><td></td><td colspan="7">PYTHON PROGRAMMING LABORATORY</td></tr>
<tr><td>Course Code</td><td colspan="7">21CSL405</td></tr>
<tr><td>Category</td><td colspan="7">Engineering Science Course (ES)</td></tr>
<tr><td rowspan="3">Scheme and Credits</td><td colspan="5">No. of Hours/Week</td><td rowspan="2">Total Hrs./semester</td><td rowspan="2">Credits</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>SS</td><td>Total</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>0</td><td>2</td><td>24</td><td>1</td></tr>
<tr><td>CIE Marks: 50</td><td>SEE Marks: 50</td><td colspan="2">Total Max. Marks: 100</td><td colspan="4">Duration of SEE: 03 Hours</td></tr>
</table>

Course objectives to:

1. Explain problem statements and identify appropriate solutions
2. Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
3. Development of algorithms and programs using constructs of C programming language
4. Reporting the observations

<table>
<tr><th colspan="2">Lab Programs</th></tr>
<tr><td>Sl. No.</td><td>PART A
List of problems for which student should develop program and execute in the Laboratory</td></tr>
<tr><td>1.</td><td>Aim: Introduce the Python fundamentals, data types, operators, flow control and exception handling in Python

a. Write a python program to find the best of two test average marks out of three test's marks accepted from the user.

b. Develop a Python program to check whether a given number is palindrome or not and also count the number of occurrences of each digit in the input number.

Datatypes: https://www.youtube.com/watch?v=gCCVsvgR2KU
Operators: https://www.youtube.com/watch?v=v5MR5JnKcZI
Flow Control: https://www.youtube.com/watch?v=PqFKRqpHrjw
For loop: https://www.youtube.com/watch?v=0ZvaDa8eT5s
While loop: https://www.youtube.com/watch?v=HZARImviDxg
Exceptions: https://www.youtube.com/watch?v=6SPDvPK38tw</td></tr>
<tr><td>2.</td><td>Aim: Demonstrating creation of functions, passing parameters and return values

a. Defined as a function F as Fn = Fn-1 + Fn-2. Write a Python program which accepts a value for N (where N >0) as input and pass this value to the function. Display suitable error message if the condition for input value is not followed.

b. Develop a python program to convert binary to decimal, octal to hexadecimal using functions.

Functions: https://www.youtube.com/watch?v=BVfCWuca9nw</td></tr>
</table>

	Arguments: https://www.youtube.com/watch?v=ijXMGpoMkhQ Return value: https://www.youtube.com/watch?v=nuNXiEDnM44
3.	Aim: Demonstration of manipulation of strings using string methods a. Write a Python program that accepts a sentence and find the number of words, digits, uppercase letters and lowercase letters. b. Write a Python program to find the string similarity between two given strings Sample Output:
	<table><tr><td>**Sample Output:** Original string: Python Exercises Python Exercises Similarity between two said strings: 1.0</td><td>**Sample Output:** Original string: Python Exercises Python Exercise Similarity between two said strings: 0.967741935483871</td></tr></table>
	Strings: https://www.youtube.com/watch?v=lSItwlnF0eU String functions: https://www.youtube.com/watch?v=9a3CxJyTq00
4.	**Aim:** Discuss different collections like list, tuple and dictionary a. Write a python program to implement insertion sort and merge sort using lists b. Write a program to convert roman numbers in to integer values using dictionaries. Lists: https://www.youtube.com/watch?v=Eaz5e6M8tL4 List methods: https://www.youtube.com/watch?v=8-RDVWGktuI Tuples: https://www.youtube.com/watch?v=bdS4dHIJGBc Tuple operations: https://www.youtube.com/watch?v=TItKabcTTQ4 Dictionary: https://www.youtube.com/watch?v=4Q0pW8XBOkc Dictionary methods: https://www.youtube.com/watch?v=oLeNHuORpNY
5.	**Aim:** Demonstration of pattern recognition with and without using regular expressions a. Write a function called isphonenumber () to recognize a pattern 415-555-4242 without using regular expression and also write the code to recognize the same pattern using regular expression. b. Develop a python program that could search the text in a file for phone numbers (+919900889977) and email addresses (sample@gmail.com) Regular expressions: https://www.youtube.com/watch?v=LnzFnZfHLS4
6.	**Aim:** Demonstration of reading, writing and organizing files. a. Write a python program to accept a file name from the user and perform the following operations

	1. Display the first N line of the file 2. Find the frequency of occurrence of the word accepted from the user in the file b. Write a python program to create a ZIP file of a particular folder which contains several files inside it. Files: https://www.youtube.com/watch?v=vuyb7CxZgbU https://www.youtube.com/watch?v=FqcjKewJTQ0 File organization: https://www.youtube.com/watch?v=MRuq3SRXses
7.	**Aim:** Demonstration of the concepts of classes, methods, objects and inheritance a. By using the concept of inheritance write a python program to find the area of triangle, circle and rectangle. b. Write a python program by creating a class called Employee to store the details of Name, Employee_ID, Department and Salary, and implement a method to update salary of employees belonging to a given department. OOP’s concepts: https://www.youtube.com/watch?v=qiSCMNBIP2g Inheritance: https://www.youtube.com/watch?v=Cn7AkDb4pIU
8.	**Aim:** Demonstration of classes and methods with polymorphism and overriding a. Write a python program to find the whether the given input is palindrome or not (for both string and integer) using the concept of polymorphism and inheritance. Overriding: https://www.youtube.com/watch?v=CcTzTuIsoFk
9.	**Aim:** Demonstration of working with excel spreadsheets and web scraping a. Write a python program to download the all XKCD comics b. Demonstrate python program to read the data from the spreadsheet and write the data in to the spreadsheet Web scraping: https://www.youtube.com/watch?v=ng2o98k983k Excel: https://www.youtube.com/watch?v=nsKNPHJ9iPc
10.	**Aim:** Demonstration of working with PDF, word and JSON files a. Write a python program to combine select pages from many PDFs b. Write a python program to fetch current weather data from the JSON file PDFs: https://www.youtube.com/watch?v=q70xzDG6nls https://www.youtube.com/watch?v=JhQVD7Y1bsA

https://www.youtube.com/watch?v=FcrW-ESdY-A

Word files: https://www.youtube.com/watch?v=ZU3cSl51jWE

JSON files: https://www.youtube.com/watch?v=9N6a-VLBa2I

PART B – Practical Based Learning

A problem statement for each batch is to be generated in consultation with the co-examiner and student should develop an algorithm, program and execute the program for the given problem with appropriate outputs.

Course Outcomes:

CO1: Demonstrate proficiency in handling of loops and creation of functions.
CO2: Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3: Discover the commonly used operations involving regular expressions and file system.
CO4: Interpret the concepts of Object-Oriented Programming as used in Python.
CO5: Determine the need for scraping websites and working with PDF, JSON and other file formats.

Suggested Learning Resources:

1. Gowrishankar S, Veena A, **"Introduction to Python Programming",** 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2. Al Sweigart, **"Automate the Boring Stuff with Python",** 1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/)
3. Allen B. Downey, **"Think Python: How to Think Like a Computer Scientist",** 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf)

MAPPING of COs with POs

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	**1**	**1**	**2**	**2**	**2**	-	-	-	-	-	-	-
CO2	1	1	2	2	2	-	-	-	-	-	-	-
CO3	2	2	3	1	3	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	1	1	2	2	2	-	-	-	-	-	-	-

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