Detailed Scheme

ACADEMIC YEAR 2021-2022

Dr. Ambedkar Institute of Technology
Bangalore

III - IV (2020-2024 BATCH) (175 Credits)

B.E

Department Of Information Science and Engineering

Vision

- To create **D**ynamic, **R**esourceful, **A**dept and **I**nnovative **T**echnical professionals to meet global challenges.

Mission

- To offer state-of-the-art undergraduate, postgraduate and doctoral programmes in the fields of Engineering, Technology and Management.
- To generate new knowledge by engaging faculty and students in research, development and innovation
- To provide strong theoretical foundation to the students, supported by extensive practical training to meet industry requirements.
- To install moral and ethical values with social and professional commitment.

DEPARTMENT VISION AND MISSION

Vision:

- Imparting quality technical education and preparing professionals to meet Information Technological challenges globally.

Mission:

- Prepare highly capable Information Science engineers through best practices.
- Encourage students to pursue higher education for further growth in the learning process and to promote research in the frontier areas of Information Technology.
- Educate students to take up social and professional responsibilities with ethical values for the betterment of the society.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Graduates will have the ability to become successful computing professionals in the area of Information Science and Engineering.

PEO2: Graduates will be equipped to enhance their knowledge through core engineering and latest technological skills to promote lifelong learning.

PEO3: Graduates will be able to take up social, technical and entrepreneurial challenges in inter disciplinary and multi disciplinary fields.

PROGRAM SPECIFIC OBJECTIVES(PSOS)

PSO1:Students should be able to understand, analyze and adopt principles of programming paradigms by using latest technologies such as Cloud computing, Big data analytics, AI ,Machine Learning and IoT based applications for solving real-world problems.

PSO2: Students should be able to acquire and demonstrate the team work, professional ethics, competence and communication skills while developing software products.

PROGRAMME OUTCOMES (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2021-22

B.E INFORMATION SCIENCE AND ENGINEERING

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

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 Mathematics and Numerical Methods	Mathematics	2	2	--	03	50	50	100	3
2	PC	18IS31	Computer Organization and Architecture	ISE	4	0	--	03	50	50	100	4
3	PC	18IS32	Data Structures with C	ISE	4	0	--	03	50	50	100	4
4	PC	18IS33	Unix and Shell Programming	ISE	3	2	--	03	50	50	100	4
5	PC	18IS34	Digital principles and logic design	ISE	3	0	--	03	50	50	100	3
6	PC	18IS35	Software Engineering	ISE	3	0	--	03	50	50	100	3
7	PC	18ISL36	Data structure with C Lab	ISE	--		2	03	50	50	100	1
8	PC	18ISL37	Digital principles and logic design Lab	ISE	--		2	03	50	50	100	1
9	HS	18HS31/32	Constitution of India Professional Ethics and Human Rights/ / Env. Studies	Hu/Civ	1	--	--	02	50	50	100	1
10	MC	18HS33	Soft skills (MC)	Humanities	02		--	--	50	-	50	0
				TOTAL	**22**	**04**	**04**	**26**	**500**	**450**	**950**	**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: HODs are informed to accommodate one more laboratory in addition to the above courses if needed, without altering the total number of credits (TOTAL: 24).

(a)**The mandatory non – credit courses** Advance Mathematics I and II prescribed at III and IV semesters respectively, to lateral entry Diploma holders admitted to III semester of BE programs shall compulsorily be registered during respective semesters to complete all the formalities of the course and appear for SEE examination.

(b) **The mandatory non – credit courses** Advance Mathematics I and II, prescribed to lateral entrant Diploma holders admitted to III semester of BE programs, are to be completed to secure eligibility to VII semester. However, they are not considered for vertical progression from II year to III year of the programme but considered as head of passing along with credit courses of the programme to eligibility to VII semester

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, MC: Mandatory Course.

HEAD DEPT. OF INFORMATION SCIENCE & ENGG

Dr. Ambedkar Institute of Technology, Bengaluru-56

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2021-22

B.E INFORMATION SCIENCE AND ENGINEERING

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

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, Queuing Theory and Reliability	Mathematics	2	2	--	03	50	50	100	3
2	PC	18IS41	Microcontroller and Embedded Systems	ISE	3	0	--	03	50	50	100	3
3	PC	18IS42	Design and Analysis of Algorithm	ISE	4	0	--	03	50	50	100	4
4	PC	18IS43	Object Oriented Concepts	ISE	4	0	--	03	50	50	100	4
5	PC	18IS44	Python Programming	ISE	3	0	--	03	50	50	100	3
6	PC	18IS45	Computer Networks	ISE	3	2	--	03	50	50	100	4
7	PC	18ISL46	Object Oriented Concepts Lab	ISE	--		2	03	50	50	100	1
8	PC	18ISL47	Design and Analysis of Algorithm Lab	ISE	--		2	03	50	50	100	1
9	HS	18HS41/42	Constitution of India Professional Ethics and Human Rights/ Env. Studies	Hum/Civ	1	--	--	02	50	50	100	1
10	MC	18HS43	Employability skills (MC)	Humanities	02		--	--	50	-	50	0
				TOTAL	**24**	**04**	**04**	**26**	**500**	**450**	**950**	**24**
Course prescribed to lateral entry Diploma holders admitted to III semester of Engineering programs												
11	MC	18MAD41	Advance Mathematics - II	Mathematics	02	01	--	03	50		50	0

Note: HODs are informed to accommodate one more laboratory in addition to the above courses if needed, without altering the total number of credits (TOTAL: 24).

(a) The mandatory non – credit courses Advance Mathematics I and II prescribed at III and IV semesters respectively, to lateral entrant Diploma holders admitted to III semester of BE programs shall compulsorily be registered during respective semesters to complete all the formalities of the course and appear for SEE examination.

(b) The mandatory non – credit courses Advance Mathematics I and II, prescribed to lateral entrant Diploma holders admitted to III semester of BE programs, are to be completed to secure eligibility to VII semester. However, they are not considered for vertical progression from II year to III year of the programme but considered as head of passing along with credit courses of the programme to eligibility to VII semester.

Note: BC: Science Course, PC: Professional Core. Hu: Humanities, MC: Mandatory Course.
ENV: Environmental Studies, CIP: Constitution of India Professional Ethics and Human Rights

HEAD DEPT. OF INFORMATION SCIENCE & ENGG

III SEMESTER

For THIRD Semester B E (For CS/IS branch only)

	SUBJECT TITLE: DISCRETE MATHEMATICS & NUMERICAL METHODS		
	Subject Code : 18MA31CS/IS	**Number of Credits: 3 = 2 : 1 : 0 (L : T : P)**	**No of lecture hours per week: 04 (L=2+T=2)**
	Exam Duration: 3 Hrs	**Exam Marks: CIE +Assignment + Group Activity+ SEE = 40 + 5 +5+ 50 = 100**	**Total No. of lecture hours: 39**
	Course objectives: To enhance the student's ability to think logically, mathematically and algorithmically many basic computer related concepts and provide a coherent development in the field of Discrete Structures and Numerical methods.		

Unit No.	Syllabus Content	No. of hours	
		Theory	Tutorial
1	**Logics and Quantifiers:** Basic Connectives and Truth Tables, Logic equivalence – The Laws of Logic, Logical Implication – Rules of Inference.	05	02
2	**Lattices and Boolean Algebra:** Relation and ordering, partially ordered sets, Lattices as poset, properties of lattices, complete lattices, bounds of lattices, distributive lattice and complemented lattices.	06	02
3	**Groups:** Binary algebra, Semigroups and monoids, Groups, Examples and Elementary Properties, Subgroups, Homomorphisms, Isomorphisms, and Cyclic Groups, Cosets, and Lagrange's Theorem.	06	02
4	**Solutions of algebraic and transcendental equations:** Regula-Falsi method and Newton-Raphson method. **Interpolation:** Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.	06	02
5	**Numerical differentiation, integration and solutions of ODE'S:** Numerical differentiation using Newton's forward and backward difference formulae. Numerical Integration: Simpson's $1/3^{rd}$, $3/8^{th}$ rules and Weddle's rule. Solutions of first ODE's: Euler's modified method, Runge-Kutta fourth order method, Milne's and Adams Bashforth methods.	06	02

Course Outcomes: After the successful completion of the course the students are able to:
CO1: Demonstrate understanding of how to read and annotate an outline of a proof and able to write a logical poof of a statement.
CO2: Create rigorous mathematical arguments to logical gates and develop an algorithm.
CO3: Apply algebraic structures in codes in cryptography.
CO4: Compare the viability of different approaches to the numerical solution of problems arising in finding roots of equations, interpolation and approximation, numerical differentiation and integration, and solution of ODE's.
CO5: Develop a variety of numerical algorithms using appropriate technology/programming languages.

Course Outcomes (CO) Mapping with Programme Outcomes (PO)
CO1: PO1, PO2
CO2: PO1, PO2
CO3: PO1, PO2
CO4: PO1, PO2
CO5: PO1, PO2,PO4

TEXTBOOKS:

1. Ralph P. Grimaldi: Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2004.
2. J. P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science", ,Tata McGraw-Hill
3. B.S. Grewal, Higher Engineering Mathematics (Latest Edition, 2016), Khanna Publishers, New Delhi

REFERENCE BOOKS/Web sources:

1. Kenneth H. Rosen: Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007.
2. D.S. Malik and M.K.Sen: Discrete Mathematical Structures: Theory and Applications, Thomson, 2004.
3. H.K.Dass and Er. RajnishVerma, Advanced Engineering Mathematics (Latest Edn, 2015), S.Chand Publisher, New Delhi.
4. Dennis G Zill, MihaelGulle, Advanced Engineering Mathematics (2ndEdn), CBS publishers.
5. N.P.Balli and Manish Goyal, A text book of Engineering Mathematics, Lakshmi PublicationsYork.

QUESTION PAPER PATTERN:

The Semester End Examination (SEE) is for 100 marks.

1. There shall be five full questions (one question for each unit) carrying 20 marks each and all are Compulsory.
2. There shall be internal choice in all the Units.

Note: Three assignments are evaluated for 5 marks.

Sub Title : COMPUTER ORGANIZATION AND ARCHITECTURE		
Sub Code: 18IS31	**No. of Credits:4=4: 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course Objectives:

1. Presents the basic structure and operation of a digital computer.
2. To understand the basics of assembly language.
3. Implement assembly programs that accomplish basic computational and I/O operations.
4. Acquire knowledge of semiconductor memories, cache memory and virtual memory.
5. Analyze the concepts of CPU Bus structures and Pipelining.

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, Pipelining and Superscalar Operation,Clock Rate, Instruction Set:CISC and RISC, Performance Measurement. Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language. **T 1:Ch 1-1.1,1.2,1.3,1.4,1.6(1.6.1,1.6.2,1.6.3,1.6.4,1.6.5,1.6.7)** **Ch 2-2.1,2.2,2.3,2.4,2.5,2.6**	**12**
2	I**nput / Output Organization:** Accessing I/O Devices, Interrupts – Interrupt Hardware, **Enabling** and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB. **T1: Ch – 4.1, 4.2 (4.2.1 to 4.2.5), 4.4, 4.5, 4.6, 4.7**	**10**
3	**Memory System:** Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage. **T1: Ch 5 – 5.1 to 5.7, 5.9**.	**10**
4	**Arithmetic:** Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication,	**10**

	Integer Division, Floating-point Numbers and Operations. **T1 : Ch 6 – 6.1 to 6.7**	
5	**Basic Processing Unit:** Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Micro programmed Control. Pipelining, Embedded Systems and Large Computer Systems: Basic Concepts of pipelining, Examples of Embedded Systems, Processor chips for embedded applications, Simple Microcontroller. **T1: Ch 7, Ch 8 – 8.1, Ch 9 – 9.1, 9.2, 9.3**	**10**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:
After the completion of the course students will be able to
CO1: Analyze functional units of a computer, its operational concepts, addressing modes, internal organization of a system through practicing with an assembly language
CO2:Analyze and design I/O devices, interrupts and I/O interfaces.
CO3: Analyze and design of memory unit including SRAM, DRAM, cache mapping techniques and basics of virtual memory.
CO4:Design basic processing unit and implement execution of complete instruction.
CO5: Implement basic and intermediate concepts of pipelining.

COs	**Mapping with POs**
CO1	PO1,PO2,PO12
CO2	PO1,PO5,PO12
CO3	PO1,PO2, PO5,PO12
CO4	PO1,PO3,PO5,PO12
CO5	PO1,PO2, PO5,PO12

TEXT BOOKS:
1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002. (Listed topics only from Chapters 1, 2, 4, 5, 6, 7, 8, 9 and12).

REFERENCE BOOKS / WEBLINKS:

1. William Stallings: Computer Organization & Architecture, March ,2012.
2. NPTEL:http://nptel.ac.in/courses/106106092/
3. http://freevideolectures.com/Course/2277/Computer-Organization#

Sub Title : DATA STRUCTURES WITH C		
Sub Code: 18IS32	**No. of Credits:4=4: 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course Objectives:

1. To become familiar with the concept of pointers and its usage in dynamic memory allocation.
2. To study and understand the representation and implementation of linear data structures.
3. To classify and comprehend the consequences of using non linear data structures in implementing a system .
4. To identify the suitable data structure during application development
5. To gain knowledge of sorting, searching and hashing techniques .

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Data Structures, Classifications (Primitive & Non Primitive), Data structure Operations, Review of Arrays, Structures, Self-Referential Structures, and Unions. Pointers and Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, Dynamically allocated arrays. **Array Operations**: Traversing, inserting, deleting, searching, and sorting. Multidimensional Arrays, Polynomials and Sparse Matrices. **Strings:** Basic Terminology, Storing, Operations and Pattern Matching algorithms. Programming Examples. **T 1: Ch 1: 1.2, Ch 2: 2.2 - 2.7 T 2: Ch 1: 1.1 - 1.4, Ch 3 : 3.1 - 3.3, 3.5, 3.7 , Ch 4: 4.1 - 4.9, 4.14 R3: Ch 1: 1.4**	**12**
2	**Stacks:** Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to postfix conversion, evaluation of postfix expression. **Recursion** - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi, Ackerman's function. **Queues:** Definition, Array Representation, Queue Operations, Circular Queues,Circular queues using Dynamic arrays, Dequeues, Priority Queues, A Mazing Problem. Multiple Stacks and Queues. Programming Examples. **T 1: Ch 3: 3.1 -3.7 T 2: Ch 6: 6.1 -6.3, 6.5, 6.7-6.10, 6.12, 6.13**	**10**

3	**Linked Lists:** Definition, Representation of linked lists in Memory, Memory allocation;Garbage Collection. Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. **Applications of Linked lists** – Polynomials, Sparse matrix representation. Programming Examples. **T 1: Ch 4: 4.1 – 4.6, 4.8 T 2: Ch 5: 5.1 – 5.10**	**10**
4	**Trees:** Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Additional Binary tree operations,Threaded binary trees, Binary Search Trees – Definition,Insertion, Deletion, Traversal, Searching, Application of Trees-Evaluation of Expression , Programming Examples, AVL Trees, AVL rotations, overview of Red Black trees and Tournament Trees **T 1: Ch 5.1 –5.5, 5.7 T 2: Ch 7: 7.1 – 7.9**	**10**
5	**Graphs:** Definitions, Terminologies, Matrix and Adjacency List Representation Of Graphs, Elementary Graph operations, Traversal methods: Breadth First Search and Depth First Search. Sorting and Searching: Insertion Sort, Radix sort, Address Calculation Sort. **Sorting and Searching:** Insertion Sort, Radix sort, Address Calculation Sort. **Hashing:** Hash Table organizations, Hashing Functions, Static and Dynamic Hashing. **Files and Their Organization:** Data Hierarchy, File Attributes, Text Files and Binary Files, Basic File Operations, File Organizations and Indexing. **T 1: Ch 7, Ch 8: 8.1,Ch 9: 9.1, 9.2, 9.3**	**10**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:
After the completion of the course students will be able to
CO1: Implement pointers in memory allocation , data structure functions.
CO2: Classify common data structures and implement them.
CO3: Apply appropriate algorithm for problem solving after identifying the appropriate linear data structure.
CO4: Design efficient programs by choosing the most apt non linear data structure.

COs	**Mapping with POs**
CO1	PO3,PO4,PO9,PO10
CO2	PO2,PO3,PO4,PO9,PO12

CO3	PO2,PO3,PO4,PO9,PO12
CO4	PO2,PO3,PO4,PO9,PO12

TEXT BOOKS:

1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press,2014.
2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.

REFERENCE BOOKS / WEBLINKS:

1. Gilberg & 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
4. A M Tenenbaum, Data Structures using C, PHI, 1989
5. Robert Kruse, Data Structures and Program Design in C, 2nd Ed, PHI, 1996.

Sub Title : UNIX AND SHELL PROGRAMMING		
Sub Code: 18IS33	**No. of Credits:4= 3: 1 : 0 (L-T-P)**	**No. of Lecture Hours/Week :4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course Objectives:

1. Understand and execute the different types of unix command related to file, protection and security.
2. Develop shell programs using command substitution, positional parameters and control structures .
3. Implementation of SED and AWK commands.
4. Develop simple programs using PERL and AWK scripts.

Unit No.	Syllabus Content	No of Hours
1	Introduction. The UNIX operating system, UNIX architecture, Features of UNIX, Command usage:- locating commands, internal and external commands, Man Browsing the manual pages ,Understanding the man documentation File system: - the file, what is in a file name?, The parent child relationship ,The HOME variable: the Home directory, Pwd: checking your current directory,Cd: changing the current directory Mkdir : making directories, Rmdir: removing current directories, Absolute pathnames Relative pathnames, Ls :listing directory contents, Unix file system. Basic file attributes: Ls –l: listing file attributes, the –d option: listing directory attributes,File ownership, File permission , Chmode: changing file permission (relative and absolute method), Directory permission, changing file ownership, chown, chgrp. The vi editor: Vi basics, three modes of vi editor ,Input mode –entering and replacing text, Saving text and quitting –the ex mode,Navigation, Editing text,Undoing last editing instructions, Repeating the last command, Searching for a pattern substitution. The shell: The shells interpretive cycle, shell offering, pattern matching. Escaping and quoting: Redirection: the three standard files,/dev/null and dev/tty: two special files,Pipe, Tee: creating a tee, Command substitution, Shell variables	**11**
2	**The process:** Process basics, Ps:process status, System process, mechanism of process creation,Internal and external commands, Process states and Zombies, Running jobs in background,Nice: job executing with low priority, Killing processes with signals, Job control , at and batch: execute later,cron:running jobs periodically,Time: timing processes **Customizing the environment:** The shells, Environmental variables, the common environmental variables,aliases,in-line command editing , The initialization scripts. **More file attributes:** File systems and Inodes, Hard links,Symbolic links and ln,	**11**

	The directory,Umask: Default file and directory permission, Modification and access times,Find: locating files, **Simple filters:** The sample database, Pr:printing 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.	
3	**Filters using regular expression: Introduction,grep**: searching for a pattern,Basic regular expression(BRE), Extended regular expression(ERE) and egrep,**Sed:** the stream editor, Line addressing, using multiple instructions,**Context addressing**Writing selected lines to a file, Text editing,Substitution, basic regular expression **Essential shell programming:** Shell script, Read: making scripts interactive, Using command line arguments, Exit and exit status of command, Logical operator && 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,While: looping, For : looping with a list , Set and shift :manipulating the positional parameter,The header document , Trap :interrupting a program, Debugging shell script with set –x, Sample validation and entry scripts.	**10**
4	**Awk**-advanced filter: Simple awk filtering, Splitting a line into fields, Printf: formatting output,Variables and expressions, The comparison operators, Number processing,Variables, The –f option : storing awk programs in a file,The BEGIN and END section, Built in variables,Arrays, functions,Control flow – the if statement,Looping with for, Looping with while	**10**
5	**Perl-the master manipulator:** Perl preliminaries, The chop function, Variables and operators,The string handling functions, Specifying filenames in command line, $-: the default variable,Current line number ($.) and range operator (..), Lists and arrays, Foreach:looping through a list,Split:, join,dec2bin.pl,grep,associative arrays,Regular expressions and substitution,File handling, file tests, subroutines	**10**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5
Note 3: Group Activity is evaluated for 5 Marks

Course Outcomes:
After the completion of the above course students will be able to

CO1: Develop simple command level codes for file, process, redirection, piping, protection and security
CO2: Demonstrate the usage of shell using shell positional parameters and command substitution.
CO3: Demonstrate different types of SED addressing and AWK filtering.
CO4: Develop PERL programs for string usage, file concept and arrays handling.

COs	Mapping with POs
CO1	PO1, PO2,PO3,PO4
CO2	PO1,PO2,PO3,PO4,PO5
CO3	PO1,PO2,PO3,PO4,PO5
CO4	PO1,PO2,PO3,PO4,PO5,PO7

TEXT BOOK:

UNIX –Concepts and Applications, Sumitabha Das, 4 thEdition, Tata Mc GrawHill, 2006.
(Chapters 1.2, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19)

REFERENCE BOOKS:

1. UNIX and Shell Programming, Behrouz A. Forouzan and Richard F. Gilberg, Thomson, 2005.
2. Unix & Shell Programming, M.G. Venkateshmurthy, Pearson Education, 2005.

Sub Title : DIGITAL PRINCIPLES AND LOGIC DESIGN		
Sub Code: 18IS34	**No. of Credits:3=3: 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. To understand how to work with variety of digital logic gates along with their operations using truth table and logic diagram.
2. To understand and apply minimization techniques for designing optimized digital circuits along with HDL implementation.
3. To analyze and design cost effective combinational and sequential circuits for given problems.
4. To analyze and design a synchronous and asynchronous counter.
5. To analyze and design a sequential circuit.

Unit No.	**Syllabus Content**	**No. of Hours**
1	**Digital Principles:** Definitions for Digital Signals, Digital Waveforms, Digital Logic. **Digital Logic**: Overview of basic gates and universal gates, AND-OR-Invert Gates, Positive and Negative Logic. T1:1.1,1.2,1.3,2.1,2.2,2.3,2.4 **Combinational Logic Circuits:** Boolean Laws and Theorems ,Sum-of-Products Method, Truth Table to Kamaugh Map, Pairs, Quads, and Octets , , Karnaugh Simplifications for 4 variables, Don't-care Conditions, Product-of-Sum, Product-of-sums Simplification ,Simplification using Quine McClusky Method. T1: Ch 3: 3.1 to 3.9.	8
	Data-Processing Circuits: Multiplexers, Demultiplexers, 1-of-16 Decoder, Encoders, Magnitude Comparator, HDL Implementation of Data Processing Circuits. T1: Ch 4: 4.1,4.2,4.3,4.6,4.9,4.14	8
3	**Flip-Flops:** Flip-flops: RS FLIP-FLOPs , Gated FLIP-FLOPs Edge-triggered RS FLIP-FLOPs, Edge-triggered D FLIP-FLOPs, Edge-triggered JK FLIP-FLOPs, JK Master-slave FLIP-FLOPs; JK Master-slave FLIP-FLOP, Various Representations of FLIP-FLOPs, Conversion ofFLIP-FLOPs: A Synthesis Example, HDL Implementation of Flip-flops. T1: Ch 8: 8.1 to 8.8, 8.10,8.12 **Registers:** Types of Registers, Applications of Shift Registers, Register Implementation using HDL. T1: Ch 9: 9.1,9.7	8
4	**Counters:** Asynchronous Counters ,Synchronous Counters, Decade Counters ,Counter Design as a Synthesis problem, Counter Design using	8

	HDL.T1:Ch 10: 10.1,10.3,10.5,10.7,10.9	
5	**Design of Synchronous and Asynchronous Sequential Circuits:** Design of Synchronous Sequential Circuit: Model Selection, State Transition Diagram, State Synthesis Table, Design Equations and Circuit Diagram, State Reduction Technique. T1: Ch 11: 11.1 to 11.4,11.7	7

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5
Note 3: Group Activity is evaluated for 5 Marks

Course Outcomes:
After the completion of the course students will be able to

CO1: Comprehend the fundamental concepts and principles of digital design.
CO2: Design and analyze cost effective combinational circuits and apply concept of Minimization of Boolean functions using different methods. Implement HDL programming.
CO3: Design, analyze and implement various data processing circuits and describe behavior of various digital circuits.
CO4: Design and analyze synchronous and asynchronous counters.
CO5: Design and analyze sequential logic circuits using different models.

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

TEXT BOOK:
Donald P Leach, Albert Paul Malvino & Goutam Saha: Digital Principles and Applications, 7th Edition, Tata McGraw Hill, 2011.

REFERENCE BOOKS:
1. Stephen Brown, Zvonko Vranesic: Fundamentals of Digital Logic Design with VHDL, 2nd Edition, Tata McGraw Hill, 2005.
2. Charles H. Roth: Fundamentals of Logic Design, Jr., 5th Edition, Thomson, 2004.
3. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss: Digital Systems Principles and Applications, 10th Edition, Pearson Education, 2007.
4. R D Sudhaker Samuel, *K.S. Nandini Prasad*: Logic Design, 1st edition, Elsevier Publication, 2013.

Sub Title : SOFTWARE ENGINEERING		
SubCode:18IS35	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week: 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course objectives:

1. Knowledge of basic SW engineering methods and practices, and their appropriate application.
2. Understanding of software requirements and the SRS documents.
3. Describe System model and Object oriented concepts.
4. Understanding of software evolution and related issues of Design Patterns.
5. Understanding of approaches to verification and validation including static analysis, project management, and ensure good quality software.

Unit No.	Syllabus	No of Hours
1	**Overview:** FAQ's about software engineering, Professional and ethical responsibility.**Socio-Technical systems:** Emergent system properties; Systems engineering.**Software Processes:** Process activities; The Rational Unified Process; Agile methods, Plan-driven and agile development, XP, Scrum, Computer Aided Software Engineering. T1: Ch 1, Ch 2, Ch 3	**8**
2	**Requirements:** Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The software requirements document. **Requirements Engineering Processes:** Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management. T1: Ch 4	**8**
3	**System modeling:** System Models: Context models; Behavioral models; Object models; Structured methods.**Software 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; Object-oriented design using the UML. T1: Ch 5 ,Ch 6	**8**
4	Design patterns ,Implementation issues, Design evolution.**Development:** Rapid Software Development: Rapid application development. Open source development. **Software Evolution:** Program evolution dynamics; Software maintenance. T1: Ch 7 , Ch 9	**7**
5	**Verification and Validation:** Verification and Validation: Planning;	**8**

	Software inspections; Automated static analysis; Verification and formal methods. **Software Management**: Project Management; Risk management.**Project planning:** software pricing; Project scheduling; Agile Planning; Estimation techniques. T1: Ch 22, Ch 23,Ch 24	

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5
Note 3: Group Activity is evaluated for 5 Marks

Course Outcomes:
After completion of course students will be able to :
CO1: Assess professional and ethical responsibility of a software engineer.

CO2: Design and develop software system, component, or process to meet desired needs within realistic constraints

CO3: Identify and develop system models to design the software system.

CO4: Recognize and apply the techniques, modern engineering tools necessary for engineering practice

CO5: Demonstrate the knowledge of verification and validation to ensure good quality software

Cos	**Mapping with POs**
CO1	PO1,PO6,PO8,PO12
CO2	PO1,PO2,PO3,PO12
CO3	PO1,PO2,PO3,PO5
CO4	PO1,PO2,PO3,PO10
CO5	PO1,,PO6,PO10,PO11,PO12

Text Books:
1.Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. (Listed topics only from Chapters 1,2,3,4, 5,6, 7, 8, 9,10,11, 22, 23 and 24)
Reference Books:
1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill
2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India
3. http://agilemanifesto.org/
4. http://www.jamesshore.com/Agile-Book

Sub Title : DATA STRUCTURES WITH C LAB		
Sub Code:: 18ISL36	**No. of Credits:1= 0:0:1 (L-T-P)**	**No. of lecture hours/week : 2**
Exam Duration : 3 hours	**Exam Marks: CIE + SEE = 50 + 50 = 100**	

Course Objectives:

1. To understand design and implement the concept of stack using recursive techniques.
2. To Implement the application of stacks in converting an expression from infix to postfix notation and evaluate postfix expressions.
3. Design common data structures and implement linear queue, circular queue, priority queue
4. To understand the importance of implementing data structures like stacks using linked list, queues using linked list, doubly linked lists and circular linked list.
5. To traverse a non linear data structure like a Binary Search Tree.

I. LIST OF PROGRAMS

1 Design develop and implement menu driven C program to perform following set of operations on Stack of integers (using array of maximum size MAX)

i)) Push ii) Pop iii) Display iv) Exit

The program should print appropriate messages for stack overflow, stack underflow, and stack empty.

2 Design , develop and implement a program in C to convert and print a given valid parenthesized or parenthesize free infix expression to postfix expression. The expression consists of single character operands and the binary operators + (plus), - (minus), * (multiply) , / (divide), % (mod) and ^ (power) .

3 Design , develop and implement a program in C to evaluate a valid suffix/postfix expression using stack. Assume that the suffix/postfix expression is read as a single line consisting of positive single digit operands and binary arithmetic operators. The arithmetic operators are + (add), - (subtract), * (multiply) and / (divide), % (mod) and ^ (power) .

4 Design develop and implement menu driven C program to perform following set of operations on queue of integers using an array.

i) Insert ii) Delete iii) Display iv) Exit

The program should print appropriate messages for queue overflow, queue underflow, and queue empty.

5 Design develop and implement menu driven C program to perform following set of operations on circular queue of integers using an array.

i) Insert ii) Delete iii) Display iv) Exit

The program should print appropriate messages for circular queue overflow, circular queue

underflow, and circular queue empty.

6 Design, Develop and Implement a menu driven program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: *USN, Name, Branch, Sem, PhNo*

i. Create a SLL of N Students Data by using *front insertion*.
i. Display the status of SLL and count the number of nodes in it
i. Perform Insertion at End of SLL
. Perform Deletion at End of SLL
. Exit

The program should print appropriate messages for dynamic stack overflow, underflow and empty.

7 Design, Develop and Implement a menu driven program in C for the following operations on Singly Linked List (SLL) of Student Data with the fields: *USN, Name, Branch, Sem, PhNo*

i. Create a SLL of N Students Data by using *front insertion*.
i. Display the status of SLL and count the number of nodes in it
i. Perform Insertion at End of SLL
. Perform Deletion at front end of SLL
. Exit

The program should print appropriate messages for dynamic queue overflow, underflow and empty

8 Design, Develop and Implement a menu driven Program in C for the following operations on
Doubly Linked List (DLL) of Employee Data with the fields: *SSN, Name, Dept, Designation,*
Sal, PhNo

i. Create a DLL of N Employees Data by using *end insertion.*
i. Display the status of DLL and count the number of nodes in it
i. Perform Insertion and Deletion at End of DLL
. Perform Insertion and Deletion at Front of DLL
. Exit

9 Design, Develop and Implement a menu driven Program in C for the following operations on
Binary Search Tree (BST) of Integers .
a. Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2
b. Traverse the BST in Inorder, Preorder and Post Order
c. Search the BST for a given element (KEY) and report the appropriate message
d. Exit

10 Design, Develop and Implement a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes.

Represent and Evaluate a Polynomial:
$P(x,y,z) = 6 x^2 y^2 z - 4 y z^5 + 3 x^3 y z + 2 x y^5 z - 2 x y z^3$

Note: Programs 2, 3, 6, 8, 9, 10 to be conducted with support of Virtual Lab .

Weblink:

https://cse01-iiith.vlabs.ac.in /
https://ds1-iiith.vlabs.ac.in/data-structures-1/

II. OPEN ENDED QUESTIONS

Design and implement a solution to the following in C.

1. Design, Develop and Implement a menu driven Program in C for the following array operations.
i. Creating an array of N Integer Elements
ii. Display of array Elements with Suitable Headings
iii. Inserting an Element (ELEM) at a given valid Position (POS)
iv. Deleting an Element at a given valid Position (POS)
v. Exit.

2. Design, Develop and Implement a Program in C for the following operations on Strings.
i. Read a main String (STR), a Pattern String (PAT) and a Replace String (REP)
ii. Perform Pattern Matching Operation: Find and Replace all occurrences of PAT in
iii. STR with REP if PAT exists in STR. Report suitable messages in case PAT does not exist in STR

3. Design, Develop and Implement a Program in C for the following operations on Singly Circular Linked List (SCLL) with header nodes
i. Represent a Polynomial P(x,y,z)
ii. Find the sum of two polynomials POLY1(x,y,z) and POLY2(x,y,z) and store the result in POLYSUM(x,y,z)
iii. Display the polynomial P (x,y,z)

NOTE:
1. Student is permitted to submit open ended solution to any other open ended question apart from the list above . But it has to be approved by the staff in charge.
2. In the examination each student picks one question from a lot of all 10 questions

Course Outcomes:
After the completion of the above course students will be able to
CO1: Design and develop stack, an application providing solution to convert infix to postfix expression using stack and also design a solution to evaluate postfix expression.
CO2: Implement queues like linear queue, circular queue .
CO3: Design and develop solution to implement the following : singly linked list, stacks using linked list, queues using linked list, doubly linked list and circular linked list.
CO4: Design the solution to traverse a Non linear data structure like a Binary Search Tree.

COs	**Mapping with POs**
CO1	PO2,PO3,PO4,PO7,PO9
CO2	PO3,PO4,PO7,PO9
CO3	PO2,PO3,PO4,PO7,PO9
CO4	PO3,PO4,PO7,PO9

Sub Title : DIGITAL PRINCIPLES AND LOGIC DESIGN LAB		
Sub Code:18ISL37	**No. of Credits:1=0 : 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
Exam Duration : 3 hours	**Exam Marks: CIE + SEE = 50 + 50 = 100**	

Course Objectives:

1. Acquire basic skills and confidence to design, analyze, and implement circuits involving various digital logic gates.
2. To design, implement and analyze combinational logic circuits.
3. To design, implement and analyze sequential logic circuits.
4. Realization of one, two bit magnitude comparator.
5. Simulation and analysis of various logic circuits using VERILOG/VHDL.

I. LIST OF EXPERIMENTS

PART –A

1. Realize full adder using 3-to-8 decoder IC and 4 input NAND gates.
2. Given any 4-variable logic expression simplify using multiplexer IC.
3. Design and implement mod-n (n<8) synchronous up counter using J-K Flip-Flop ICs
4. Design and implement a ring counter using 4-bit shift register.
5. Design and implement an asynchronous counter using decade counter IC to count up from 0 to n (n<=9). Display the count value on 7 segment LED display using BCD to 7 segment code converters IC.

PART- B

1. Write VHDL/Verilog code to realize all the logic gates.
2. Given a Boolean expression , simplify it using K-Map .Write Verilog/VHDL code to realize simplified boolean expression.
3. Write the Verilog/VHDL code for a full adder. Simulate and verify it's working.
4. Write VHDL code for full subtractor. Simulate and verify its working.
5. Write the Verilog /VHDL code for an 8:1 multiplexer. Simulate and verify its working.
6. Write Verilog /VHDL code for two bit magnitude comparator.
7. Write the Verilog/VHDL code for D Flip-Flop with positive-edge triggering. Simulate and verify it's working.
8. Write the Verilog/VHDL code for JK flip flop with negative triggering .Simulate and verify it's working.
9. Write the Verilog/VHDL code for switched tail counter. Simulate and verify it's working.
10. Write the Verilog/VHDL code for mod-8 up counter. Simulate and verify it's working.

II. OPEN ENDED QUESTIONs

Students can build their own applications using the digital components either hardware or simulation tools (software tools)

Course Outcomes:
After completion of the course the students will be able to:
CO1: Simplify Boolean expressions and implement optimal Logic circuits.
CO2: Design and realize combinational circuits.
CO3: Design and realize sequential circuits used for variety of applications.
CO4: Apply minimization techniques to design and implement optimized digital circuits.
CO5: Develop HDL programs for combinational and sequential circuits.

COs	Mapping with POs
CO1	PO1,PO2, PO4,PO5 ,PO7
CO2	PO1,PO2, PO4,PO5
CO3	PO1, PO2,PO4,PO5
CO4	PO1,PO2,PO3, PO4
CO5	PO1,PO2, PO4,PO5 , PO7

NOTE:
1. STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.
2. IN THE EXAMINATION EACH STUDENT PICKS ONE QUESTION FROM PART A AND ONE QUESTION FROM PART B

	CONSTITUTION OF INDIA & PROFESSIONAL ETHICS		
	Subject Code: 18HS31	No. of Credits: 1	No of lecture hours per week: 2 Hrs
	Exam Duration: 2 Hrs	Exam Marks: 50	Total No. of lecture hours: 16 hrs per week

Total Text Objectives:

Constitution of India and professional Ethics taught to the students to enable them an insight into the constitution and enlighten them about the fundamental rights, Protection of rights through enforcement of writs. Functions of judiciary, knowledge and importance of election in democratic country procedure of elections to the post of president, members of parliament and state legislative assembly and the function of Parliament, legislative Assembly and their powers. Professional ethics- The duties and basic responsibilities of engineers towards society and their employer, apply of new ideas and protection of those ideas.

Course Objective

1. The objective of part-I of the syllabus is to know how the Constitution of India was framed and the basic structure of Indian Constitution and the rights given by the Constitution to their Citizens.
2. The objective of part-II.. To inculcate knowledge on election commission in the democratic system. The functions of judiciary in upholding of the Indian Constitution

3. The objective of part-III. Is enlightening them about the system of government adopted in both Central and State and Method of election of representative of Parliament and State Assembly their powers and function and also enlighten them about the term democracy

4. The Objective of part IV. To create awareness on Professional ethics and Human Values
5. The objective of part-V. To inculcate knowledge and exposure on Safety and Risk, Risk Benefit Analysis and have an idea about the Collective Bargaining, Confidentiality, Professional, Employee, Intellectual Property Rights

UNIT NO	SYLLABUS CONTENTS	NO of hours
1	INTRODUCTION Framing of India Constitution, Salient Features of the Constitution, Basic Structure, Preamble of the Constitution, Fundamental Rights- Article(12-35),Art 32 &226, Restrictions under Constitution Fundamental Duties Art (51A).	8
2	Directive Principles Of State Policy,Election commission, Judiciary system-Role of Supreme Court of India and High Court of State	3
3	UNION GOVERNMENT:Executive - President, Prime Minister, council of ministers,Legislature- Parliament, Lok-Sabha , Rajya-Sabha STATE GOVERNMENT:Executive – Governor, Chief Minister, Council of Ministers.Legislative- Legislative Assembly , Legislative Council	5
	HUMAN VALUES& PROFESSIONAL ETHICS:	5

4	Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence.	
5	SAFETY, RESPONSIBILITIES AND RIGHTS : Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) Piracy and plagiarism.	4

Course Outcomes

1. Students come to know that who are all take part in the framing of Indian Constitution and how it was framed, what it contained. The Rights they can enjoy as a citizen of India. Case law gives detailed knowledge to the students about their fundamental rights. Procedure of enforcement of fundamental rights.
2. . Student gets the knowledge about procedure of conducting of election by the election commission, its duties and powers along with powers and functions of judiciary.
3. Student comes to know regarding system of parliamentary form of government .and how the representative of Central and State Government are elected their powers and functions
4. Student comes to know the correct meaning of ethics and their ethical duties and responsibilities and using of honesty in their profession, and the decision making ability.
5. Student gets the knowledge of using the intellectual propert rights and its protection and its application in their profession.

TEXT BOOKS:

1. Introduction To The Constitution Of India By Durga Das Basu. (Students Edition) Prentice – Hall Eee, 19th/20th Edn., 2001.
2. Engineering Ethics By Charles E. Haries, Michael.S.Pritchard And Michael J. Robins Thompson Asia, 2003-08-05

REFERENCE BOOKS:

1 An Introduction to Constitution of India by M.V.Pylee, Vikas Publishing, 2002.
2 Constitution of India by B S Raman
3 Engineering Ethics by M.Govindarajan, S. Natarajan, V.S.Sendilkumar, Prentice – Hall of India Private Ltd, New Delhi, 2004.
4 Constitution of India and Professional Ethics—K R Phaneesh
5 Introduction to the Constitution of India—Brij Kishore Sharma

	SOFT SKILLS		
	Subject Code: 18HS33	**Mandatory Course**	**No of lecture hours per week: 2 Hrs**
	Exam Duration:	**Exam marks: NIL**	**Total No. of lecture hours: 26 hrs per semester**

COURSE OBJECTIVES:

1. The lessons under unit 1 is to help students to recognize oneself as an individual being aware of one's knowledge, personality, environment and lifestyle, through different base and measures like SWOC analysis, personal developments.

2. The lessons under this unit make students to understand the importance of soft skills and hard skills and how to think critically and also learn the importance of creative thinking.

3. The lessons under this unit make students to understand the importance of attitude, time, and also learn to manage them.

4. The objective of this unit is to help a student to learn the art of goal setting and being motivated in achieving his goal in spite of all the hardships with different problems along with teamwork, and leadership qualities.

5. The unit 5 aims at teaching the students about importance of handwriting, punctuation marks, spellings, which helps them, improve in writing skills.

UNIT NO	SYLLABUS CONTENT	HRS /COS
1	• **SWOC ANALYSIS** • **SELF – AWARENESS AND PERSONAL DEVELOPMENT** • **ETTIQUTTE AND MANNERS**	**5 CO1**
2	• **INTRODUCTION TO SOFT SKILLS AND HARD SKILLS** • **CREATIVITY** • **CRITICAL THINKING**	**5 CO2**
3	• **ATTITUDE** • **ADAPTABILITY** • **TIME MANAGEMENT/ PRIORITY** • **STRESS MANAGEMENT**	**5 CO3**
4	• **GOAL SETTING** • **MOTIVATION** • **TEAM WORK** • **PROBLEM SOLVING** • **LEADERSHIP**	**5 CO4**

5	• **GUIDELINES FOR HANDWRITING** • **PUNCTUATION MARKS** • **SPELLING** • **VISUAL NARRATIVES(Ramayana, Mahabharata, Short Stories, films and advertisements)**	**6** **CO5**

COURSE OUTCOME:

1. After the completion of this unit students will know about their self assessments and personality that how to handle various situations in a positive way.

2. At the end of this unit student will be able to see how important it is to consider things carefully and from different angles, something one sees, hears, experiences or reads in order to understand it fully. The student will also have understood the importance of soft skills and thinking creatively.

3. After the completion of this unit students will have learnt about attitude and adaptability and also how to deal with problems and stress in the present world.

4. At the end of this unit students will have learnt some simple ways of planning to achieve his dream and also feel enthusiastic about doing something individually and as well in team.

5. After the completion of this unit students writing skills will have improved.

REFERENCE:

- English for Job Seekers (Language and Soft Skills for the Aspiring) by Geetha Rajeevan, C.L.N. Prakash at al) Cambridge University Press pvt,Ltd.
- New International Business English by Leo Jones and Richard Alexander. Cambridge University Press pvt,Ltd
- Business Benchmark by Norman Whitby. Cambridge University Press pvt,Ltd
- Grammar practice Activities (practical guide for teachers) Cambridge University Press pvt,Ltd

IV SEM

For FOURTH Semester B E (For CS/IS branch only)

	SUBJECT TITLE: PROBABILITY, STATISTICS & QUEUEING THEORY		
	Subject Code : 18MA41CS/IS	**Number of Credits: 3 = 2 : 1 : 0 (L : T : P)**	**No of lecture hours per week: 04 (L=2+T=2)**
	Exam Duration: 3 Hrs	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of lecture hours: 39**

Course objectives: To develop analytical capability and to impart knowledge in Statistical methods and Queuing theory and their applications in Engineering and Technology, so as to enable them to apply the same for solving real world problems.

Unit No.	**Syllabus Content**	**No. of hours**	
		Theory	**Tutorial**
1	**Probability distributions:** Recap of Random Variables.Discrete probability distributions- Binomial, Poisson and Geometric distributions; Continuous probability distributions-Exponential, Normal and Weibull distributions.	06	02
2	**Two dimensional Random variables:** Joint probability mass function, Marginal probability function, conditional probability function, Joint density function, marginal density function, conditional probability density function, covariance, correlation coefficient.	06	02
3	**Statistical techniques:** Curve fitting by method of least squares: $y = ax+b$, $y = ax^2+bx+c$ and $y= ab^x$, Correlation– Karl Pearson's coefficient of correlation, Regression analysis – lines of regression (without proof)- problems.	05	02
4	**Random Process:** Classification of random process, description of random process, stationary random process – first order, second order and Strict-sense stationary processes, Autocorrelation and Cross-correlation functions, Ergodic process.	06	02
5	**Queuing Theory:** Basic characteristics of Queuing models- Transient and steady states, Kendall's notation of a Queuing system, Steady state probabilities for Poisson Queue systems, Markov process, Poisson process, birth and death process, Queuing models: Model I- M/M/1/ ∞ /FIFO and Model II- M/M/s/ ∞ /FIFO.	06	02

Course Outcomes: After the successful completion of the course the students are able to:

CO1: Understand of basic rules of random variables and moments of random variables.
CO2: Create probability functions of transformation of random variables and use these techniques to generate data from various distributions.
CO3: Develop probabilities in joint probability distributions and derive the marginal and conditional distributions of bivariate random variables.
CO4: Apply the concepts of probability theory to discrete time Markov chain and establish the Markovian queuing models.
CO5: Implement a variety of statistical techniques to solve problems of industry standard statistical software.

Course Outcomes (CO) Mapping with Programme Outcomes (PO)
CO1: PO1, PO2
CO2: PO1, PO2
CO3: PO1, PO2
CO4: PO1, PO4
CO5: PO1, PO2

TEXTBOOKS:

1. Kishore S. Trivedi, Probabilty and Statistics with Reliability, Queuing and Computer Science.
2. S D Sharma, Operation research, Tata Mc-Grill.
3. Sundaran Pillai, Probabililty, Statistics and Queuing theory PHI.

REFERENCE BOOKS/Web sources:

1. S.C.Gupta and B.K.Kapur, Fundamentals of Mathematical Statistics.
2. Robert B Cooper, Introduction to queuing theory, 2nd Edition, North Holland.
3. Ivo Adan and Jacques Resing, Queueing Systems, Lecture notes, Netherlands (2015).
4. Arnold O. Allen, Probability, Statistics and Queing theory with computer Science Applications, Academic Press, INC. New York.

QUESTION PAPER PATTERN:

The Semester End Examination (SEE) is for 100 marks.
1. There shall be five full questions (one question for each unit) carrying 20 marks each and all are Compulsory.
2. There shall be internal choice in all the Units
Note: Three assignments are evaluated for 5 marks.

Sub Title : MICROCONTROLLER AND EMBEDDED SYSTEMS		
Sub Code: 18IS41	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

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
4. Comprehend the real time operating system used for the embedded system

Unit No..	Syllabus Content	No of Hours
1	**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 T1:Ch 1 - 1.1 to 1.4, Ch 2 - 2.1 to 2.5	7
2	**Introduction to Arm Instruction Set:** Data Processing Instructions, Branch Instructions, Load-Store Instructions, Software Interrupt Instruction, Program Status Register Instructions, Loading Constants,ARMv5E Extensions, Conditional Execution T1: Ch 3-3.1-3.8	8
3	**Embedded System Components:** Embedded Vs General computing system, Classification of Embedded systems, Major applications and purpose of ES. 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. **T2: All the Topics from Chapter1 and Chapter2**	8
4	**Embedded System Design Concepts:** Characteristics and Quality Attributes of Embedded Systems, Operational and non-operational quality attributes, Embedded Systems-Application and Domain specific, Hardware Software Co-Design and Program Modeling, embedded firmware design and development	**8**

	T2: Chapter-3, Chapter-4, Chapter-7 (Sections 7.1, 7.2 only), Chapter-9 (Sections 9.1, 9.2, 9.3.1, 9.3.2 only)	
5	**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, Preemptive Task scheduling techniques, Task Communication, 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 T2: Chapter-10 (Sections 10.1, 10.2, 10.3, 10.5.2 , 10.7, 10.8.1.1, 10.8.1.2, 10.8.2.2, 10.10 only), Chapter 12, Chapter-13 (block diagram before 13.1, 13.3, 13.4, 13.5, 13.6 only)	8

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5
Note 3: Group Activity is evaluated for 5 Marks

Course Outcomes:

After the completion of the above course students will be able to

CO1: Apply the knowledge gained for Programming ARM for different applications.
CO2: Interface external devices and I/O with ARM microcontroller.
CO3: Interpret the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
CO4: Develop the hardware /software co-design and firmware design approaches.
CO5: Demonstrate the need of real time operating system for embedded system applications

Cos	**Mapping with POs**
CO1	PO1,PO2,PO3,PO5,PO11
CO2	PO1,PO2,PO3,PO5,PO9,PO12
CO3	PO2,PO4,PO5,PO6,PO12
CO5	PO1,PO2,PO5,PO6,PO12

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. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005
2. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015
3. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008
4. Ragunandan, An Introduction to ARM System Design, Cengage Publication

Sub Title : DESIGN AND ANALYSIS OF ALGORITHMS		
Sub Code:18IS42	**No. of Credits:4= 4 :0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course Objectives:

1. To introduce the concept of an algorithm and understand the techniques for its analysis.
2. To represent the algorithmic time efficiency using different asymptotic notations.
3. Explore the various algorithm design techniques, the process of its design and analysis.
4. To solve problems using appropriate design techniques.
5. Understand concepts of space-time tradeoffs.

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 and Basic efficiency classes: Informal introduction , O- notation, Ω-notation , Θ- notation,Basic efficiency classes, Important problem types: Sorting searching string processing, graph problems, combinatorial problems , Mathematical Analysis of Non-Recursive and Recursive Algorithms **Brute Force** : Introduction, Bubble Sort, sequential search T2: Ch 1 : 1.1,1.2, 1.3 ; T1: Ch 2 : 2.1, 2.2,2.3,2.4 T1: Ch 3: 3.1,3.2	**10**
2	**Divide and conquer:** General Method, Binary search , Recurrence equation for DAC, Finding Minimum and maximum Merge Sort, Quick Sort **Decrease-and-conquer :** Introduction, Depth First Search, Breadth First Search, Topological Sorting. T2: Ch 3: 3.1,3.2,3.3,3.4,3.5; T1: Ch 5: 5.2, 5.3	**11**
3	**Greedy method:** The General Method, Knapsack Problem, Job Sequencing with Deadlines) Minimum cost spanning trees : Prim's Algorithm, Kruskal's Algorithm, Single Source Shortest Paths: Dijikstras Algorithms, Huffman trees **Transform and Conquer: Heaps and** Heap sort T2: Ch 4: 4.1,4.2,4.4**; T1: Ch 9 : 9.1,9.2,9.3,9.4** T1: Ch 6 : 6.4	**10**
4	**Dynamic Programming: computing binomial coefficient,** Warshall's and Floyds algorithms, Knapsack problem Travelling Salesperson problem **Backtracking**: N-Queens problem, sum of Subset Problem T1: Ch 8 : 8.1,8.2,8.4 T2: Ch 5.9 T1: Ch 12: 12.1	**11**
5	**Branch-and-Bound:** Assignment Problem,Knapsack problem, Traveling	**10**

	Salesman n Problem **Space and Time Tradeoffs**: Sorting by Counting, Horspool's algorithm NP-Complete and NP Hard problems: Basic concepts , non deterministic algorithms , P,NP, NP-Complete and NP-Hard classes T1:Ch 11: 11.2 T1:Ch 7.1,7.2 T2: Ch 11: 11.1.	

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:
After the completion of the above course students will be able to
CO1: Determine time efficiency of recursive and non- recursive algorithms.
CO2: Apply, analyze algorithms and solve problems using various algorithm design techniques.
CO3: Design and analyze algorithms to solve the optimization problems.
CO4: Design and analyze algorithms associated with space–time tradeoffs .

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

TEXT BOOKS:
1. Anany Levitin: Introduction to the Design and Analysis of Algorithms, Second Edition, Pearson Education, 2009.
2. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran: Computer Algorithms/ C++, 2nd Edition, University press, 2014

REFERENCE BOOKS / WEBLINKS:
1. Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein: Introduction to Algorithms, 2nd Edition, PHI, 2006.
2. Design and Analysis of Algorithms , S. Sridhar, Oxford (Higher Education)

Sub Title : OBJECT ORIENTED CONCEPTS		
Sub Code: 18IS43	**No. of Credits:4=4: 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course Objectives:

1. To understand the object oriented concepts.
2. To understand the concepts of java.
3. To understand the concept of inheritance and exception handling.
4. To understand the concept of event handling and threads.
5. To design and write a applet and swing programs.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Java**: Java and Java applications; Java Development Kit (JDK); Java is interpreted, Byte Code, JVM; Object-oriented programming; Simple Java programs. Data types and other tokens: Boolean variables, int, long, char, operators, arrays, white spaces, literals, assigning values; Creating and destroying objects; Access specifiers.Operators and Expressions: Arithmetic Operators, Bitwise operators, Relational operators, The Assignment Operator, The.? Operator; Operator Precedence; Logical expression; Type casting; Strings Control Statements: Selection statements, iteration statements, Jump Statements.**T1:Ch1,2,3,4,5**	11
2	**Classes, Inheritance, Exceptions:** Classes: Classes fundamentals; Declaring objects; Constructors, this keyword, garbage collection. Inheritance: inheritance basics, using super, creating multi-level hierarchy, method overriding. Exception handling: Exception handling in Java. **Text book 2: T1 :Ch 6 , Ch 7, Ch 8 , Ch10**	10
3	**Packages and Interfaces, Multi-Threaded Programming:** Packages, Access Protection, Importing Packages, Interfaces. Multi Threaded Programming: What are threads? How to make the classes threadable ; Extending threads; Implementing runnable; Synchronization; Changing state of the thread;read-write problem, producer consumer problems.**T1 : Ch 9 , Ch 11**	10

4	**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**.** **Introducing the AWT: Working with Windows, Graphics, and Text:** Introduction the AWT: Working with Windows, Graphics and Text AWT Classes, Window Fundamentals, Working with Frame Windows, Introducing Graphics, Working with Color **T1:Ch 22 , Ch 23**	10
5	**Swings:** Swings: The origins of Swing; Two key Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; Jlabel and ImageIcon; JTextField;The Swing Buttons; JTabbedpane; JScrollPane; JList; JComboBox; JTable. **T1: Ch 29, Ch 30**	11

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:

After the completion of the course students will be able to

CO1: Develop JAVA programs using OOPs principles.

CO2: Develop computer programs to solve real world problems in Java.

CO3: Develop simple GUI interfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using Applets and swings.

CO4: Develop the procedure to store and retrieve data using AWT

CO5:Build the simple swings module using Jlist, Jcombobox as GUI

COs	Mapping with POs
CO1	PO1,PO2,PO3,PO4,PO5
CO2	PO1, PO5,PO6, PO9,PO10,
CO3	PO1, PO2,PO2,PO5,PO11
CO4	PO1,PO2,PO3, PO4,PO5
CO5	PO3,PO4,,PO5, PO9,PO11

TEXT BOOK:

1. Herbert Schildt: Java - The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

(Chapters 1, 2, 3, 4, 5, 6, 8, 10, 11, 21, 22, 29, 30, 31)

REFERENCE BOOKS:

1. Mahesh Bhave and Sunil Patekar, "Programming with Java", First Edition, Pearson Education,2008, ISBN:9788131720806

2. Herbert Schildt, The Complete Reference C++, 4th Edition, Tata McGraw Hill, 2003.

3. Stanley B.Lippmann, JoseeLajore, C++ Primer, 4th Edition, Pearson Education, 2005.

4. RajkumarBuyya,SThamarasiselvi, xingchenchu, Object oriented Programming with java, Tata McGraw Hill education private limited.

5. Richard A Johnson, Introduction to Java Programming and OOAD, CENGAGE Learning.E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies

Sub Title : PYTHON PROGRAMMING		
Sub Code: 18IS44	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Understanding the syntax and semantics of the Python language.
2. To create Functions in Python.
3. To handle Files & Regular expressions in Python.
4. To apply Object Oriented Programming concepts in Python.
5. To create Threaded and Networking applications in Python .

UNIT No	Syllabus Content	No of Hours
1	Introduction to Python, Writing Our First Python Program, Datatypes in Python, Operators in Python, Input and Output, Control Statements T1: **Ch 1, Ch 2, Ch 3, Ch 4,Ch 5 , Ch 6**	**7**
2	Arrays in Python, Strings and Characters, Functions, Lists and Tuples, Dictionaries T1: **Ch 7,Ch 8,Ch 9, Ch 10, Ch 11**	**7**
3	Introduction to OOPS, Classes and Objects, Inheritance and Polymorphism, Exceptions T1:C**h12,Ch13,Ch14,Ch16**	**7**
4	Files in Python, Regular Expressions in Python, Data Structures in Python, Date and Time T1: C**h 17, Ch 18 ,Ch 19, Ch 20**	**9**
5	Threads, Graphical User Interface, Networking in Python, Python's Database Connectivity T1: C**h 20 ,Ch 21, Ch 22, Ch 23**	**9**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:

After the completion of the above course students will be able to

CO1: Demonstrate the understanding and usage of core python scripting elements python constructs, data types.

CO2 : Demonstrate the understanding and usage of functions ,lists, tuples and dictionaries.

CO3: Demonstrate the understanding and usage of modules, packages and regular expressions.

CO4: Demonstrate usage of object oriented features such as Inheritance, Polymorphism, operator overloading.

CO5:Apply the knowledge of python and use the language scripting elements and constructs to develop threaded and networking applications

TEXT BOOK:

1. Core Python Programming: Dr.R.Nageshwara Rao,Dreadm Tech Press 2018

REFERENCE BOOKS:

1. Think Python, Allen Downey, Green Tea Press.
2. Learning Python, Mark Lutz, Orielly.

COs	**Mapping with POs**
CO1	PO1,PO2,PO4
CO2	PO1,PO2,PO4
CO3	PO1,PO2,PO4,PO5,PO8
CO4	PO1,PO2,PO4,PO5,PO8
CO5	PO1,PO2,PO4,PO5,PO8

Sub Title : COMPUTER NETWORKS		
Sub Code: 18IS45	**No of Credits : 3:1:0**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course Objectives:

- To understand basic concepts,topologies and OSI/TCP layers
- Understand the working of different protocols.
- To understand the working of various Network layer Routing algorithms & Transport layer services
- To understand usage of application layer like DNS, Remote login, E-mail, FTPetc.

Unit No.	**Syllabus**	**No of Hours**
1	**Data Communications :Introduction to** Data Communications; Network Models;; Layered tasks; The OSI Model and the layers in the OSI model; TCP / IP Protocol Suite. **T1: Ch 1, Ch 2, Ch 3** **Digital & Analog Transmission: Data** signals; Digital Transmission; Analog Transmission **T1: Ch:4 , Ch 5, Ch 8**	**10**
2	**Data Link Layer** **Error detection and correction** : Introduction to error detection / correction; Block coding; Linear block codes; Cyclic codes, Checksum. **Data Link control:** Framing; Flow and Error control; Protocols; Noiseless channels; Noisy channels; HDLC; Point-to-point Protocol - framing, transition phases. **Multiple Access:** Random Access; Controlled Access; Channelization. **T1: Ch 10, Ch 11,Ch 12**	**10**
3	**Network Layer** **Logical Addressing** IPv4 addresses, IPv6 addresses, Internet Protocol, Delivery, forwarding and Routing **T1: Ch 19, Ch 20,Ch 22**	**12**
4	**Transport Layer** **Process to process Delivery**: UDP, TCP, SCTP, Congestion control and Quality of Service **T1: Ch 23, Ch 24**	**10**
5	**Application Layer, Network Management:** **Domain Name System (DNS)**: Name Space, Domain name space,	10

	Distribution of name space , DNS in internet, Resolution,DNS messages, Types of record. Remote Login,**E-mail**: Architecture, user agent, Message Transfer Agent(SMTP),Message Access Agent: POP and IMAP. FTP **World Wide Web and HTTP**: Architecture, web documents, HTTP: HTTP transaction, Network Management: SNMP. **T1: Ch 25, Ch 26, Ch 27, Ch 28**	

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcome:
After completion of course students will be able to :
CO1: Analyze and formulate components of computer networks.
CO2:Design and develop protocols for transmission at lower layers.
CO3: Identify and develop routing algorithms for network layer.
CO4: Recognize and apply technology for transport layer services.
CO5: Demonstrate the knowledge of Computer networks for different applications.

COs	Mapping with POs
CO1	PO1,PO2, PO5, PO7,PO12
CO2	PO1,PO2,PO3,PO9,PO12
CO3	PO1,PO2,PO5,PO7,PO12
CO4	PO1,PO2,PO3,PO4,PO12
CO5	PO1,PO2,PO3,PO11,PO12

Text Books:

1.Behrouz A. Forouzan: Data Communications and Networking, 4th Edition, Tata McGraw-Hill, 2006.

Reference Books:

1. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
2. Larry L. Peterson and Bruce S. David: Computer Networks – A Systems Approach, 4th Edition, Elsevier, 2007.
3. Wayne Tomasi: Introduction to Data Communications and Networking, Pearson Education, 2005.

Sub Title : OBJECT ORIENTED CONCEPTS LAB		
Sub Code:: 18ISL46	**No. of Credits:1= 0:0:1 (L-T-P)**	**No. of Lecture Hours/Week: 2**
Exam Duration : 3 hours	**Exam Marks: CIE + SEE = 50 + 50 = 100**	

Course Objectives:

1. Design programs using classes and objects for java
2. Build programs for automatic initialization of objects and destroy objects that are no longer required through constructors and destructors.
3. Construct applications to provide flexible options for the creation of new definitions for some of the operators.
4. Specifying mechanism of deriving a new class from older classes through inheritance.
5. Implement methods to select appropriate member function during run time.

I. LIST OF PROGRAMS

1 Create a class called Studentwith the following details as variables within it.
(i) USN
(ii) Name
(iii) Branch
(iv) Phone
Write a Java/c++ program to create nStudent objects and print the USN, Name, Branch, and Phoneof these objects with suitable headings.

2 Design
a . Java/c++ Program to demonstrate Constructor Overloadingand method overloading
b. Develop a Java/c++ Program to implementInner class and demonstrate itsAccess Protections.

3 Write a Java/c++ program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.

4 Design a superclass called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.

5 Write a Java class called Customer to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as and display as using StringTokenizer class considering the delimiter character as "/".

6 Write a Java/c++ program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero.

7 Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.

8 Design a JAVA program using Synchronized Threads, which demonstrates Producer Consumer concept.

9 Develop JAVA programs which demonstrates utilities of Linked List Class
10 Develop JAVA Applet programs which handles Key Board Event

Note: In the examination each student picks one question from a lot of all 10 questions.

II. OPEN ENDED QUESTIONS

Identify the different objects in the following environments and implement different suitable operations

1. Banking System
2. Library
3. Automobile Industry
4. Home Appliances
5. User Interface design etc

NOTE:
1. STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY APROVED BY THE STAFF IN CHARGE.
2. IN THE EXAMINATION EACH STUDENT PICKS ONE QUESTION FROM A LOT OF ALL 10 QUESTIONS

Course Outcomes:
After completing the course the students are able to:

CO1:Design programs using classes and objects using JAVA/C++
CO2: Develop programs for automatic initialization of objects and destroy objects that are no longer required.
CO3: Develop applications to provide flexible options for the creation of new definitions for some of the operators.
CO4:Specify mechanism of deriving a new class from older classes through inheritance .
CO5: Design a program using Templates & Exception Handling.

COs	**Mapping with POs**
CO1	PO2,PO3,PO5
CO2	PO2,PO3,PO6,PO9
CO3	PO2,PO3,PO5,PO6
CO4	PO2,PO3,PO5,PO9
CO5	PO2,PO3,PO5,PO6

Sub Title : DESIGN AND ANALYSIS OF ALGORITHMS LAB		
Sub Code:18ISL47	**No. of Credits:1 =0 : 0 : 1 (L-T-P)**	**No. of Lecture Hours/Week: 2**
Exam Duration : 3 hours	**Exam Marks: CIE + SEE = 50 + 50 = 100**	

Course Objectives:

1. To introduce various algorithm design techniques.
2. To design algorithms with specific technique and implement these algorithms using the appropriate technique.
3. Enhance written and oral communication skills among students.
4. To enhance the skill to debug programs

I. LIST OF PROGRAMS

Implement the following using C/C++:

1 Design and implement an algorithm to Sort a given set of elements using DAC merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n and analyze the time complexity.

2 Print all the nodes reachable from a given starting node in a digraph using BFS method.

3 Obtain the topological ordering of vertices in a given graph using DFS method/ Source removal method

4 From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

5 Apply Prim’s algorithm to undirected graph and obtain minimum cost Spanning Tree.

6 Design and implement Heap Sort algorithm to arrange elements in desired order

7 Design and implement an algorithm to solve 0/1 Knapsack problem using dynamic programming.

8 Design and Implement Floyd’s algorithm for the All-Pairs- Shortest-Paths problem.

9 Design and implement an algorithm to solve N-Queen's problem using Back Tracking.

10 Design and implement Horspool’s algorithm.

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Note: In the examination each student picks one question from the lot of all 10 questions.

II. OPEN ENDED QUESTIONS

Develop / Simulate Following Game Applications:

1. Knapsack
2. Spanning Trees
3. Sum of Subset
4. Travelling Sales Person etc.

NOTE:

1. STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE. BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.

2. IN THE EXAMINATION EACH STUDENT PICKS ONE QUESTION FROM A LOT OF ALL 10 QUESTIONS

Course Outcomes:

After the completion of course the student will be able to :

CO1: Design algorithms using different design techniques.
CO2: Implement the algorithms using C/C++.
CO3: Analyze the time complexity of algorithms.
CO4: Design key algorithmic paradigms to solve optimization problems.

COs	Mapping with POs
CO1	PO2,PO3,PO4,PO9
CO2	PO2,PO3,PO4,PO9
CO3	PO2,PO3,PO4,PO9
CO4	PO2,PO3,PO4,PO9

	EMPLOYABILITY SKILLS		
	Subject Code: 18HS43	**Mandatory Course**	**No of lecture hours per week: 2 Hrs**
	Exam Duration:	**Exam marks: NIL**	**Total No. of lecture hours: 26 hrs per semester**

COURSE OBJECTIVE:

1. According to the present day requirement, this unit is designed on job seeking topics, adopting a task based approach with activities and worksheets.
2. In this unit students will be taught to prepare project report effectively which is integral part of their academics by making use of referencing skills. And also they will be taught how to write an abstract and will be familiarized with research paper guidelines.
3. The unit 3 aims at preparing the student to face interviews confidently.
4. Under the topics like synonyms, antonyms and homophones students' vocabulary will be enhanced.
5. The lessons under this unit help students' to use idioms and phrases, decoding the analogies and the correct usage of collective nouns

UNIT NO	SYLLABUS CONTENT	HRS/COS
1	• Employability Skills • PRESENTATION SKILLS • RESUME WRITING • COVERING LETTER • E-MAIL WRITING	**8** **CO1**
2	• PROJECT REPORT • REFERENCING SKILLS • ABSTRACT WRITING • RESERCH PAPER GUIDELINE AND FORMAT	**2** **CO2**
3	• INTERVIEW SKILLS	**8** **CO3**
4	• SYNONYMS • ANTONYMS • HOMOPHONES	**4** **CO4**
5	• IDIOMS & PHRASES • ANALOGY • COLLECTIVE NOUNS	**4** **CO5**

COURSE OUTCOME:

1. After the completion of this unit students will have learnt to make presentations both in formal and informal situations. And also will have learnt the art of resume writing.
2. After the completion of this unit student will have learnt how to do a project report using referencing skills. And also they will have learnt how to write abstract and will have been familiarized with research paper guidelines.
3. This unit will have helped student to communicate with various skills required for job interviews.
4. After the completion of this unit the students will have learnt the strategies of vocabulary.
5. After the completion of this unit student will have learnt to use idioms and phrases in everyday conversation.

REFERENCE:

- English Skills for Technical Students by British Council, Orient Black Swan.
- A course in Grammar and Composition by Geetha Nagaraj, Cambridge University Press India Pvt. Ltd.
- Communication Skills for Professionals by Nira Konar, PHI learning Pvt. Ltd.
- Enhancing English and Employability Skills by State Board of Technical Education.

Detailed Scheme

ACADEMIC YEAR 2021-2022

Dr. Ambedkar Institute of Technology
Bangalore

V - VI (2019-2023 BATCH) (175Credits)

B.E

Department Of Information Science and Engineering

Vision

- To create **D**ynamic, **R**esourceful, **A**dept and **I**nnovative **T**echnical professionals to meet global challenges.

Mission

- To offer state-of-the-art undergraduate, postgraduate and doctoral programmes in the fields of Engineering, Technology and Management.
- To generate new knowledge by engaging faculty and students in research, development and innovation
- To provide strong theoretical foundation to the students, supported by extensive practical training to meet industry requirements.
- To install moral and ethical values with social and professional commitment.

DEPARTMENT VISION AND MISSION

Vision:

- Imparting quality technical education and preparing professionals to meet Information Technological challenges globally.

Mission:

- Prepare highly capable Information Science engineers through best practices.
- Encourage students to pursue higher education for further growth in the learning process and to promote research in the frontier areas of Information Technology.
- Educate students to take up social and professional responsibilities with ethical values for the betterment of the society.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Graduates will have the ability to become successful computing professionals in the area of Information Science and Engineering.

PEO2: Graduates will be equipped to enhance their knowledge through core engineering and latest technological skills to promote lifelong learning.

PEO3: Graduates will be able to take up social, technical and entrepreneurial challenges in inter disciplinary and multi disciplinary fields.

PROGRAM SPECIFIC OBJECTIVES(PSOS)

PSO1:Students should be able to understand, analyze and adopt principles of programming paradigms by using latest technologies such as Cloud computing, Big data analytics, AI ,Machine Learning and IoT based applications for solving real-world problems.

PSO2: Students should be able to acquire and demonstrate the team work, professional ethics, competence and communication skills while developing software products.

PROGRAMME OUTCOMES (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Dr. Ambedkar Institute of Technology, Bengaluru-560 056
SCHEME OF TEACHING AND EXAMINATION from Academic Year 2021-2022
B.E Information Science and Engineering
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
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**	**Intellectual Property Rights**	Hu	3	-	--	03	50	50	100	3
2	**PC**	**18IS51**	Operating System	ISE	3	-	--	03	50	50	100	3
3	**PC**	**18IS52**	Web Technologies	ISE	3	2	--	03	50	50	100	4
4	**PC**	**18IS53**	Artificial Intelligence	ISE	3	--	--	03	50	50	100	3
5	**PC**	**18IS54**	Data base Management Systems	ISE	4	--	--	03	50	50	100	4
6	**PE**	**18IS55X**	**Elective -1**	ISE	3	--	--	03	50	50	100	3
7	**OE**	**18ISE01X**	**Open Elective -A**	ISE	3	--	--	03	50	50	100	3
8	**PC**	**18ISL56**	Computer Networks Lab	ISE	--	--	2	03	50	50	100	1
9	**PC**	**18ISL57**	Data base Management System Lab	ISE	**--**	**--**	2	03	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 -1	Open Elective -A

18IS551	Internet of things
18IS552	Unix System Programming
18IS553	Information systems
18IS554	Object-Oriented Modeling and Design

Open Elective -A

INTER-DEPARTMENTAL ELECTIVE OFFERED BY ISE

Subject Code	Subject Title	No. of credits
18ISE011	Machine Learning	3
18ISE012	Internet of Things	3
18ISE013	Information Systems	3

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.

HEAD DEPT. OF INFORMATION SCIENCE & ENGG

Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2021-2022

B.E Information Science and Engineering

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

VI 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	18HS61	**Management and Entrepreneurship**	Hu	3	-	--	03	50	50	100	3
2	PC	18IS61	Automata theory and compiler design	ISE	3	2	--	03	50	50	100	4
3	PC	18IS62	Machine Learning	ISE	4	--	--	03	50	50	100	4
4	PC	18IS63	Cloud Computing	ISE	3	--	--	03	50	50	100	3
5	PE	18IS64X	Professional Elective -2	ISE	3	--	--	03	50	50	100	3
6	OE	**18ISE02X**	**Open Elective -B**	ISE	3	--	--	03	50	50	100	3
7	PC	18ISL65	Machine Learning Lab	ISE	--	--	2	03	50	50	100	1
8	PC	18ISL66	Cloud Computing Lab	ISE	--	--	2	03	50	50	100	1
9	MP	18ISMP67	Mini-project	ISE				03	50	50	100	2
10	INT	18ISI68	Industry Internship	(To be carried out during the intervening vacations of VI and VII semesters)				--	--	--	--	--
			TOTAL		**19**	**2**	**4**	**27**	**450**	**450**	**900**	**24**

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

<table>
<tr><th colspan="3">Electives</th></tr>
<tr><th>Course code</th><th>Professional Electives -2</th><th>Open Elective -B</th></tr>
<tr><td>18IS641</td><td>Advanced Java and J2EE</td><td rowspan="5">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>18IS642</td><td>Digital Image Processing</td></tr>
<tr><td>18IS643</td><td>Network and Cyber Security</td></tr>
<tr><td>18IS644</td><td>Mobile Application Development</td></tr>
<tr><td colspan="2"><u>Open Elective -B</u>
INTER-DEPARTMENTAL ELECTIVE OFFERED BY ISE
<table><tr><th>Sub Code</th><th>Subject Title</th><th>No. of Credits</th></tr><tr><td>18ISE021</td><td>Data Base Management System</td><td>3</td></tr><tr><td>18ISE022</td><td>Web Technologies</td><td>3</td></tr><tr><td>18ISE023</td><td>Unix and Shell Programming</td><td>3</td></tr></table></td></tr>
</table>

HEAD DEPT. OF INFORMATION SCIENCE & ENGG

V SEMESTER

	INTELLECTUAL PROPERTY RIGHTS(2020-21)		
	Subject Code: 18HS51	**No. of Credits: 3**	**No of lecture hours per week: 3 Hrs**
	Exam Duration: 3HOURS	**Exam Marks: 100**	**Total No. of lecture hours: 39hrs**

Course Objective:

1. The main objective of the IPR is to make the students to be aware of their innovative & creative rights & Protection of IPR.

2. To impart knowledge how to obtain & register their inventions & patenting their inventions & knowledge of creative works that can be protected under Copy Right.

3. To create awareness to prevent fraudulent use of Trade Mark& impart knowledge on Registrable Trade Mark, Rights of Registered Proprietor of TM& its protection& to promote creativity& aesthetic aspects being protected under Designs.

4.To inculcate knowledge on Geographical Indication of a product, its origin & its protection under Geographical Indication & Important GIs in India.

5.To enable students to have knowledge of Plagiarism ,Cyber Crimes & their impact on human society,its prevention & punishment under Information Technology.

Units	Syllabus Content	Hours
1	**INTRODUCTION:** Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights, Importance of human creativity in the present scenario, Provision of IPR under TRIPS and WTO. Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge.	**04**
2	**PATENT RIGHTS AND COPY RIGHTS—** Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and licence ,Register of Patents& Patent Offices,Patent Agent,Government use of Invention, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties. **COPY RIGHT—**Origin, Definition &Subject matter of Copy Right, Author & Ownership of Copy Right, Rights conferred by Copy Right, Registration procedure, Assignment, Licence& Relinquishment of CopyRight, Term of Copy Right, Infringement, Remedies, Computer Software & Copy Right Protection	**10**
3	**TRADE MARKS—** Origin, Meaning & Nature of Trade Marks, Types, Features of Good Trade Mark,Trade Mark Registry & Register of Trade Mark,Registration of Trade Marks,Deceptive Similarity,Assignment & Transmission, Infringement & Remedies, Offences relating to Trade **Marks, Passing Off, Penalties.** **DESIGN-** Meaning, Definition, Object, Registration of Design,Rights conferred by Registration, Cancellation of Registration, International convention of design- types and functions,Powers & duties of Controller.	**10**

	Semiconductor Integrated circuits and layout design Act-2000.	
4	**GEOGRAPHICAL INDICATION**-----Introduction, Meaning, Scope of Geographical Indication, Important GIs in India, Protection of GI,Registration of GI, Role & Functions of Registrar of GI,Infringement & Remedies.	**06**
5	**PLAGIARISM**- Meaning, Plagiarism with respect to IPR,Salient Features of ITAct 2000,Cyber crimes, Meaning, Types of Cyber Crime, Digital signature, Authorities to issue Digital Signature Certificate, E-Commerce.	**09**

Course outcomes:

1. The students learn the property rights under IPR, kinds of IPR, their protection of creative & innovative Rights.

2.Students also learn the inventions patentable,their registration , protection & punishment for Infringement& knowledge of creative works, Authors right under Copy Right & its term & Infringement of Copy Right.

3.Students will have the knowledge of Registrable Trade Mark, Rights of Proprietor, Protection & prevention of fraudulent use of Trade Mark & learn aesthetic aspects that can be protected , Registered under Designs .

4.Students will be aware of Geographical Indication of a product , its origin , protection of GI s, Important GIs in India.

5.Students will get knowledge of plagiarism in their innovations which can be questioned legally, knowledge on Digital Signature ,Cyber crime & punishment under Information Technology .

TEXT BOOKS:

1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy
2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra
3. IPR by P. Narayanan
4. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.

Sub Title : OPERATING SYSTEMS		
Sub Code: 18IS51	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week :3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. To analyze structure ,management, concepts of process scheduling and multithreading in operating system
2. To identify the various methods of causing deadlocks.
3. To describe the techniques for main memory management.
4. To analyze the file system interface, implementation and disk management.
5. To understand the Protection and security concepts in operating system.

Unit No.	Syllabus Content	No of Hours
1	**Introduction**: What operating systems do, Computer-System Architecture, Operating System Structure, Operating System Operations, Process Management, Memory Management, Storage Management, Protection and Security. T1: Ch 1: 1.1 to 1.9. **System Structures**: Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating System Structure; T1: Ch 2: 2.1 to 2.7. **Processes**: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication; Multithreaded Programming: Multithreading Models; T1: Ch 3: 3.1 to 3.4, Ch 4: 4.1 to 4.3.	8
2	**Process Synchronization**: The Critical Section Problem, Peterson‟s Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples; T1: Ch 5: 5.1 to 5.9. **CPU Scheduling :**Scheduling Criteria , Scheduling Algorithms , Thread Scheduling, Multiple-Processor Scheduling , Real-Time CPU Scheduling ,Operating-System Examples. T1: Ch 6: 6.1 to 6.7. **Dead locks:** System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance and detection, Recovery from Deadlock T1: Ch 7: 7.1 to 7.7.	8
3	**Memory Management Strategies**: **Main Memory:** Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table. T1: Ch 8: 8.1 to 8.6. Virtual Memory Management: Background, Demand Paging, Copy on Write, Page Replacement, Allocation of frames, Allocating Kernel Memory. T1: Ch 9: 9.1 to 9.8	8

4	**File System**: File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection; T1: Ch 11: 11.1 to 11.6. **File-System Implementation**: File System Structure , File System Implementation, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery. T1: Ch 12: 12.1 to 12.7. **Mass storage structures, protection:** Mass storage structures; Disk structure; Disk attachment, Disk scheduling; Disk management; Swap space management. T1: Ch 10: 10.1 to 10.6	8
5	**Protection and Security**: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability-Based systems. T1: Ch 14: 14.1 to 14.8 The Security Problem, Program Threats ,System and Network Threats, Cryptography as a Security Tool , User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Networks, Computer-Security Classifications T1:Ch 15 : 15.1 to 15.8	7

TEXT BOOK:

Abraham Silberschatz Peter Baer Galvin, Greg Gagne **- Operating System concepts,** , 9th edition, Wiley-India, 2012.

REFERENCE BOOKS:

1. D.M Dhamdhere – **Operating Systems: A Concept Based Approach**, 2nd Edition, Tata McGraw- Hill, 2002.
2. P.C.P. Bhatt **- Operating Systems**, 2nd Edition, PHI, 2006.
3. Harvey M Deital **- Operating Systems** –, 3rd Edition Wesley, 1990.

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4

Assignment -III from Unit 5

Course Outcomes

After the completion of the course students will be able to

CO1: Analyze the fundamental principles and concepts of operating systems.

CO2: Identify, analyze various synchronization technique, deadlocks.

CO3: Identify, analyze, apply the various algorithms for memory management.

CO4: Analyze issues related to file system, disk management, protection and security.

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

Sub Title : WEB TECHNOLOGIES		
Sub Code: 18IS52	**No. of Credits:4=3 : 1 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course Objectives:

1. To create a web pages using XHTML using Cascading Style Sheets
2. To do data validation and user interaction using JavaScript
3. To create XML documents and provide styling to documents.
4. To develop website using AngularJS ,Node JS
5. To design web applications using the concepts of PHP

Unit No	Syllabus Content	No of Hours
1	**Basics of XHTML :** Basic syntax; Standard XHTML document structure; Basic text markup. Images; Hypertext Links; Lists; Tables; Forms; Frames; **Introduction to XML:** XML Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying XML documents with CSS; XSLT style sheets; XML processors **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. T1:Ch 2, Ch 3, Ch 7	**10**
2	**JavaScript:** Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions. T1: Ch 4	**10**
3	**JavaScript and HTML documents:** 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 T1: Ch 5	**10**
4	**Angular JS , Node JS:** OVERVIEW: General features, Core Features, Concepts, Advantages of AngularJS, Disadvantages of AngularJS, AngularJS Directives, ENVIRONMENT, MVC ARCHITECTURE, Creating Angular JS Application, Executing AngularJS Application, How AngularJS Integrates with HTML, DIRECTIVES, EXPRESSIONS, CONTROLLERS, FILTERS, TABLES, HTML DOM, MODULES, FORMS	12

	Node Js:Over view of Node Js, Node Js Vs Angular JS, NPM	
5	**PHP:** Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, Operations, and Expression, Output, Control Statements, Arrays, Form handling, Files, Cookies, Session Tracking. T1: Ch 11 **Web Application Design:** Real World Web Software Design, Principles of Layering, Software design patterns in the web context, Data and Domain patterns, Presentation patterns, T2: Ch 14	10

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
Students will demonstrate the knowledge and the skills acquired with respect to:

CO1: Design simple web pages using different tags of XHTML and XML document and use the style sheet to display
CO2 : Validate and provide user functionality using JavaScript
CO3 : Use Angular JS, Node JS in your website development
CO4: Design and develop PHP programs to perform database access & session tracking.
CO5: Develop web application projects

COs	**Mapping with POs**
CO1	PO1,PO2,PO3,PO4,PO5,PO6,PO10,PO11
CO2	PO2,PO3,PO5,PO6,PO9
CO3	PO1,PO5,PO9, PO11
CO4	PO1, PO5,PO9,PO10,PO11
CO5	PO5, PO6, PO8,PO10,PO11

TEXT BOOKS:
1. Robert W. Sebesta: Programming the World Wide Web, 4th Edition, Pearson education, 2011.
2. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1stEdition, Pearson education, 2015. (ISBN:978-9332575271)
3. https://www.javatpoint.com/angularjs

REFERENCE BOOKS / WEBLINKS:
1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson education, 2011.
2. Pro PHP and jQuery- JASON LENGSTORF,2010.
3. http://nptel.ac.in
4. http://www.w3schools.com/

Sub Title :ARTIFICIAL INTELLIGENCE		
Sub Code:18IS53	**No. of Credits:3=3: 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours :39**

Course Objectives:

1. Understand about agent, behavior and structure
2. Learn different AI models and search strategies
3. Representation of knowledge and reasoning
4. Gain knowledge about learning strategies

Unit No	Syllabus Content	No of Hours
1	What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems	8
2	Knowledge representation issues: Representations and mappings approaches to knowledge representation, Issues in knowledge representation.	8
3	Logical Agents: Knowledge based agents, The Wumpus world, Logic-Propositional logic Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic. Using predicate logic: Representing simple facts in logic	8
4	Resolution, Natural Deduction, Learning: Forms of Learning; Inductive learning; Learning decision trees; Ensemble learning; Computational learning theory	8
5	Statistical learning, Maximum likelihood parameter learning, Bayesian parameter learning, passive reinforcement learning, active reinforcement learning	7

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After the completion of course, the students will be able to:
CO1: Describe the modern view of AI as the study of agents that receive percepts and perform actions.
CO2: Apply AI search Models and Generic search strategies.
CO3: Write Logic for representing Knowledge and Reasoning of AI systems.
CO4: Design different learning algorithms for improving the performance of AI systems.
CO5: Implement projects using different AI learning techniques

COs	**Mapping with POs**
CO1	PO1,PO2
CO2	PO1,PO2,PO12
CO3	PO1,PO2,PO4,PO6,PO12
CO4	PO1,PO2,PO3,PO4,PO12
CO5	PO1,PO2,PO3,PO4,PO6,PO12

TEXT BOOKS:

1.“Artificial Intelligence: A Modern Approach ” by Stuart Russel, Peter Norvig,

2nd Edition, Pearson Education, 2003.

2.“Artificial Intelligence” by Elaine Rich, Kevin Knight, Shivashankar B Nair: Tata

MCGraw Hill 3rd edition. 2013

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).

E Books:

1. Practical Artificial Intelligence Programming With Java,Third Edition ,Mark Watson
2. Artificial Intelligence Lecture Notes MIT.

MOOCs:

1. Artificial Intelligence -http://www.nptelvideos.in/2012/11/artificial-intelligence.html

Sub Title : DATABASE MANAGEMENT SYSTEMS		
Sub Code:18IS54	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1. To analyze the basic concepts and architecture of DBMS.
2. To understand the conceptual and relational models to design databases.
3. To Create and manipulate a relational database using SQL.
4. To understand the normalization steps in database design and removal of data anomalies.
5. To acquire the knowledge of transaction processing, NoSQL and MongoDB concepts

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; 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 Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two. TEXT 1 Chapter-1,2,7	**12**
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. Relational Database Design Using ER-to-Relational Mapping TEXT1 Chapter- 3, 6.1,6.2,6.3,6.4,6.5, 9.1	**10**
3	**SQL :Schema Definition, Basic Constraints and Queries:** SQL Data Definition and Data Types; 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; Embedded SQL. Introduction to SQL Programming Techniques:	**10**

	Database programming issues and techniques, Embedded SQL, Dynamic SQL. TEXT1 Chapter 4,5,13.1,13.2	
4	**DatabaseDesign: Functional Dependencies and Normalization:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. Relational Database Schema Design Algorithms and further Dependencies: Properties of Relational Decompositions; Multi valued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form TEXT1 Chapter15,16	**10**
5	**Transaction Management:** Overview of Transaction Management**:** The ACID Properties, Transaction and schedules, Concurrent Execution of Transactions, Lock based concurrency control, performance of locking, Transaction support in SQL,Introduction to crash recovery,Concurrency control **Introduction to NoSQL and MongoDB:** What is NoSQL? Why NoSQL? Benefit over RDBMS, Types of NoSQL Database, and NoSQL vs. SQL Comparison. What is MongoDB? Overview of MongoDB, Design Goals for MongoDB Server and Database, MongoDB Tools, MongoDB CRUD Concepts, MongoDB Datatypes TEXT2 Chapter-16,17	**10**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:

After completing the course the students are able to:
CO1: Analyze the database concepts, data models and design the ER model for real world applications.
CO2: Design a database schema for database application.
CO3: Develop complex queries using SQL to retrieve the information required from the database.
CO4: Apply normalization techniques to database.
CO5: Analyze the concepts of transaction processing, NoSQL and MongoDB

COs	Mapping with POs
CO1	PO1,PO2,PO3,PO5
CO2	PO1,PO3,PO5
CO3	PO2,PO3, PO5, PO9
CO4	PO1,PO2,PO3
CO5	PO1, PO2, PO3,PO5

TEXT BOOKS:

1. Elmasri and Navathe: Fundamentals of Database Systems, 6th Edition, Pearson Education, 2011.
2. Raghu Ramakrishna and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003.

REFERENCE BOOKS/WEBLINKS:

1. Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, Mc-GrawHill, 2006.
2. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education, 2006.
3. www.w3resources.com

Sub Title : INTERNET OF THINGS

Sub Code:18IS551	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours :39**

Course Objectives

1. To Learn the characteristics, designs,and challenges in the IoT
2. To Understand the key Technologies and protocols in IoT
3. To Analyze various Layers connectivity and motivation of IPV6
4. To Illustrate the role of IoT in various domains of Industry
5. Infer the role of Data Analytics in IOT

UNIT No	**Syllabus Content**	**No of Hours**
1	**Introduction to IoT** Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.Enabling IOT Technologies,IOT and M2M-Introduction, difference between IOT and M2M. **T1:Chapter1-1.1,1.2,1.3,1.4 , Chapter3-3.1,3.2,3.3**	8
2	**Fundamentals IoT** Mechanism and Key Technologies-Identification of IoT Object and Services, Structural Aspects of the IoT, Key IoT Technologies. Evolving IoT Standards-Overview and Approaches,IETF IPV6 Routing Protocol for RPL Roll, Constrained Application Protocol, Representational State Transfer, ETSI M2M,Third Generation Partnership Project Service Requirements for Machine-Type Communications, CENELEC, IETF IPv6 Over Lowpower,Zigbee. **T2:Chapter4-4.1,4.2,4.3** **T2:Chapter5-5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9**	8
3	**Layer ½ Connectivity**: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M,Layer 3 Connectivity :IPv6 Technologies for the IoT: Overview and Motivations. Address Capabilities,IPv6 Protocol Overview, IPv6 Tunneling. **TEXT BOOK 2: Chapter6-6.1,6.2, Chapter7-7.1,7.2,7.3,7.4,7.5**	8
4	**Case Studies** Illustrating IoT Design-Introduction, Home Automation, Cities,Environment, Agriculture, Productivity Applications. **T1:Chapter 9-9.1,9.2,9.3,9.4,9.5,9.6**	8
5	**Data Analytics for IoT**– Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis, Structural Health Monitoring . **T1:Chapter 10-10.1,10.2,10.3,10.4,10.5,10.6,10.7,10.8**	7

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course outcomes:
On successful completion of the course, the student will be able to
CO1: Interpret the impact and challenges posed by IoT networks
CO2: Appraise the role of IoT protocols for efficient network communication
CO3: Deployment of different sensor technologies and Layers to connect the network.
CO4: To Deploy the role of IoT design in various domains of Industry
CO5:Elaborate the need for Data Analytics .

COs	Mapping with PO's
CO1	PO3,PO4,PO5,PO6,PO9,PO10
CO2	PO3,PO4,PO5,PO6,PO7,PO9,PO10
CO3	PO4,PO6,PO7,PO8,PO9,PO11
CO4	PO4,PO5,PO8,PO9,PO10,PO11
CO5	PO4,PO5,PO6,PO7,PO9,PO10

TEXT BOOK:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things : A Hands on Approach" Universities Press., 2015
2. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6:The Evolving World of M2M Communications", Wiley, 2013

REFERENCE BOOKS/WEBLINKS

1.Michael Miller," The Internet of Things", First Edition, Pearson, 2015.

2.Claire Rowland,Elizabeth Goodman et.al.," Designing Connected Products", First Edition,O'Reilly, 2015

Sub Title : UNIX SYSTEMS PROGRAMMING		
Sub Code:18IS552	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Know the operating system standards like POSIX standards.
2. Comprehend UNIX internal-kernel structures.
3. Design & develop UNIX commands & applications using UNIX system API's.
4. Understand the UNIX process control mechanism.
5. Analyze the problem & apply the relevant IPC techniques in UNIX system programming.
6. Adopting signals as IPC for efficient low level and high level application development on Unix systems.

UNIT No.	Syllabus Content	No of Hours
1	**Introduction:** UNIX and ANSI Standards:The ANSI C Standard, The ANSI/ISOC++ Standards, Difference between ANSI C and C++, The POSIX Standards, The POSIX.1 FIPS Standard, The X/Open Standards. UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics. T2:Ch 1,Ch 5,Ch 6	8
2	**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.**UNIX File APIs:** General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs. T2:Ch 7,Ch 8,Ch 9	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. T1:Ch 7,Ch 8	8
4	**Process Control:** Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection. Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups. T1:Ch 9,Ch 10	8
5	**Signals and Daemon Processes:** Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb	7

	Timers.Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model. **Interprocess Communication – 1:** Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores. T1:Ch 11,Ch 12.	

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4 .

Assignment -III from Unit 5

Course Outcomes:

After completion of course students will be able to

CO1 : Understand the fundamentals of UNIX operating system such as the POSIX standards, . UNIX processes, UNIX file system and Signals.

CO2 :Analyze UNIX kernel level support for UNIX processes, UNIX filesystem and Signals.

CO3 : Demonstrate advanced UNIX features such as signals, Job Control, daemon processes and inter Process communication.

CO4 : Develop UNIX commands, utilities and applications utilizing UNIX System calls.

CO5 : Analyze process control, Deamon characteristics, coding rules and error logging and IPC facilities

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

TEXT BOOKS:

1. Terrence Chan: UNIX System Programming Using C++, Pearson India, 2015.

2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 3rd Edition, Pearson Education, 2015.

REFERENCE BOOKS / WEBLINKS:

1. Maurice JBach :Advanced UNIX Programming, 2nd Edition, Pearson Education, 2015.

2. UNIX kernel Internals –UreshVahlia PHI 2010.

3. www.tutorialspoint.com/unix/unix-basic-operators.html

4. https://www.youtube.com/watch?v=DpcCtaaGxyQ&list=PLd3UqWTnYXOmKXhD-PVqMN1XhNQV-s4lj

Sub Title : INFORMATION SYSTEMS		
Sub Code:18IS553	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Introduce to various types of information systems, issues and concepts related to it.
2. Understand about electronic and enterprise business system management.
3. Familiarize the need and benefits of E-Business, ERP, E-Commence, SCM, DSS.
4. Comprehend the concept of IT planning and Managing the Information Systems.
5. Understand about Security management of IT, Enterprise and Global Management of IT.

UNIT No.	Syllabus Content	No of Hours
1	**Foundation concepts – 1:** Information Systems in Business: Introduction, The real world of Information Systems, Networks, What you need to know, The fundamental role of IS in business, Trends in IS, Managerial challenges of IT. System Concepts: A foundation, Components of an Information System, Information System Resources, Information System activities, Recognizing Information Systems **Foundation Concepts – 2:** Fundamentals of strategic advantages: Strategic IT, Competitive strategy concepts, The competitive advantage of IT, Strategic uses of IT, Building a customer-focused business, The value chain and strategic IS, Reengineering business processes, Becoming an agile company Creating a virtual company, Building a knowledge-creating company. T1: Ch 1, Ch 2	**8**
2	**Electronic Business Systems:** Enterprise Business Systems: Introduction, Cross-functional enterprise applications, Enterprise application integration, Transaction processing systems, Enterprise collaboration systems. Functional Business Systems: Introduction, Marketing systems, Manufacturing systems, Human resource systems, Accounting systems, Financial management systems. **Enterprise Business Systems:** Customer relationship management: Introduction, What is CRM? Benefits and challenges of CRM, Trends in CRM.T1: Ch 7, Ch 8	**8**
3	**Enterprise resource planning:** Introduction, What is ERP? Benefits and challenges of ERP, Trends in ERP. Supply chain Management: Introduction, What is SCM? The role of SCM, Benefits and challenges of SCM, Trends in SCM. **Electronic Commerce Systems:** Electronic commerce fundamentals: Introduction, The scope of e-commerce, Essential e-commerce, processes, and Electronic payment processes. E-commerce application trends, Business-to- Consumer e-commerce, Business-to-Business e-commerce, e-commerce marketplacesT1: Ch 8, Ch 9	**8**
4	**Decision Support Systems:** Decision support in business: Introduction,	**8**

	Decision support trends, Decision support systems (DSS), Management Information Systems, On-line analytical processing, Using DSS, Executive information systems, Enterprise portals and decision support.T1: Ch 10	
5	**Decision Support Systems contd:** Knowledge management systems, Business and Artificial Intelligence (AI).**Security management of IT:** Introduction, Tools of security management, Internetworked security defenses, Other security measures, System Controls and audits. **Enterprise and Global Management of IT:** Managing IT: Business and IT, Managing IT, Business / IT planning, Managing the IS function. T1: Ch 10, Ch 13,Ch 14	**7**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course outcomes:
After completing the course the students are able to:
CO1:Describe the role of information technology and information systems in business
CO2: Apply planning and maintenance strategies to the information systems
CO3: Interpret how to use information technologies such as ERP, E-Business and E-Commerce, m-Commerce, wireless networks, mobile computing etc. to solve business problems
CO4: Understand concepts of a Decision Support System (DSS) and its affect on management
CO5: Identify the threats to information security and protect information resources & to identify and propose Business/IT Solutions to the addressed problems.

COs	**Mapping with POs**
CO1	PO2,PO4.PO7
CO2	PO2,PO3,PO6,PO7,PO9,PO11
CO3	PO2,PO3,PO6,PO7,PO9,PO11
CO4	PO6,PO7,PO9
CO5	PO6,PO7,PO9,PO11

TEXT BOOK:

1. James A. O'Brien, George M. Marakas - Management Information Systems -10th edition, Tata McGraw Hill, 2010.

REFERENCE BOOKS:

1. Kenneth C. Laudon and Jane P. Laudon - Management Information System, Managing the Digital Firm -, 9th Edition, Pearson Education, 2006.
2. Steven Alter - Information Systems The Foundation of E-Business , 4th Edition, Pearson Education, 2002.
3. W.S. Jawadekar - Management Information Systems -, Tata McGraw Hill 1998.

Sub Title : OBJECT-ORIENTED MODELING AND DESIGN

Sub Code: 18IS554	**No. of Credits: 3=3 : 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week 3**
Exam Duration : 3 hours	**Exam Marks :CIE +Assignment + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours :39**

Course Objectives:

1. Introduce students with the concept and terms used in Object Oriented Modelling .
2. Understand the importance of Object Oriented approach and UML notation .
3. Develop an understanding of Class, State and Interaction models.
4. Design and develop a system with Object Oriented approach.

Unit No	Syllabus Content	No of Hours
1	**Introduction:** What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history **Modeling Concepts:**Modeling as Design Technique: Modeling; abstraction; The three models. **Class Modeling**: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model ,practical tips. Text:1.1-1.5,2.1-2.3,3.1-3.4,3.6	8
2	**Advanced Class Modeling**: Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes , Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages. **State Modeling**: Events, States, Transitions and Conditions; State diagrams; State diagram behavior. **Advanced State Modeling:** Nested state diagrams; Nested states; Signal generalization; Concurrency; Relation of class and state models Text:4.1-4.11,5.1-5.5,6.1-6.6	8
3	**Interaction Modeling:** Use case models; Sequence models; Activity models. **Advanced Interaction Modeling:** Use case relationships; Procedural sequence models; Special constructs for activity models. **Process Overview:** Development stages; Development life cycle. **System Conception**: Devising a system concept; Elaborating a concept; Preparing a problem statement. Text:7.1-7.3,8.1-8.3,10.1,110.2,11.1-11.3	8
4	**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. **System Design** Overview of system design; Estimating performance;	8

	Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example. Text:12.1-12.5,13.1-13.4,14.1-14.13	
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. Text:15.1-15.11,17.1-17.5	**7**

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4

Assignment -III from Unit 5

Course Outcomes:

CO1: Identify objects, attributes and operations performed on the objects in real world situations
CO2: Design class and state models for a given problem.
CO3: Analyze and build interaction models for the system to be developed.
CO4: Design System using class and application domain.
CO5: Implement system with OO approach.

COs	Mapping with Pos
CO1	PO1,PO2,PO3,PO7,PO12
CO2	PO1,PO2,PO3,PO4,PO12
CO3	PO1,PO2,PO3,PO4
CO4	PO1,PO2,PO3,PO4
CO5	PO1,PO2,PO3,PO4,PO7

TEXT BOOK:

Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005.

REFERENCE BOOKS/WEBLINKS:

1. Grady Booch et al , Object-Oriented Analysis and Design with Applications -, 3rd Edition, Pearson, 2007.
2. Mark Priestley,Practical Object-Oriented Design with UML - 2nd Edition, Tata McGraw-Hill, 2003.
3. K. Barclay, J. Savage ,Object-Oriented Design with UML and JAVA -, Elsevier, 2008.
4. Booch, G., Rumbaugh, J., and Jacobson ,The Unified Modeling Language User Guide - 2nd Edition, Pearson, 2005.

OPEN ELECTIVES-A:

Sub Title: MACHINE LEARNING		
Sub. Code:18ISE011	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE +Assignment +Group Activity + SEE = 45 + 5 + 50 =100**	**Total No. of Contact Hours : 39**

Course objectives: This course will enable students to:

- Define machine learning and understand about various machine learning applications
- Differenciate supervised, unsupervised and reinforcement learning methods
- Apply decision trees, neural networks, Bayes classifier, Kmeans clustering and k-nearest neighbour methods for problems in machine learning

Unit No.	Syllabus Content	No. of Hours
1	**INTRODUCTION TO MACHINE LEARNING:** Introduction; Human learning and types of human learning; What is machine learning?; Types of machine learning; Well-posed learning problems; Designing a learning system; Applications of machine learning; Tools in machine learning; Machine learning activities; Issues in machine learning. **CONCEPT LEARNING AND THE GENERAL-TO-SPECIFIC ORDERING:** Concept learning task; Concept learning as search; Find-S algorithm; Version spaces and the Candidate-elimination algorithm. **Chapter 1: 1.1- 1.8 (T2) , 1.1-1.3 (T1) ; Chapter 2:2.1-2.5 (T1), 2.2 (T2)**	**8**
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; **Chapter 3: 3.2-3.7 (T1)**	**8**
3	**LINEAR REGRESSION:** Notation (Model); Error term; Least square estimation of parameters. Batch Gradient Descent **LOGISTIC REGRESSION:** Introduction; The Sigmoid; Learning in logistic regression; Cross-entropy loss function; Batch Gradient Descent **Chapter 2: 2.1-2.2 (T3) ; Chapter 5: 5.1-5.4(T4)**	**8**
4	**ARTIFICIAL NEURAL NETWORKS:** Introduction; Neural Network representations; Appropriate problems for neural network learning; Perceptrons; Back propagation algorithm. **BAYESIAN LEARNING-I:** Introduction; Bayes theorem; Bayes theorem and concept learning **Chapter 4: 4.1-4.4 (Till 4.4.3), 4.5 (T1);Chapter 6: 6.1-6.3(Only 6.3.1) (T1)**	**8**

5	**BAYESIAN LEARNING-II:** Bayes optimal classifier; Naive Bayes classifier; Bayesian belief networks. **CLUSTERING:** Introduction; K Means clustering **Chapter 6: 6.7, 6.9, 6.11 (T1)**	**7**

Note 1: All chapters will have internal choice.
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After completion of course students will be able to:

CO1: Identify problems of machine learning and it's methods
CO2: Apply apt machine learning stratergy for any given problem
CO3: Design systems that uses appropriate models of machine learning
CO4: Solve problems related to various learning techniques

COs	Mapping with POs
CO1	PO1, PO2
CO2	PO3, PO4
CO3	PO2,PO3, PO5,PO12
CO4	PO4, PO9, PO12

TEXT BOOKS:

1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education. India Edition 2013.

2. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning" , Pearson India Education Services Pvt. Ltd., 2019.

REFERENCE BOOKS/WEB LINKS:

1. Ethem Alpaydin, "Introduction to Machine Learning", 2nd Ed., PHI Learning Pvt. Ltd., 2013.

2. T. Hastie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer; 1st edition, 2001.

3. Peter Harrington , "Machine Learning in Action", MANNING Shelter Island Publication, ISBN 9781617290183, 2012.

Weblinks:
1.NPTEL course by Balaram Ravindran
2.FAST.ai course on ML

Sub Title : INTERNET OF THINGS

Sub Code:18ISE012	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours :39**

Course Objectives

1. To Learn the characteristics, designs,and challenges in the IoT
2. To Understand the key Technologies and protocols in IoT
3. To Analyze various Layers connectivity and motivation of IPV6
4. To Illustrate the role of IoT in various domains of Industry
5. Infer the role of Data Analytics in IOT

UNIT No	**Syllabus Content**	**No of Hours**
1	**Introduction to IoT** Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs.Enabling IOT Technologies,IOT and M2M-Introduction, difference between IOT and M2M. **T1:Chapter1-1.1,1.2,1.3,1.4 , Chapter3-3.1,3.2,3.3**	**8**
2	**Fundamentals IoT** Mechanism and Key Technologies-Identification of IoT Object and Services, Structural Aspects of the IoT, Key IoT Technologies. Evolving IoT Standards-Overview and Approaches,IETF IPV6 Routing Protocol for RPL Roll, Constrained Application Protocol, Representational State Transfer, ETSI M2M,Third Generation Partnership Project Service Requirements for Machine-Type Communications, CENELEC, IETF IPv6 Over Lowpower,Zigbee. **T2:Chapter4-4.1,4.2,4.3** **T2:Chapter5-5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9**	**8**
3	**Layer ½ Connectivity**: Wireless Technologies for the IoT-WPAN Technologies for IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M,Layer 3 Connectivity :IPv6 Technologies for the IoT: Overview and Motivations. Address Capabilities,IPv6 Protocol Overview, IPv6 Tunneling. **TEXT BOOK 2: Chapter6-6.1,6.2, Chapter7-7.1,7.2,7.3,7.4,7.5**	**8**
4	**Case Studies** Illustrating IoT Design-Introduction, Home Automation, Cities,Environment, Agriculture, Productivity Applications. **T1:Chapter 9-9.1,9.2,9.3,9.4,9.5,9.6**	**8**
5	**Data Analytics for IoT**– Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis, Structural Health Monitoring . **T1:Chapter 10-10.1,10.2,10.3,10.4,10.5,10.6,10.7,10.8**	**7**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course outcomes:
On successful completion of the course, the student will be able to
CO1: Interpret the impact and challenges posed by IoT networks
CO2: Appraise the role of IoT protocols for efficient network communication
CO3: Deployment of different sensor technologies and Layers to connect the network.
CO4: To Deploy the role of IoT design in various domains of Industry
CO5:Elaborate the need for Data Analytics .

COs	Mapping with PO's
CO1	PO3,PO4,PO5,PO6,PO9,PO10
CO2	PO3,PO4,PO5,PO6,PO7,PO9,PO10
CO3	PO4,PO6,PO7,PO8,PO9,PO11
CO4	PO4,PO5,PO8,PO9,PO10,PO11
CO5	PO4,PO5,PO6,PO7,PO9,PO10

TEXT BOOK:
3. ArshdeepBahga, Vijay Madisetti, "Internet of Things : A Hands on Approach" Universities Press., 2015
4. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6:The Evolving World of M2M Communications", Wiley, 2013

REFERENCE BOOKS/WEBLINKS
1.Michael Miller," The Internet of Things", First Edition, Pearson, 2015.

2.Claire Rowland,Elizabeth Goodman et.al.," Designing Connected Products", First Edition,O'Reilly, 2015

Sub Title : INFORMATION SYSTEMS		
Sub Code:18ISE013	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Introduce to various types of information systems, issues and concepts related to it.
2. Understand about electronic and enterprise business system management.
3. Familiarize the need and benefits of E-Business, ERP, E-Commence, SCM, DSS.
4. Comprehend the concept of IT planning and Managing the Information Systems.
5. Understand about Security management of IT, Enterprise and Global Management of IT.

UNIT No.	Syllabus Content	No of Hours
1	**Foundation concepts – 1:** Information Systems in Business: Introduction, The real world of Information Systems, Networks, What you need to know, The fundamental role of IS in business, Trends in IS, Managerial challenges of IT. System Concepts: A foundation, Components of an Information System, Information System Resources, Information System activities, Recognizing Information Systems **Foundation Concepts – 2:** Fundamentals of strategic advantages: Strategic IT, Competitive strategy concepts, The competitive advantage of IT, Strategic uses of IT, Building a customer-focused business, The value chain and strategic IS, Reengineering business processes, Becoming an agile company Creating a virtual company, Building a knowledge-creating company. T1: Ch 1, Ch 2	**9**
2	**Electronic Business Systems:** Enterprise Business Systems: Introduction, Cross-functional enterprise applications, Enterprise application integration, Transaction processing systems, Enterprise collaboration systems. Functional Business Systems: Introduction, Marketing systems, Manufacturing systems, Human resource systems, Accounting systems, Financial management systems. **Enterprise Business Systems:** Customer relationship management: Introduction, What is CRM? Benefits and challenges of CRM, Trends in CRM. T1: Ch 7, Ch 8	**7**
3	**Enterprise resource planning:** Introduction, What is ERP? Benefits and challenges of ERP, Trends in ERP. Supply chain Management: Introduction, What is SCM? The role of SCM, Benefits and challenges of SCM, Trends in SCM. **Electronic Commerce Systems:** Electronic commerce fundamentals: Introduction, The scope of e-commerce, Essential e-commerce, processes,	**9**

	and Electronic payment processes. E-commerce application trends, Business-to- Consumer e-commerce, Business-to-Business e-commerce, e-commerce marketplaces T1: Ch 8, Ch 9	
4	**Decision Support Systems:** Decision support in business: Introduction, Decision support trends, Decision support systems (DSS), Management Information Systems, On-line analytical processing, Using DSS, Executive information systems, Enterprise portals and decision support. T1: Ch 10	**7**
5	**Decision Support Systems contd:** Knowledge management systems, Business and Artificial Intelligence (AI). **Security management of IT:** Introduction, Tools of security management, Internetworked security defenses, Other security measures, System Controls and audits. **Enterprise and Global Management of IT:** Managing IT: Business and IT, Managing IT, Business / IT planning, Managing the IS function. T1: Ch 10, Ch 13,Ch 14	**7**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course outcomes:
After completing the course the students are able to:
CO1: Analyze the components, activities and strategies of Information system.
CO2: Apply planning and maintenance strategies to the information systems
CO3: Apply the technologies such as ERP, E-Business and E-Commerce, m-Commerce, wireless networks, mobile computing etc.
CO4: Identify the threats to information security and protect information resources.
CO5: To identify and propose Business/IT Solutions to the addressed problems.

COs	**Mapping with POs**
CO1	PO2,PO7,PO12
CO2	PO2,PO3,PO6,PO7,PO9,PO11
CO3	PO2,PO3,PO6,PO7,PO9,PO11
CO4	PO6,PO7,PO9,PO11
CO5	PO6,PO7,PO9,PO11,PO12

TEXT BOOK:

1. James A. O'Brien, George M. Marakas - Management Information Systems -10th edition, Tata McGraw Hill, 2010.

REFERENCE BOOKS:

1. Kenneth C. Laudon and Jane P. Laudon - Management Information System, Managing the Digital Firm -, 9th Edition, Pearson Education, 2006.
2. Steven Alter - Information Systems The Foundation of E-Business , 4th Edition, Pearson Education, 2002.
3. W.S. Jawadekar - Management Information Systems -, Tata McGraw Hill 1998.

Sub Title : COMPUTER NETWORKS LAB		
Sub Code: 18ISL56	**No. of Credits:1 : 0:0:1(L-T-P)**	**No. of lecture hours/week :2**
Exam Duration : 3 hours	**Exam Marks:CIE + SEE = 50 + 50 =100**	

Course Objectives:

1. Construct sample networks with different topologies and configurations.
2. Analysis of the network behavior with respect to different parameters and conditions.
3. Build programs to implement error detection techniques and congestion control techniques.
4. Construct programs to build optimal routing table.
5. Build programs to implement the specified security algorithms

I. LIST OF PROGRAMS

PART A

The following experiments shall be conducted using either NS2/OPNET/NCTUNS or any other suitable simulator.

1. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and 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 the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

4. Implement simple ESS and with transmitting nodes in wireless LAN by simulation and determine the performance with respect to transmission of packets

5. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.

PART-B

Implement the following in Java:

1. Write a program for error detecting code using CRC-CCITT (16- bits).

2. Write a program for distance vector algorithm to find suitable path for transmission.

3. Implement Diffie-Hellman Key exchange algorithm.

4. Write a program for simple RSA algorithm to encrypt and decrypt the data.

5. Write a program for congestion control using leaky bucket algorithm.

II. OPEN ENDED QUESTIONS

Develop/ Simulate the following applications:

1. Shortest Path from source to destination

2. File Transfer

3. Remote Login

4. Any other network and/or security application.

5. 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.

NOTE:

1.STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.

2. STUDENT IS REQUIRED TO SOLVE ONE PROBLEM FROM PART-A AND ONE PROBLEM FROM PART-B. THE QUESTIONS ARE ALLOTTED BASED ON LOTS. BOTH QUESTIONS CARRY EQUAL MARKS.

Course Outcomes:

After completing the course the students are able to:

CO1: Simulate a sample network on a virtual screen.
CO2: Design and **a**nalyze the network behavior against various parameters through simulation
CO3: Demonstrate error detection, routing protocol techniques
CO4: Implement an optimal routing table and apply security algorithms for a given network.
CO5: Demonstrate congestion control techniques.

COs	**Mapping with POs**
CO1	PO1,PO2,PO5,PO9,PO12
CO2	PO1,PO2,PO3,PO12
CO3	PO1,PO2,PO3,PO4,PO12
CO4	PO1,PO2,PO4,PO5,PO12
CO5	PO1,PO2,PO5,PO6,PO12

Sub Title : DATABASE APPLICATIONS LAB		
SubCode: 18ISL57	**No. of Credits:1=0: 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
Exam Duration : 3 hours	**Exam Marks: CIE + SEE = 50 + 50 =100**	

Course Objectives:

1. To execute SQL commands.
2. To implement simple exercises on relational database schema.
3. To design a relational database schema for specific database application using SQL.
4. To apply the normalization procedure on relational database schema

1. Consider the customer-sale scenario given below. The primary keys are underlined and the data types are specified:
CUSTOMER(Cust id : integer, cust_name: string)
ITEM(item_id: integer, item_name: string, price: integer)
SALE(bill_no: integer, bill_data: date, cust_id: integer, item_id: integer, qty_sold: integer)
For the above schema, perform the following:
a) Create the tables with the appropriate integrity constraints
b) Insert around 10 records in each of the tables
c) List all the bills for the current date with the customer names and item numbers
d) List the total Bill details with the quantity sold, price of the item and the final amount
e) List the details of the customer who have bought a product which has a price>200
f) Give a count of how many products have been bought by each customer
g) Give a list of products bought by a customer having cust_id as 5
h) List the item details which are sold as of today
i) Create a view which lists out the bill_no, bill_date, cust_id, item_id, price, qty_sold, amount
2 Consider the following schema for a Library Database:

BOOK(Book_id, Title, Publisher_Name, Pub_Year)
BOOK_AUTHORS(Book_id, Author_Name)
PUBLISHER(Name, Address, Phone)
BOOK_COPIES(Book_id, Programme_id, No-of_Copies)
BOOK_LENDING(Book_id, Programme_id, Card_No, Date_Out, Due_Date)
LIBRARY_PROGRAMME(Programme_id, Programme_Name, Address)
Write SQL queries to
a) Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
b) Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2019 to Jun 2019
c) Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.

d) Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.

e) Create a view of all books and its number of copies that are currently available in the Library.

3. Consider the Employee-pay scenario given below. The primary keys are underlined and the data types are specified:

EMPLOYEE(emp_id : integer, emp_name: string)

DEPARTMENT(dept_id: integer, dept_name:string)

PAYDETAILS(emp_id : integer, dept_id: integer, basic: integer, deductions: integer, additions: integer, DOJ: date)

PAYROLL(emp_id : integer, pay_date: date)

For the above schema, perform the following:

a) Create the tables with the appropriate integrity constraints

b) Insert around 10 records in each of the tables

c) List the employee details department wise

d) List all the employee names who joined after particular date

e) List the details of employees whose basic salary is between 10,000 and 20,000

f) Give a count of how many employees are working in each department

g) Give a names of the employees whose netsalary>10,000

h) List the details for an employee_id=5

i) Create a view which lists out the emp_name, department, basic, dedeuctions, netsalary

j) Create a view which lists the emp_name and his netsalary

4. Consider the following relational schema for the Office of the Controller of Examinations Application.

Student (Rollno, Name, Dob, Gender, Doa, Bcode);

Implement a check constraint for Gender

Branch (Bcode, Bname, Dno);

Department (Dno, Dname);

Course (Ccode, Cname, Credits, Dno);

Branch_Course (Bcode, Ccode, Semester);

Enrolls (Rollno, Ccode, Sess, Grade);

For Example, SESS can take values **'MAY2019', 'DEC2019'** Implement a check constraint for grade Value Set **('S', 'A', 'B', 'C', 'D', 'E', 'U');** Students are admitted to Branches and they are offered by Departments. A branch is offered by only one department. Each branch has a set of Courses (Subjects). Each student must enroll during a semester. Courses are offered by Departments. A course is offered only by one department. If a student is unsuccessful in a course he/she must enroll for the course during next session. A student has successfully completed a course if the grade obtained by is from the list **(A, B, C, D, and E).** A student is unsuccessful if he/she have grade **'U'** in a course.Develop a SQL query to

a) list details of Departments that offer more than 3 branches.

b) list the details of Departments that offer more than 6 courses.

c) list the details of courses that are common for more than 3 branches.

d) list students who got 'S' in more than 2 courses during single enrollment.

e) Create a view that will keep track of the roll number, name and number of courses, a student has completed successfully.

5.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

a) List the titles of all movies directed by 'Hitchcock'.

b) Find the movie names where one or more actors acted in two or more movies.

c) List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation).

d) 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.

e) Update rating of all movies directed by 'Steven Spielberg' to 5.

6. Demonstrate the CRUD operations on Mongodb database.

II.OPEN ENDED QUESTIONS

1. Develop the Database applications for any of the following:
1. customer-sales
2. Student Library
3. Employee-payroll
4. Video Library
5. Any Application

2. NO SQL Examples

NOTE :

1. **THE EXERCISES ARE TO BE SOLVED IN AN RDBMS ENVIRONMENT LIKE ORACLE OR DB2.**

2. STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.

3.IN THE EXAMINATION EACH STUDENT PICKS ONE QUESTION FROM A LOT OF ALL 5 QUESTIONS AND STUDENT NEED TO DO EXTRA QUERIES ALSO.

Course Outcomes:
After completing the course the students are able to:

CO1: Apply the underlying concepts of database technologies.
CO2:Design and implement a relational database schema for a given problem-domain using SQL/MongoDb.
CO3: Develop sophisticated queries to extract information from large datasets.

COs	**Mapping with POs**
CO1	PO1,PO2,PO3
CO2	PO3,PO4,PO5,PO9
CO3	PO4,PO5,PO9, PO12

VI SEMESTER

Sub Title: Management and Entrepreneurship		
Sub Code: 18HS61	**No. of Credits : 3**	**No. of Lecture hours/week : 3**
Exam Duration :3 hours	**CIE + Assignment + SEE =100** **45 + 5 + 50 = 100**	**Total No. of Contact Hours: 39**

Course Objectives :

1. To help students understand the Management concepts & its evolution.
2. To impart the knowledge about various Managerial functions.
3. To make the student learn the Entrepreneurial process.
4. To understand the role of SSI in economic development and gain an insight of funding agencies.
5. To have a clear understanding of preparation of project & its screening.

UNIT NO	Syllabus Content	No. of Hours
1	**MANAGEMENT:** Introduction- Meaning, characteristics of management, functions of Management- POSDCORB, Levels and Skills of Management, Roles of Managers Management as science or an art or profession, Management and Administration, Development of management thought - Early management approaches: Psychological Development, Bureaucratic, Scientific and Administrative, Human Relations Approach, Modern management approaches: Behavioral, Systems, Quantitative and Contingency Approach.	**07 Hours**
2	**PLANNING:** Meaning, Types of Plans (Single use & Standing plans), Steps in Planning process. **ORGANIZING:** – Meaning, Types of organization (Line, Staff, Line & Staff, Matrix and Committee form) Departmentation (Functional, Product, Process, Territorial and Customer), Span of Control, MBO and MBE. **STAFFING:** Meaning and importance of staffing, Sources of recruitment, process of selection. **DIRECTING:** Meaning, **Leadership:** Definition, Leadership styles (Autocratic, Democratic, Charismatic, Laissez faire and Participative.) ***Introduction to motivation:*** Meaning & Definition – Maslow, Herzberg & McGregor's Theory X & Y. ***Communication***– Meaning, types, communication process and barriers of communication, ***Co-ordination*****:** Meaning and importance. **CONTROLLING:** Meaning, steps in controlling, types of controlling. ***Case study discussion with respect to Indian context.***	**08 Hours**
3	**ENTREPRENEUR**: Definition & Meaning, Characteristics, types of entrepreneurs(Imitative, Innovative, Fabian and drone), Intrapreneur-	**08 Hours**

	meaning, Difference between Entrepreneurs, Intrapreneur & Manager, Stages in Entrepreneurial process, barriers to entrepreneurs, Role of Entrepreneurs in economic development. **Rural entrepreneurship**– Definition, challenges & opportunities. **Women Entrepreneurs** – Definition, challenges, and Institutional support to Women Entrepreneurs in India **Family Business:** Meaning and Definition, succession planning in family business and reasons for failure of family business. **Corporate Social Responsibility**- Meaning, definition and benefits. ***Case study discussion with respect to Indian context.*** ***Activity: Profile of successful entrepreneur.***	
4	**MSME:** Definition of MSME (latest). **SMALL SCALE INDUSTRY**: Meaning, and definition, Characteristics, forms of ownership, sources of financing, Steps to start SSI, Problems faced by SSI. Introduction to GATT, WTO & LPG. **Institutional Support**: ***Central level Institutions*** – KVIC, NSIC, SIDBI, EDI and NABARD. S***tate level Institutions***- DIC, KSFC, KIADB, TECSOK. **STARTUP COMPANIES-**Meaning and Challenges. Make in India concept and MUDRA Bank Initiative. ***Activity for students: Schemes for startup companies.***	**09 Hours**
5	**PREPARATION OF PROJECT:** Project- Meaning, Project identification, Project selection, Project Appraisal, Project implementation. Project Report –Outline, Feasibility Study- –PESTLE and errors in preparation of project report. .***Activity for students*****: *Writing of a business plan.***	**7 Hours**

Note: Every unit will have an internal choice question for SEE.

Course Outcomes :

CO1 : The students will gain knowledge on management concepts & its evolution.
CO2 : The students will learn the application of managerial skills & attributes.
CO3 : The students will get an in depth knowledge of entrepreneurial process & contribute to the betterment of the society.
CO4 : Students will be able to compile information about setting up an MSME & explore the sources of funding agencies.
CO5 : Students will be able to identify business opportunities & design a project report.

Cos	Mapping with POs
CO1 :	PO11
CO2 :	PO10,PO11
CO3 :	PO6
CO4 :	PO11
CO5 :	PO10

RECOMMENDED BOOKS:

1. Entrepreneurship and Management- S Nagendra and V S Manjunath- Pearson Publication 4 /e, 2009.
2. Principles of Management – PC Tripathi, and P N Reddy – Tata MacGraw Hill.
3. Entrepreneurship Development – Poornima M Charanthimath Pearson Education 2nd Edition.

REFERENCE BOOKS:

1. Dynamics of Entrepreneurial Development and Management-Vasant Desai-Himalaya Publishing House. Latest edition.

1. Entrepreneurship and management - Shashi k Gupta- Kalyani publishers, Latest edition.

Financial Management- Shashi k Gupta- Kalyani publishers, Latest edition.

Sub. Title: AUTOMATA THEORY and COMPILER DESIGN		
Sub. Code: 18IS61	**No. of Credits:4=3 : 1 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course objectives:

1.Introduce concepts in automata theory and to classify machines by their power to recognize languages.

2.To understand and design deterministic and non-deterministic finite automata, Regular languages.

3.To apply ideas and techniques discussed to various software designs. Recognize phases of compiler with respect to design.

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; Non-deterministic finite Automata; Finite automata with Epsilon-transitions. **Regular expressions and LanguageS:** Regular expressions;; Minimization of automata T1: Ch 1-Ch 4	**10**
2	**Context-Free Grammars And Languages:** Context free grammars; Writing a Grammar; Parse trees; Ambiguity in grammars. **Normal forms for CFGs:** Useless symbols, λ-productions, Unit productions, CNF, GNF. T1:Ch 5: 5.1-5.4; Ch 7: 7.1	**10**
3	**Pushdown Automata:** Definition of the Pushdown automata; Acceptance by empty stack and final state methods. **Introduction To Turing Machine:** The standard Turing machine; Design of Turning machine. T1:Ch 6: 6.1-6.2; Ch 8: 8.2-8.4	**10**
4	**Introduction, Lexical analysis:** Language processors; The structure of a Compiler. **Lexical analysis:** The Role of Lexical Analyzer. **Syntax Analysis – 1:** Introduction; Top-down Parsing: Predictive parser. T2: Ch 1, T2: Ch 3, Ch 4: 4.1, 4.3-4.4	**10**
5	**Syntax Analysis – 2:** Bottom-up Parsing; Introduction to LR Parsing: Simple LR parser; More powerful LR parsers(CLR,LALR) **Syntax-Directed Translation:** Syntax-Directed definitions; Evaluation order for SDDs. **Intermediate Code Generation:** Variants of syntax trees; Three-address code. **Code Generation:** Issues in the design of Code Generator; The Target language; Basic blocks and Flow graphs; Optimization of basic blocks T2: Ch 4: 4.5-4.9 Ch 5: 5.1-5.2; Ch 6: 6.1-6.2; Ch 8: 8.1-8.5	**12**

Note 1: All Units will have internal choice.

Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2;
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After completion of course students will be able to:
CO1: Analyze concepts in automata theory and classify machines by their power to recognize languages.
CO2: Impart the knowledge of models of computation.
CO3: Design grammar and recognizers for different formal languages.
CO4: Design and solve problems related to Pushdown Automata & Turing Machine.
CO5: Demonstrate the syntax analysis and error correction strategies in Compiler Design.

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

TEXT BOOKS:

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman: Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Education, 2009.
2. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman, Compilers- Principles, Techniques and Tools - 2nd Edition, Addison-Wesley, 2010.

REFERENCE BOOKS/WEB LINKS:

1.John C Martin: Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill, 2007.

2.Nandini Prasad K.S: Automata Theory and Computability, 1st Edition, Cengage Publication, 2019.

3.Peter Linz: An Introduction to Formal Languages and Automata, 5th Edition, Jones and Bartlett, New Delhi, India, 2011.
4.Nandini Prasad K S, Principles of Compiler Design - 3rd Edition, Elsevier Publication, 2014.

5.http://mapmf.pmfst.unist.hr/~milica/Matem_teorija_r/MTR_web/Introduction%20To%20Automata%20Theory.pdf

Sub Title : MACHINE LEARNING		
Sub Code: 18IS62	**No. of Credits: 4 =4:0:0**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 52**

Course objectives: This course will enable students to:

1. Define machine learning and understand about various machine learning applications
2. Differentiate supervised, unsupervised and reinforcement learning methods
3. Apply decision trees, neural networks, Bayes classifier, Kmeans clustering and k-nearest neighbour methods for problems in machine learning

Unit No.	Syllabus Content	No. of Hours
1	**INTRODUCTION TO MACHINE LEARNING:** Introduction; Human learning and types of human learning; What is machine learning?; Types of machine learning; Well-posed learning problems; Designing a learning system; Applications of machine learning; Tools in machine learning; Machine learning activities; Issues in machine learning. **CONCEPT LEARNING AND THE GENERAL-TO-SPECIFIC ORDERING:** Concept learning task; Concept learning as search; Find-S algorithm; Version spaces and the Candidate-elimination algorithm. **Chapter 1: 1.1- 1.8 (T2) , 1.1-1.3 (T1) ; Chapter 2:2.1-2.5 (T1), 2.2 (T2)**	**10**
2	**LINEAR REGRESSION:** Notation (Model); Error term; Least square estimation of parameters; Gradient Descent **LOGISTIC REGRESSION:** Introduction; The Sigmoid; Learning in logistic regression; Gradient Descent **DECISION TREE LEARNING:** Decision tree representation; Appropriate problems for decision tree learning; Basic decision tree learning algorithm; Issues in decision tree learning. **Chapter 2: 2.1-2.2(T3); Chapter 5: 5.1-5.4(T4); Chapter 3: 3.2-3.4,3.7 (T1)**	**12**
3	**ARTIFICIAL NEURAL NETWORKS:** Introduction; Neural Network representations; Appropriate problems for neural network learning; Perceptron's; Back propagation algorithm. **BAYESIAN LEARNING:** Introduction; Bayes theorem; Bayes theorem and concept learning; Bayes optimal classifier; Naive Bayes classifier; Bayesian belief networks. **Chapter 4: 4.1-4.5 (T1);Chapter 6: 6.1-6.3(Only 6.3.1), 6.7, 6.9-6.1 (T1)**	**10**

4	**INSTANCE BASED LEARNING:** k-nearest neighbor learning **INTRODUCTION TO:** Bagging and Boosting (To balance bias and variance); Support Vector Machines (SVM); Random forests **CASE STUDIES OF APPLICATIONS:** Weather forecasting, Stock market prediction, Real Time Sentiment Analysis, etc. **Chapter 8: 8.1-8.3 (T1)**	**10**
5	**DEEP LEARNING:** Introduction **CLUSTERING:** Introduction; KMeans clustering ; Hierarchal Clustering **REINFORCEMENT LEARNING:** Introduction; Learning task. **Chapter 6:6.12 (T1); Chapter 13: 13.1-13.3 (T1)**	**10**

Note 1: All units will have internal choice.
Demo will be given to the students on usage of Google Colab, TensorFlow; "Orange" and "Weka" tools.
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment - III from Unit 5

Course Outcomes:
After completion of course students will be able to:

CO1: Identify problems of machine learning and it's methods
CO2: Apply apt machine learning strategy for any given problem
CO3: Design systems that uses appropriate models of machine learning
CO4: Solve problems related to various learning techniques

COs	**Mapping with POs**
CO1	PO1, PO2
CO2	PO3, PO4
CO3	PO2,PO3, PO5,PO12
CO4	PO4, PO9, PO12

TEXT BOOKS:

1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education. India Edition 2013.
2.Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning" , Pearson India Education Services Pvt. Ltd., 2019.
3.Douglas C. Montgomery, Elizabeth A. Peck, G. Geoffrey Vining, "Introduction to Linear Regression Analysis" , Wiley publications, 5th edition, 2012.
4. Daniel Jurafsky & James H Martin, "Speech and Language processing". Copyright 2019

REFERENCE BOOKS/WEB LINKS:

1. Ethem Alpaydin, “Introduction to Machine Learning”, 2nd Ed., PHI Learning Pvt. Ltd., 2013.
2. Peter Harrington , “Machine Learning in Action”, MANNING Shelter Island Publication, ISBN 9781617290183, 2012.

Web links:

1. NPTEL course by Balaram Ravindran
2. Machine Learning course from Coursera by Andrew Ng
3. FAST.ai course on ML

Sub Title : CLOUD COMPUTING		
SubCode:18IS63	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. To study the history and the fundamental concepts of Cloud Computing, Parallel, Distributed Computing.
2. To understand the concepts of Virtualization, Containers and Microservices for developing and deploying applications with cloud
3. To learn the concept of Cloud Computing Architecture and different Cloud Models.
4. To Understand cloud management and cloud security.
5. To impart open source cloud platforms for developing the applications
6. To become familiar with the different applications of Cloud Computing.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Cloud Computing:** Cloud Computing at a Glance, Historical Developments, Building Cloud Computing Environments Computing Platforms and Technologies. **Principles of Parallel and Distributed Computing:** Eras of Computing, Parallel vs. Distributed Computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing. T1: Ch1: 1.1-1.3, Ch 2: 2.1-2.5	8
2	**Virtualization:** Introduction, Characteristics of Virtualized Environments, Virtualization and Cloud Computing, Pros & Cons of Virtualization. **Microservices, Dockers and Containers:** An Introduction to Microservices, Modular Architecture, Advantages and Disadvantages of Microservices. Docker Containers: Containers, Docker architecture and Components, The Power of Docker : A Simple Example T1: Ch 3: 3.1-3.5, T2: Ch 1 & Ch5	**9**
3	**Cloud Computing Architecture:** Introduction, Cloud Reference Model, Types of Clouds, Economics of the cloud, Open challenges. T1: Ch 4: 4.1-4.5	**7**
4	**Managing the Cloud:** Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards. **Understanding Cloud Security:** Securing the Cloud, Securing Data, Establishing Identity and Presence. T3: Chapter 11 & 12	**8**

5	**Cloud Platforms in Industry:** Amazon Web Services, Google AppEngine. **Cloud Applications:** Scientific Applications, Business and Consumer Applications. T1: Ch 9: 9.1-9.2, Ch: 10: 10.1-10.2	**7**

Note 1: All chapters will have internal choice.
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After the completion of course, the student will be able to:
CO1: Analyze core concepts and fundamentals of the Cloud Computing.
CO2: Identify mechanisms to support Cloud Infrastructure.
CO3: Analyze the reference models for Cloud Computing.
CO4: To manage the Cloud Environment & Cloud Security.
CO5: Develop applications and host on Cloud Environment.

COs	Mapping with Pos
CO1	PO4,PO5,PO10,PO11,PO12
CO2	PO1,PO2,PO4,PO7,PO8,PO9
CO3	PO2,PO3, PO4,PO5,PO9,PO10
CO4	PO3,PO4,PO5,PO7,PO8, PO9,PO10,PO11,PO12
CO5	PO4,PO5,PO6,PO7,PO8,PO10,PO11,PO12

TEXT BOOKS AND WEBLINKS:

1. Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi ,Mastering Cloud Computing , Tata McGraw Hill Education Private Limited, 2013.
2. Parminder Singh Kocher, Microservices and Containers, Addison Wesley, 2018
3. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010

REFERENCE BOOKS:

1. Dinkar Sitaram, Geetha Manjunath, Moving to the Cloud. Elsevier Publications, 2011.
2. Dr. Kumar Saurabh , Cloud Computing , Wiley India, 2011.
3.

Sub Title : ADVANCED JAVA AND J2EE		
Sub Code:18IS641	**No. of Credits: 3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Identify the need for advanced Java concepts like Enumerations and Collections
2. Construct client-server applications using Java socket API.
3. Make use of JDBC to access database through Java Programs.
4. Adapt servlets to build server side programs.
5. Demonstrate the use of JavaBeans to develop component-based Java software

Unit No.	Syllabus Content	No of Hours
1	**Enumerations, Autoboxing and Annotations(metadata):** Enumerations, Enumeration fundamentals, the values() and valueOf() Methods, java enumerations are class types, enumerations Inherits Enum, example, type wrappers, Autoboxing, Autoboxing and Methods, Autoboxing/Unboxing occurs in Expressions, Autoboxing/Unboxing, Boolean and character values, Autoboxing/Unboxing helps prevent errors, A word of Warning. Annotations, Annotation basics, specifying retention policy, Obtaining Annotations at run time by use of reflection, Annotated element Interface, Using Default values, Marker Annotations, Single Member annotations, Built-In annotations. T1:Ch 12	7
2	**The collections and Framework**: Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections?, The legacy Classes and Interfaces, Parting Thoughts on Collections. T1: Ch.17	8
3	**String Handling** :The String Constructors, String Length, Special String Operations, String Literals, String Concatenation, String Concatenation with Other Data Types, String Conversion and toString( ) Character Extraction,	08

	charAt( ), getChars( ), getBytes( ) toCharArray(), String Comparison, equals( ) and equalsIgnoreCase( ), regionMatches( ) startsWith( ) and endsWith( ), equals( ) Versus == , compareTo( ) Searching Strings, Modifying a String, substring( ), concat( ), replace( ), trim( ), Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Additional String Methods, StringBuffer , StringBuffer Constructors, length( ) and capacity( ), ensureCapacity( ), setLength( ), charAt( ) and setCharAt( ), getChars( ),append( ), insert( ), reverse( ), delete( ) and deleteCharAt( ), replace( ), substring( ), Additional StringBuffer Methods, StringBuilder T 1: Ch 15	
4	**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 08 Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking. Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects T1: Ch 31, T2: Ch 11	08
5	**The Concept of JDBC**; JDBC 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. T2: Ch 06	08

Note 1: All Units will have internal choice.
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2;
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

TEXT BOOK:
1. Herbert Schildt: JAVA the Complete Reference, 7th/9th Edition, Tata McGraw Hill, 2007.
2. Jim Keogh: J2EE-TheCompleteReference, McGraw Hill, 2007.

REFERENCE BOOKS:
1. Y. Daniel Liang: Introduction to JAVA Programming, 7thEdition, Pearson Education, 2007.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education,2004.
3. Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015.

Course Outcomes:

After the completion of the course students will be able to

CO1: Interpret the need for advanced Java concepts like enumerations and collections in developing modular and efficient programs

CO2:Build client-server applications and TCP/IP socket programs

CO3: Illustrate database access and details for managing information using the JDBC API

CO4: Describe how servlets fit into Java-based web application architecture

CO5:Develop reusable software components using Java Beans

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

Sub. Title : DIGITAL IMAGE PROCESSING		
Sub.Code: 18IS642	**No. of Credits: 3 =3:0:0(L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**CIE + Assignment+Group activity+SEE = 40+5+5+50=100**	**Total No. of Contact Hours : 39**

Course objectives:

The objectives of the course are :

1. To overview of Digital image processing
2.To gain knowledge of image enhancement.
3.To be aware of image restoration techniques.
4.To acquire knowledge of colour fundamentals and morphological image processing.

Unit No.	Syllabus	No. of Hours
1	Introduction: What is Digital Image Processing, Origins of Digital Image Processing, Examples of fields that use DIP, Fundamental Steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Basic Concepts in Sampling and Quantization, Representing Digital Images, Spatial and Gray-level Resolution,Some Basic Relationships Between Pixels, Linear and Nonlinear Operations.	**8**
2	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. Image Enhancement in the Frequency Domain: Introduction to the Fourier Transform and the Frequency Domain, Smoothing frequency-Domain Filters, Sharpening Frequency-Domain Filters, Homomorphic Filtering.	**8**
3	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, Constrained Least Square Filtering, Geometric Mean Filter.	**8**
4	Color Fundamentals: Color Models, Pseudocolor Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation,Color Image Compression. Wavelets and Multiresolution Processing: Image Pyramids, Subband coding, The Haar Transform, Multiresolution Expansions, Wavelet Transforms in one Dimension, Fast Wavelet Transform, Wavelet Transforms in Two Dimensions, Wavelet Packets.	**8**

5	Image Compression: Fundamentals, Image Compression Models, Error-free (Lossless) compression, Lossy Compression Morphological Image Processing: Preliminaries, Dilation and Erosion, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms. Image Segmentation: Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation.	**7**

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 10 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:
At the end of the course, the students will be able to:
CO1:understand image processing concepts.
CO2: Analyze image enhancement techniques.
CO3:Choose image restoration applications.
CO4:Identify color fundamentals and its transformations.
CO5:Analyze morphological image concepts

Text Books: 1. Rafael C Gonzalez and Richard E. Woods: Digital Image Processing, PHI 2nd Edition 2005

Reference Books:

1. S. Sridhar, Digital Image Processing, Oxford University Press India, 2011.
2. K. Jain: Fundamentals of Digital Image Processing, Pearson, 2004.
3. Scott E. Umbaugh: Digital Image Processing and Analysis, CRC Press, 2014.
4. S. Jayaraman, S. Esakkirajan, T. Veerakumar: Digital Image Processing, McGraw Hill Ed. (India) Pvt. Ltd., 2013.
5. Anthony Scime, "Web Mining Applications and Techniques", Idea Group Publishing,2005.

Sub Title : NETWORK AND CYBER SECURITY		
Sub Code: 18IS643	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours :39**

Course Objectives:

1. To gain knowledge of cryptography
2. To acquire knowledge of application protocols to provide security.
3. To gain knowledge of securing data in transit across networks.
4. To introduce the area of cybercrime and Cyber security to students .

UNIT No	Syllabus Content	No of Hours
1	**Classical Encryption Techniques** : Symmetric Cipher Model: Cryptography, Cryptanalysis and Brute-Force Attack. Substitution Techniques:caeser cipher, monoalphabetic cipher, playfair cipher, hill cipher, polyalphabetic cipher, one-time pad **Public-Key Cryptography** Principles of public-key cryptosystems: Public-key cryptosystems, Applications for public-key cryptosystems, requirements for public-key cryptosystems, public-key cryptanalysis. RSA algorithm, ECC T1: Ch 1:1,2 Ch 8: 1,2	8
2	**Electronic Mail Security**: Pretty good privacy, notation, operational; description, S/MIME, RFC5322, Multipurpose internet mail extensions, S/MIME functionality, S/MIME messages, S/MIME certificate processing. T1:Ch 17: 1,2,3	8
3	**IP Security:** IP Security overview: Applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes. Encapsulating Security payload: ESP format, encryption and authentication algorithms, Padding, Anti replay service, transport and tunnel modes T1 :Ch 18:1,2,3	7
4	**Transport Level Security:** Web security considerations: Web security threats, Web Traffic security approaches Secure sockets layer: SSL architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert protocol, hand shake protocol T1 : Ch 15: 1,2,3,4,5	8
5	**Introduction to Cybercrime & Cyber security**: Introduction,Cybercrime:Definition and Origins of the word. Definition of Cyber Security. Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes. Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective. Cybercrime and the Indian	8

	ITA 2000. A Global Perspective on Cybercrimes. Cybercrime Era: Survival Mantra for the Netizens. Cyberoffenses: How Criminals Plan Them: Introduction, How Criminals Plan the Attacks. Social Engineering, Cyberstalking, Cyber cafe and Cybercrimes. Botnets: The Fuel for Cybercrime. Attack Vector. Cloud Computing. T2 : Ch 1, Ch 2	

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After the completion of the above course students will be able to
CO1: Apply the knowledge of symmetric and asymmetric technique for securing data.
CO2: Analyze Email Security aspects and application protocols .
CO3: Analyze security aspects and protocols of IP layer .
CO4: Secure data in transit across network by using appropriate protocol.
CO5: Acquire Knowledge on the cyber security, cybercrime.

COs	**Mapping with POs**
CO1	PO2,PO3,PO6
CO2	PO2,PO6
CO3	PO2,PO6
CO4	PO3,PO6,PO12
CO5	PO2,PO7,PO8,PO12

TEXT BOOKS:
1. William Stallings: Cryptography and Network Security, Principles and Practice Pearson, 6th edition 2014.
2. Sunit Belapure and Nina Godbole, " Cyber Security: Understandign Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN:978-81-265-2179-1. Publish Date 2013.

REFERENCE BOOKS:
1. Jennifer L. Bayuk, Jason Healey, Paul Rohmeyer, "**Cyber Security Policy Guidebook** " Wiley Publications .
2. Behrouz A. Forouzan: Cryptography and Network Security Tata-Macgraw Hill 2007

Sub Title : MOBILE APPLICATION DEVELOPMENT		
Sub Code: 18IS644	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment +Group Activity + SEE = 45 + 5+5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. To understand fundamentals of Android OS, and use appropriate tools for Android Application development.
2. To be familiar with managing of application resources to build elegant user interfaces with views, layouts & fragments
3. To design styling, and common design patterns found among applications
4. To understand storing of application data using preferences, files and directories, SQLite, and content providers.
5. Develop, test, debug and publish mobile applications using android Platform.

UNIT No	Syllabus Content	No of Hours
1	**Platform Overview:** Introducing Android – History of Mobile Software Development, The Open Handset Alliance, Android Platform Uniqueness, The Android Platform, Setting Up Your Android Development Environment - Configuring Your Development environment, Exploring the Android SDK. Creating first android application - Testing Your Development Environment, Building Your First Android Application. **Application Basics :** Understanding Application Components - Mastering Important Android Terminology, The Application Context, Performing Application Tasks with Activities, Organizing Activity Components with Fragments, Managing Activity Transitions with Intents TB1: Ch1, Ch2, Ch3,ch4	7
2	**Application Basics Continued** – Defining the Manifest , Managing Application Resources- What Are Resources?, Adding Simple Resource Values in Android Studio, Working with Different Types of Resources, Working with Layouts, Exploring Building Blocks, Positioning with Layouts, Partitioning with Fragments TB1: Ch5,ch6,ch7,ch8,ch9	9
3	**Application Design Essentials:** Architecting with Patterns-Architecting Your Application's Navigation, Encouraging Action,, Appealing with Style-Styling with Support, Themes and Styles, Colors, Layout, Embracing Material Design-Understanding Material, The Default	7

	Material Theme, Designing Compatible Applications -Maximizing Application Compatibility, Designing User Interfaces for Compatibility, Providing Alternative Application Resources, Targeting Tablets and TVs, Extending Application to Watches and Cars. TB1: Ch10, ch11,ch12,ch13	
4	**Application Development Essentials:** Using Android Preferences-Working with Application Preferences, Finding Preferences Data on the File System, Creating Manageable User Preferences, Auto Backup for Android Applications. Accessing Files and Directories: Working with Application Data on a Device, Practicing Good File Management, Understanding Android File Permissions, Working with Files and Directories, Saving with SQLite : Working with Databases Leveraging Content Providers - Exploring Android's Content Providers, Modifying Content Providers Data, Using Third-Party Content Providers TB1: Ch14,Ch15,Ch16, Ch17	9
5	**Application Delivery Essentials:** Testing Your Applications - Best Practices in Testing Mobile Applications, Android Application Testing Essentials, More Android Automated Testing Programs and APIs, Distributing Your Applications - Choosing the Right Distribution Model, Packaging Your Application for Publication, Publishing to Google Play, Google Play Staged Rollouts, Publishing to the Google Play Private Channel, Translating Your Application, Publishing Using Other Alternatives, Self-Publishing Your Application. TB1: Ch21 and Ch22	7

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After completing the course the students are able to:
CO1: Analyze the fundamentals to build Mobile apps by assessing the basic framework by usage of Android SDK.
CO2: Design Android applications using various resources and built-in classes.
CO3:Apply creative skills in designing and deploying the sophisticated mobile applications.
CO4: Design and deploy Android applications with compelling User Interfaces and databases.
CO5: Develop and publish the Android Application in the global marketplace for download.

COs	Mapping with POs
CO1	PO1, PO2, PO3, PO4
CO2	PO2, PO3, PO4, PO5, PO7
CO3	PO4, PO5, PO6, PO8, PO9
CO4	PO4, PO5, PO9, PO10
CO5	PO6, PO7, PO8, PO11, PO12

TEXT BOOK:

1. Joseph Annuzzi, Jr., Lauren Darcey, and Shane Conder - Introduction to Android Application Development - Android Essentials, Fifth Edition, Pearson education, 2016.

REFERENCE BOOKS:

1 Reto Meier: Professional Android 4 Application Development , Wrox Publication,2015

OPEN ELCETIVES-B

Sub Title : DATABASE MANAGEMENT SYSTEMS		
Sub Code:18ISE021	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours :39**

Course Objectives:

1. To analyze the basic concepts and architecture of DBMS.
2. To understand the conceptual and relational models to design databases.
3. To Create and manipulate a relational database using SQL.
4. To understand the normalization steps in database design and removal of data anomalies

UNIT No	Syllabus Content	No of Hours
1	**Introduction:** Introduction; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A when not to use a DBMS. Data models, schemas and instances;Three-schema architecture and data independence; Database languages and interfaces; The database system environment; 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 Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.	**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. Relational Database Design Using ER-to-Relational Mapping	**8**
3	**SQL :Schema Definition, Basic Constraints and Queries:** SQL Data Definition and Data Types; 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;	**8**
4	**DatabaseDesign: Functional Dependencies and Normalization:** Informal	**7**

	Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form.	
5	**Transaction Management: Introduction to transaction** processing,Transaction and system concepts,Desirable properties of transaction, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL. **Concurrency Control in Databases:** Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering,	**7**

Note 1: Each unit will have internal choice.
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After completing the course the students are able to:
CO1: Analyze the database concepts and data models for real world applications.
CO2: Design a database schema for database application
CO3 : Design and apply the queries to the database to meet the user requirements.
CO4: Apply normalization techniques to database .
CO5: Analyze the concepts of transaction processing,Concurrency control

COs	**Mapping with POs**
CO1	PO2,PO4,PO5
CO2	PO2,PO4,PO5,PO6
CO3	PO2,PO3, PO5, PO9
CO4	PO2,PO3,PO5
CO5	PO4, PO6, PO9

TEXT BOOKS:

1. Elmasri and Navathe: Fundamentals of Database Systems, 6th Edition, Pearson Education, 2011.

REFERENCE BOOKS/WEBLINKS:

1. Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, Mc-GrawHill, 2006.
2. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education, 2006.
3. Raghu Ramakrishna and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003.
4. www.w3resources.com

Sub Title : WEB TECHNOLOGIES		
Sub Code:18ISE022	**No. of Credits:3=3: 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours :39**

Course Objectives:

1. To create a web page using XHTML
2. To understand Cascading Style Sheets
3. To do data validation and user interaction using JavaScript

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-1 : Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure; Basic text markup. **XHTML – 2:** Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML.	**8**
2	**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	**9**
3	**Javascript:** Overview of JavaScript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions	**8**
4	**Javascript and HTML documents:**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	**7**
5	**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	**7**

Note 1: All Units will have internal choice.
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After the completion of the above course students will be able to

CO1: Identify and relate the different terms associated with web technologies.
CO2: Design simple web pages using different tags of XHTML.
CO3: Classify and use different levels of style sheets.
CO4: Validate and provide user functionality using JavaScript (client side data).
CO5: Access the different elements using JavaScript and make use pattern matching concepts

COs	Mapping with POs
CO1	PO2,PO3,PO5
CO2	PO1,PO2,PO3,PO6,PO7,PO9
CO3	PO2,PO3,PO5,PO6
CO4	PO2,PO3,PO5,PO6,PO9
CO5	PO2,PO3,PO5,PO6

TEXT BOOK:
Robert W. Sebesta: Programming the World Wide Web, 6th Edition, Pearson education, 2010

REFERENCE BOOKS / WEBLINKS:

1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 5th Edition, Pearson education, 2012.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2006.
3. www.w3schools.com

Sub Title : UNIX AND SHELL PROGRAMMING		
Sub Code: 18ISE023	**No. of Credits:3= 3: 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week :3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Understand and execute the different types of unix command related to file, protection and security.
2. Develop shell programs using command substitution, positional parameters and control structures .
3. Implementation of SED and AWK commands.
4. Develop simple programs using PERL and AWK scripts.

Unit No.	Syllabus Content	No of Hours
1	Introduction. The UNIX operating system, UNIX architecture, Features of UNIX, Command usage:- locating commands, internal and external commands, Man Browsing the manual pages ,Understanding the man documentation File system: - the file, what is in a file name?, The parent child relationship ,The HOME variable: the Home directory, Pwd: checking your current directory,Cd: changing the current directory Mkdir : making directories, Rmdir: removing current directories, Absolute pathnames Relative pathnames, Ls :listing directory contents, Unix file system. Basic file attributes: Ls –l: listing file attributes, the –d option: listing directory attributes,File ownership, File permission , Chmode: changing file permission (relative and absolute method), Directory permission, changing file ownership, chown, chgrp. The vi editor: Vi basics, three modes of vi editor ,Input mode –entering and replacing text, Saving text and quitting –the ex mode,Navigation, Editing text,Undoing last editing instructions, Repeating the last command, Searching for a pattern substitution. The shell: The shells interpretive cycle, shell offering, pattern matching. Escaping and quoting: Redirection: the three standard files,/dev/null and dev/tty: two special files,Pipe, Tee: creating a tee, Command substitution, Shell variables	**8**
2	**The process:** Process basics, Ps:process status, System process, mechanism of process creation,Internal and external commands, Process states and Zombies, Running jobs in background,Nice: job executing with low priority, Killing processes with signals, Job control , at and batch: execute later,cron:running jobs periodically,Time: timing processes **Customizing the environment:** The shells, Environmental variables, the common	**8**

	environmental variables,aliases,in-line command editing , The initialization scripts. **More file attributes:** File systems and Inodes, Hard links,Symbolic links and ln, The directory,Umask: Default file and directory permission, Modification and access times,Find: locating files, **Simple filters:** The sample database, Pr:printing 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.	
3	**Filters using regular expression: Introduction,grep**: searching for a pattern,Basic regular expression(BRE), Extended regular expression(ERE) and egrep,**Sed:** the stream editor, Line addressing, using multiple instructions,**Context addressing**Writing selected lines to a file, Text editing,Substitution, basic regular expression **Essential shell programming:** Shell script, Read: making scripts interactive, Using command line arguments, Exit and exit status of command, Logical operator && 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,While: looping, For : looping with a list , Set and shift :manipulating the positional parameter,The header document , Trap :interrupting a program, Debugging shell script with set –x, Sample validation and entry scripts.	**8**
4	**Awk**-advanced filter: Simple awk filtering, Splitting a line into fields, Printf: formatting output,Variables and expressions, The comparison operators, Number processing,Variables, The –f option : storing awk programs in a file,The BEGIN and END section, Built in variables,Arrays, functions,Control flow – the if statement,Looping with for, Looping with while	**8**
5	**Perl-the master manipulator:** Perl preliminaries, The chop function, Variables and operators,The string handling functions, Specifying filenames in command line, $-: the default variable,Current line number ($.) and range operator (..), Lists and arrays, Foreach:looping through a list,Split:, join,dec2bin.pl,grep,associative arrays,Regular expressions and substitution,File handling, file tests, subroutines	**7**

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4

Assignment -III from Unit 5

Course Outcomes:
After the completion of the above course students will be able to

CO1: Develop simple command level codes for file, process, redirection, piping, protection and security
CO2: Demonstrate the usage of shell using shell positional parameters and command substitution.
CO3: Demonstrate different types of SED addressing and AWK filtering.
CO4: Develop PERL programs for string usage, file concept and arrays handling.

COs	Mapping with POs
CO1	PO1, PO2,PO3,PO4
CO2	PO1,PO2,PO3,PO4,PO5
CO3	PO1,PO2,PO3,PO4,PO5
CO4	PO1,PO2,PO3,PO4,PO5,PO7

TEXT BOOK:
UNIX –Concepts and Applications, Sumitabha Das, 4 thEdition, Tata Mc GrawHill, 2006.
(Chapters 1.2, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19)

REFERENCE BOOKS:
1. UNIX and Shell Programming, Behrouz A. Forouzan and Richard F. Gilberg, Thomson, 2005.
2. Unix & Shell Programming, M.G. Venkateshmurthy, Pearson Education, 2005.

Sub Title: MACHINE LEARNING LAB		
SubCode: 18ISL65	**No. of Credits:1=0: 0 : 1 (L-T-P)**	**No. of lecture hours/week : 2**
Exam Duration : 3 hours	**Exam Marks: CIE + SEE = 50 + 50 =100**	

Course Objectives :

This course will enable students to:

1. Define machine learning and understand about various machine learning applications
2. Differentiate supervised, unsupervised and reinforcement learning methods
3. Apply decision trees, neural networks, Bayes classifier, K-means clustering and k-nearest neighbor methods for problems in machine learning

LIST OF PROGRAMS

PART-A:

Execute the following programs using Google Colab/Anaconda/Jupiter Notebook:

1. Demonstrate the following:

a. Creation of .CSV files

b. insert synthetic data manually into .CSV files

c. uploading of .CSV files from local drive to python environment.

d. uploading of .CSV files from Google drive to python environment.

2. Demonstrate how to generate synthetic datasets(not manual entry) and generate at least 4 features.

3. Demonstrate the working of Find-S algorithm for finding the most specificities hypothesis using appropriate training samples.

4. Implement Candidate Elimination algorithm and display all the consistent hypotheses using appropriate training samples.

5. Create a .CSV file for the datasets containing the following fields(age, income, student, credit_rating, Buys_computer) where Buys_computer is the target attribute and implement ID3 algorithm for the same.

6. Demonstrate the working of XOR gate using Artificial Neural network with Backpropagation method using Tanh activation function.

7. Implement KNN algorithm to classify “iris dataset” using Kaggle or Machine learning repositories.

8. Implement K-means algorithm using suitable dataset from Kaggle repository or any other

Machine Learning repositories.

PART-B: Virtual Lab

1.Implementation of AND/OR/NOT Gate using Single Layer Perceptron. 2.Understanding the concepts of Perceptron Learning Rule.

3.Understanding the concepts of Correlation Learning Rule.

Web link for 1,2 and 3:

http://vlabs.iitb.ac.in/vlabs-dev/labs/machine_learning/labs/index.php

4.Neural networks simulation

Web link for 4: https://playground.tensorflow.org/

Course Outcomes:
After completion of course students will be able to:

CO1: Identify problems of machine learning and it's methods

CO2: Apply apt machine learning strategy for any given problem

CO3: Design systems that uses appropriate models of machine learning

CO4: Solve problems related to various learning techniques

COs	Mapping with POs
CO1	PO1, PO2
CO2	PO3, PO4
CO3	PO3, PO5,PO6
CO4	PO4, PO9, PO12

Sub Title : CLOUD COMPUTING LAB		
Sub Code:18ISL66	**No of Credits : 0:0:1(L:T:P)**	**No. of Lecture Hours/Week : 02**
Exam Duration : 3 hours	**Exam Marks :CIE +SEE = 50 + 50 =100**	

Course Objectives:

1. To understand the working and usage of different cloud service models.
2. To study the basic understanding of Installation and Configuration of Cloud environment.
3. To understand the concept of Service Model and its usage in Cloud Computing.
4. To learn development of applications using IaaS, PaaS and SaaS.
5. Understand how Cloud environment works, for various deployment models.

I. LIST OF PROGRAMS

1. Design and demonstrate the usage of Google Form, Google slides and Google plugins for conducting a Student Training Programme.
2. Create an application in Salesforce.com to maintain product information.
3. Create an application in Salesforce.com to demonstrate master-child relationship for generating Invoice Bill.
4. Develop a Visual Force Page to demonstrate the working of basic visual components.
5. Develop a web application project using Codeanywhere.com and collaborate over Github.
6. Demonstrate the working of different application development stacks using Codenvy.io.
7. Demonstrate Virtualization by installing Virtual box/VMware Workstation with different flavors of Operating System on Windows 10.
8. Demonstrate a simple python program by installing Python 3 in the virtual machine created using virtual box.
9. Demonstrate a procedure to launch virtual machine using TryStack.
10. Demonstrate the working of Docker Containers to build a custom app using open source - Play With Docker (PWD).

II. OPEN ENDED QUESTIONS

Design and implement Cloud based application (mini-project) using any of the Cloud Service Models.

NOTE: STUDENT IS PERMITED TO SUBMIT ANY OPEN ENDED QUESTION AND HAS TO BE APPROVED BY THE STAFF IN CHARGE.

Course Outcomes:

After the completion of course, the students will be able to:

CO1: Analyze the requirements to setup: Cloud Environment using IaaS Environment

CO2: Develop the ability to solve real-world problems through software development on Cloud Environment.

CO3: Implement, compile, test and run Java/Php/Python programs comprising on PaaS to address a particular software problem.

CO4: Design and develop useful Cloud applications with elegant user interfaces using SaaS.

COs	**Mapping with POs**
CO1	PO1,PO2,PO5,PO7,PO11
CO2	PO1,PO2, PO5, PO7,PO12
CO3	PO1,PO7,PO9,PO10,PO12
CO4	PO1,PO2,PO6,PO9,PO12

Sub Title : MINI PROJECT		
Sub Code:18ISMP67	**No. of Credits: 2=0 : 0 : 2 (L-T-P)**	**No. of lecture hours/week :**
Exam Duration : 3 hours	**Exam Marks: CIE + SEE = 50 + 50 =100**	

Sub Title : INTERNSHIP		
Sub Code:18ISI68	**No. of Credits: ----**	**No. of lecture hours/week**
Exam Marks: CIE + SEE = 50 + 50 =100		

Detailed Scheme and Syllabus

ACADEMIC YEAR 2021-2022

VII - VIII (2018-2022 BATCH) (175Credits)

Dr. Ambedkar Institute of Technology
Bangalore

Department Of
Information Science and Engineering

Vision

- To create **D**ynamic, **R**esourceful, **A**dept and **I**nnovative **T**echnical professionals to meet global challenges.

Mission

- To offer state-of-the-art undergraduate, postgraduate and doctoral programmes in the fields of Engineering, Technology and Management.
- To generate new knowledge by engaging faculty and students in research, development and innovation
- To provide strong theoretical foundation to the students, supported by extensive practical training to meet industry requirements.
- To install moral and ethical values with social and professional commitment.

DEPARTMENT VISION AND MISSION

Vision:

- Imparting quality technical education and preparing professionals to meet Information Technological challenges globally.

Mission:

- Prepare highly capable Information Science engineers through best practices.
- Encourage students to pursue higher education for further growth in the learning process and to promote research in the frontier areas of Information Technology.
- Educate students to take up social and professional responsibilities with ethical values for the betterment of the society.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Graduates will have the ability to become successful computing professionals in the area of Information Science and Engineering.

PEO2: Graduates will be equipped to enhance their knowledge through core engineering and latest technological skills to promote lifelong learning.

PEO3: Graduates will be able to take up social, technical and entrepreneurial challenges in inter disciplinary and multi disciplinary fields.

PROGRAM SPECIFIC OBJECTIVES(PSOS)

PSO1:Students should be able to understand, analyze and adopt principles of programming paradigms by using latest technologies such as Cloud computing, Big data analytics, AI ,Machine Learning and IoT based applications for solving real-world problems.

PSO2: Students should be able to acquire and demonstrate the team work, professional ethics, competence and communication skills while developing software products.

PROGRAMME OUTCOMES (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2020-2021

B.E Information Science and Engineering

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

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	18IS71	Big Data Analytics	ISE	4	-	--	03	50	50	100	4
3	PC	18IS72	Software Testing	ISE	4	--	--	03	50	50	100	4
4	PE	18IS73X	Elective-3	ISE	3	--	--	03	50	50	100	3
5	PE	18IS74X	Elective-4	ISE	3	--	--	03	50	50	100	3
6	OE	18ISE03	Open-Elective C	ISE	3	--	--	03	50	50	100	3
7	PC	18ISL75	Big Data Analytics Lab	ISE	--	--	2	03	50	50	100	1
8	PC	18XXL76	Software Testing Lab		--	--	2	03	50	50	100	1
9	Project	18ISP77	Project Work Phase-1	ISE	--	--	2	03	50	--	50	2
10	INT	18ISI78	Internship	((If not completed after (If not completed after VI semester examinations , it has to be carried out during the intervening vacations of VII and VIII semesters)				03	---	--	--	--
TOTAL					**19**		**4**	**27**	**400**	**350**	**750**	**23**

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

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 University examination will be conducted during VIII semester and prescribed credit are 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 University examination after satisfy the internship requirements.

<table>
<tr><th colspan="3">Electives</th></tr>
<tr><td>Course</td><td>Electives - 3</td><td rowspan="15">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.</td></tr>
<tr><td>18IS731</td><td>Artificial Neural Networks</td></tr>
<tr><td>18IS732</td><td>C# Programming and .Net</td></tr>
<tr><td>18IS733</td><td>Software Architecture</td></tr>
<tr><td>18IS734</td><td>BlockChain Technology</td></tr>
<tr><td>Course Code</td><td>Electives – 4</td></tr>
<tr><td>18IS741</td><td>Storage Area Network</td></tr>
<tr><td>18IS742</td><td>Ethical Hacking</td></tr>
<tr><td>18IS743</td><td>Soft and Evolutionary Computing</td></tr>
<tr><td>18IS744</td><td>Deep Learning</td></tr>
<tr><td>Course code</td><td>Open Elective -C</td></tr>
<tr><td>18ISE031</td><td>Mobile Application Development</td></tr>
<tr><td>18ISE032</td><td>Python Programming</td></tr>
<tr><td>18ISE033</td><td>Artificial Intelligence</td></tr>
</table>

HEAD DEPT. OF INFORMATION SCIENCE & ENGG.

Dr. Ambedkar Institute of Technology, Bengaluru-560 056

SCHEME OF TEACHING AND EXAMINATION from Academic Year 2020-2021

B.E Information Science and Engineering

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

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	18IM 81 /18CV81	CMEP / OSHA	IM/CV	4	--	--	03	50	50	100	2
2	Project	18ISP82	Project Work phase-2	ISE		-	--	03	50	50	100	10
3		18ISS83	Technical Seminar	ISE	-	--	-	03	50	50	100	1
4	INT	18ISI84	Internship	ISE	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semester)			03	50	50	100	2
				TOTAL	**5**		**4**	**14**	200	**200**	**400**	**15**

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

Electives

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

HEAD DEPT. OF INFORMATION SCIENCE & ENGG.

VII SEMESTER

Course Title: CMEP / OSHA		
Course code:18IS71/72	**No. of Credits:2=2 : 0 : 0 (L-T-P)**	**No. of lecture hours/week :2**
Exam Duration : 3 hours	**Exam Marks :CIE +Assignment + Group Activity + SEE = 45 + 5 + 50 = 100**	**Total No. of Contact Hours:**

Sub Title: BIG DATA ANALYTICS		
Sub Title:18IS71	**No. of Credits:4=4 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 4**
Exam Duration : 3 hours	**Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100**	**Total No. of Contact Hours:52**

Course Objectives:

- Understand Big data for industry applications.
- Analyze business case studies for Big data analytics
- Define managing of Big data without SQL
- Develop Mapreduce analytics using Hadoop and related tools.

UNIT No.	Syllabus Content	No. of Hours
1	**Introduction to Big Data:** Types of Digital Data: classification of Data(Structured, semi structured and unstructured), Characteristics of Data, Evolution of Big Data, Definition of Big Data, challenges of Big Data, Characteristics of Big Data (Volume, Velocity, Variety), Other characteristics of Big Data which are not Definitional Traits of Big Data, Why Big Data?, Are we Information consumer of producer? , Traditional BI vs Big Data, Typical Data warehouse environment, Typical Hadoop Environment, What is changing in realms of Big Data? **Text1:Chapter1,Chapter2**	10
2	**Introduction to NoSQL and Hadoop : NoSQL:** Introduction(What is it?, Where It is Used, Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL,NewSQL) **Hadoop:** Introduction (features, key advantages of Hadoop, Versions of Hadoop, Overview of Hadoop ecosystems, Hadoop distributions, Hadoop vs SQL, Integrated Hadoop Systems offered by leading market vendors, cloud based Hadoop solutions)**Text1:Chapter4,Chapter5**	10
3	**Introduction to MongoDB and MapReduce : MongoDB**: Introduction (What is MongoDB, Why MongoDb, using JSON to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating and Querying through Indexes, Document- Oriented, principles of schema design, Constructing queries on Databases, collections and Documents , MongoDB Query Language. **MapReduce:** Introduction, Mapper, Reducer, Combiner, Partitioner,	11

	Searching, Sorting, Compression. **Text1:Chapter6,Chapter8**	
4	**Introduction to HIVE AND Pig: HIVE** Introduction (What is HIVE?, HIVE Architecture, HIVE data Types, HIVE File Formats, HIVE query Language, RCFile implementation, Sharding, user-Defined Functions . **Pig:** Introduction(What is Pig? The anatomy of Pig, Pig on Hadoop, Pig philosophy,Use Case for Pig- ETL Processing, Pig Latin overview, Datatypes in Pig, running Pig, Execution modes of Pig, HDFS commands, Relational operators, Eval function, complex Data Types, Piggy Bank, User-Define Functions, Parameter substitution, Diagnostic Operator, Word Count Example using Pig, When to use and not use Pig, Pig at Yahoo, Pig vs HIVE. **Text1:Chapter9,Chapter10**	11
5	**Overview of SPARK, Tensor Flow, Theone:** Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs, Spark about anatomy of job runs, Anatomy of a Spark Job, Run–Task Execution cluster managers and, Executors and Cluster Managers Python Example ,Hive and, Execution engines installing, Installing Spark MapReduce and, Transformations and Actions RDDs and, Resilient Distributed Datasets–Functions resource requests, Resource Requests shared variables, Shared Variables–Accumulators sorting data, Total Sort YARN and, Spark on YARN–YARN cluster mode. Machine Learning with MLlib.**Text2:Chapter1,Chapter2**	10

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:
After completing the course the students are able to:
CO1: Describe Big data and use cases from selected industry domains.
CO2: Discuss about NoSQL Big data management.
CO3: Install, configure, and run Hadoop.
CO4: Perform Mapreduce analytics using Hadoop.
CO5: Use Hadoop related tools such as HBase, MongoDB, Pig ,Spark, Hive for Big Data Analytics.

COs	Mapping with PO's
CO1	PO2, PO8
CO2	PO4,PO5, PO8
CO3	PO3, PO4, PO5
CO4	PO4, PO5
CO5	PO3, PO4, PO5, PO11.

Text Book(s):

1. Seema Acharya, Subhashini Chellappan, " Big Data and Analytics", Wiley India Pvt. Ltd.,2015

2. Matei Zaharia, Patrick Wendell, Andy Konwinski, Holden Karau ,"Learning Spark",O'Reilly Media,2015

Reference Books:

1. Shashank Tiwari, " Professional NoSQL", Wiley India Pvt. Ltd.,2011

2. Kyle Banker,Peter Bakkum,Shaun Verch,Douglas Garrett,Tim Hawkins,"MongoDB in Action", DreamTech Press, 2nd Edition ,2016

3. Chris Eaton,Paul Zikopoulos,Tom Deutsch,George Lapis,Dirk Deroos,"Understanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data", Mcgraw Hill Education (India)Pvt.Ltd.,2012

4. Tom White,"Hadoop: The Definitive Guide",O'Reilly Media,4th Edition,2015

5. Vignesh Prajapati,"Big Data Analytics With R and Hadoop", Packt Pub Ltd ,2013

6. Dt Editorial Services,"Big Data - Black Book", Dreamtech Press,2016

Web Resources:

a) http://www.bigdatauniversity.com

b) http://www.mongodb.com

c) http://hadoop.apache.org/

Sub Title : SOFTWARE TESTING		
Sub Code:18IS72	**No. of Credits:4=4: 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week : 4**
Exam Duration : 3 hours	**Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100**	**Total No. of Contact Hours :52**

Course Objectives:

1. Discuss about terminologies of software testing .
2. Differentiate the various testing techniques.
3. Analyze the problem and derive suitable test cases.
4. Apply suitable technique for designing of flow graph.
5. Explain the need for planning and monitoring a process.

Unit No	Syllabus Content	No of Hours
1	Basics of Software Testing: Basic definitions, Software Quality , Requirements, Behaviour and Correctness, Correctness versus Reliability, Testing and Debugging, Test cases, Insights from a Venn diagram, Identifying test cases, Test-generation Strategies, Test Metrics, Error and fault taxonomies , Levels of testing, Testing and Verification, Static Testing. Problem Statements: Generalized pseudocode, the triangle problem, the NextDate function, the commission problem, the SATM (Simple Automatic Teller Machine) problem, the currency converter, Saturn windshield wiper T1:Chapter1, Chapter2. T3:Chapter1.	10
2	Functional Testing: Boundary value analysis, Robustness testing, Worst-case testing,Robust Worst testing for triangle problem, Nextdate problem and commission problem, 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. Fault Based Testing: Overview, Assumptions in fault based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis. T1: Chapter 5,Chapter 6,Chapter7, T2: Chapter 16	10

3	Structural Testing: Overview, Statement testing, Programme testing, Condition testing , Path testing: DD paths, Test coverage metrics, Basis path testing, guidelines and observations, Data –Flow testing: Definition-Use testing, Slice-based testing, Guidelines and observations. Test Execution: Overview of test execution, from test case specification to test cases, Scaffolding, Generic versus specific scaffolding, Test oracles, Self-checks as oracles,Capture and replay T1:Chapter 9,Chapter10, T2:Chapter 17, T3:Section 6.2.1, T3:Section 6.2.4	10
4	Process Framework :Basic principles: Sensitivity, redundancy, restriction, partition, visibility, Feedback, the quality process, Planning and monitoring, Quality goals,Dependability properties ,Analysis Testing, Improving the process, Organizational factors.Planning and Monitoring the Process: Quality and process, Test and analysis strategies and plans, Risk planning, monitoring the process, Improving the process, the quality team Documenting Analysis and Test: Organizing documents, Test strategy document, Analysis and test plan, Test design specifications documents, Test and analysis reports. T2: Chapter 3, Chapter 4, Chapter 20, Chapter 24.	11
5	Integration and Component-Based Software Testing: Overview, Integration testing strategies, Testing components and assemblies. System, Acceptance and Regression Testing: Overview, System testing, Acceptance testing, Usability, Regression testing, Regression test selection techniques, Test case prioritization and selective execution. 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. T1 : Chapter 12,Chapter 13 T2: Chapter 21,Chapter 22	11

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:
After the completion of course, the students will be able to:
CO1: Derive test cases for any given problem
CO2: Compare the different testing techniques
CO3: Classify the problem into suitable testing model
CO4: Apply the appropriate technique for the design of flow graph.
CO5: Create appropriate document for the software artefact.

COs	Mapping with Pos
CO1	PO1,PO2,PO7,PO8,PO12
CO2	PO1,PO2,PO3,PO5,PO7
CO3	PO1,PO2,PO3,PO5
CO4	PO1,PO2,PO3,PO4,PO5
CO5	PO5,PO7,PO9,P10,PO11

TEXT BOOKS:

1. Paul C. Jorgensen: Software Testing, A Craftsman's Approach, 3rd Edition, Auerbach Publications, 2008. (Listed topics only from Chapters 1, 2, 5, 6, 7, 9, 10, 12, 13)
2. Mauro Pezze, Michal Young: Software Testing and Analysis – Process, Principles and Techniques, Wiley India, 2009. (Listed topics only from Chapters 3, 4, 16, 17, 20,21, 22,24)
3. Aditya P Mathur: Foundations of Software Testing, Pearson Education, 2008.(Listed topics only from Section 1.2 , 1.3, 1.4 ,1.5, 1.8,1.12,6. 2.1,6. 2.4)

REFERENCE BOOKS/WEBLINKS:

1. Software testing Principles and Practices – Gopalaswamy Ramesh, Srinivasan Desikan, 2 nd Edition, Pearson, 2007.
2. Software Testing – Ron Patton, 2nd edition, Pearson Education, 2004.
3. The Craft of Software Testing – Brian Marrick, Pearson Education, 1995.
4. Anirban Basu, Software Quality Assurance, Testing and Metrics, PHI, 2015.
5. https://www.softwaretestingmaterial.com/software-testing/
6. https://www.guru99.com/software-testing-introduction-importance.html

Sub Title : ARTIFICIAL NEURAL NETWORKS		
Sub Code: 18IS731	**No. of Credits:3 =3 : 0 : 0 (L-T-P)**	**No. of lecture**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of**

Course Objectives:

1. Understand the basics of ANN and comparison with Human brain
2. Provide knowledge on Generalization and function approximation and various architectures of building an ANN
3. Provide knowledge of reinforcement learning using neural networks
4. Provide knowledge of unsupervised learning using neural networks.

UNIT No	Syllabus Content	No of Hours
1	Introduction: Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feedforward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem. XOR Problem, Multilayer Networks. Learning: Learning Algorithms, Error correction and Gradient Descent Rules, Learning objective of TLNs, Perceptron Learning Algorithm, Perceptron Convergence Theorem.L1, L2	**7**
2	Supervised Learning: Perceptron learning and Non Separable sets, α-Least Mean Square Learning, MSE Error surface, Steepest Descent Search, μ-LMS approximate to gradient descent, Application of LMS to Noise Cancelling, Multi-layered Network Architecture, Backpropagation Learning Algorithm, Practical consideration of BP algorithm. L1, L2, L3	**9**
3	Support Vector Machines and Radial Basis Function: Learning from Examples, Statistical Learning Theory,Support Vector Machines, SVM application to Image Classification, Radial Basis Function Regularization theory, Generalized RBF Networks, Learning in RBFNs, RBF application to face recognition.L1, L2, L3	**7**
4	Attractor Neural Networks: Associative Learning Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in a Box neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory.L1, L2, L3	**7**
5	Self-organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components, Generalized Learning Laws, Vector Quantization, Self-organization Feature Maps, Application of SOM, Growing Neural Gas.L1, L2, L3	**9**

Note 1: All chapters will have internal choice.
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After the completion of course, the student will be able to:
CO1: Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.
CO2: Understand the concepts and techniques of neural networks through the study of important neural network models.
CO3: Evaluate whether neural networks are appropriate to a particular application..
CO4: Apply neural networks to particular application.
CO5: Analyze the steps needed to improve performance of the selected neural network.

Text Book: Neural Networks A Classroom Approach– Satish Kumar, McGraw Hill Education (India) Pvt. Ltd, Second Edition.

Reference Books:
1. Introduction to Artificial Neural Systems-J.M. Zurada, Jaico Publications 1994.
2. Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.

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

Sub Title : C# PROGRAMMING AND .NET		
Sub Code:18IS732	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week : 3**
Exam Duration : 3 hours	**Exam Marks :CIE +Assignment + Group Activity+ SEE = 45 + 5 +5 + 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Understand the nature of .Net application development and build C# applications.
2. Familiarize with Object-oriented Programming concepts as associated with C#, Inheritance, Interfaces, Exception Handling, Reflection, Standard I/O programming, File Handling, Generics,
3. Understand Windows Application using Winforms, File I/O, XML in .NET.Web Services and Deployment.
4. Overview of .NET framework 3.0 features like WPF, WCF and WF.

Unit No.	Syllabus Content	No of Hours
1	**The Philosophy Of .Net:** Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language , The Role of .NET Type Metadata, The Role of the Assembly Manifast, Compiling CIL to Platform –Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime. **Building C# Applications:** The Role of the Command Line Complier (csc.exe), Building C # Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports , Remaining C# Compiler Options, The Command Line Debugger (cordbg.exe) Using the, Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# "Preprocessor:" Directives, An Interesting Aside: The System. Environment Class.**T1:Ch1,Ch2**	**8**
2	**C# Language Fundamentals:** The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing,	**8**

	Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C #, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces. **T1:Ch3**	
3	**Object- Oriented Programming With C#:** Forms Defining of the C# Class, Definition the "Default Public Interface" of a Type, Recapping the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, Pseudo-Encapsulation: Creating Read-Only Fields, The Second Pillar: C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C #'s Polymorphic Support, Casting Between. **Exceptions And Object Lifetime:** Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System. System Exception), Custom Application-Level Exception (System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying Application – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of "new', The Basics of Garbage Collection,, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System. GC Type. T**1:Ch4,Ch5,Ch6**	**8**
4	**Interfaces And Collections:** Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the IConvertible Interface, Building a Custom Enumerator (IEnumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (I Comparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type). **Understanding Callback Interfaces, Understanding the .NET Delegate** Type,Members of System. Multicast Delegate, The Simplest Possible DelegateExample, , Building More a Elaborate Delegate Example, UnderstandingAsynchronous **T1:Ch7,Ch8**	**8**
5	Delegates, Understanding (and Using)Events.The Advances Keywords of C#, A Catalog of C# Keywords Building aCustom Indexer, A Variation of the Cars Indexer Internal Representation ofType Indexer . Using C# Indexer from VB .NET. Overloading operators, TheInternal Representation of Overloading Operators, interacting with OverloadOperator from Overloaded- Operator- Challenged Languages,	**7**

	CreatingCustom Conversion Routines, Defining Implicit Conversion Routines, TheInternal Representations of Customs Conversion Routines **Understanding .Net Assembles:** Problems with Classic COM Binaries, An Overview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, A Visual Basic .NET Client Application, Cross Language Inheritance, Exploring the CarLibrary's, Manifest, Exploring the CarLibrary's Types, Building the Multifile Assembly, Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configurations Files, Probing for Private Assemblies (The Details), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly. **T1:Ch9,Ch10,Ch11**	

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:
After the completion of course, the students will be able to:

CO1:Analyze the nature of .Net application development .
CO2: Apply OOAD concepts to build C# applications
CO3: Design and develop console based applications using C#
CO4: Develop Windows Application using Winforms, File I/O, XML in .NET.Web Services and deployment.
CO5:Analyze .NET framework 3.0 features like WPF, WCF and WF.

COs	**Mapping with POs**
CO1	PO1,PO2,PO3,PO4,PO5,PO8
CO2	PO1,PO2,PO3,PO4,PO5,PO7
CO3	PO1,PO2,PO3,PO4,PO5,PO7
CO4	PO1,PO2,PO3,PO4,PO5,PO7
CO5	PO1,PO2,PO3,PO4,PO5,PO7

TEXT BOOKS:

1. Pro C# with .NET 3.0 - Andrew Troelsen, Special Edition, Dream Tech Press, India, 2013.

2. Programming in C# - E. Balagurusamy, 5th Reprint, Tata McGraw Hill, 2011.

REFERENCE BOOKS/WEB LINKS:
Inside C# - Tom Archer, WP Publishers, 2011.

Sub Title : SOFTWARE ARCHITECTURE		
Sub Code:18IS733	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week : 3**
Exam Duration : 3 hours	**Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Understanding the fundamentals of software architecture.
2. Software architecture and quality requirements of a software system
3. Fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
4. Methods, techniques, and tools for describing software architecture and documenting design rationale.
5. Software architecture design and evaluation processes.

Unit No.	Syllabus Content	No of Hours
1	**Introduction:** The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a "good" architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views. Architectural Styles and Case Studies: Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. T1:CH:1,CH2	8
2	**Quality:** Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architecture qualities. **Achieving Quality:** Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles. T1:CH4,CH5	8
3	**Architectural Patterns – 1:** Introduction; from mud to structure: Layers, Pipes and Filters, Blackboard. Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control. T1:CH2	8
4	**Architectural Patterns – 2**: Adaptable Systems: Microkernel; Reflection.	8

	Some Design Patterns: Structural decomposition: Whole – Part; Organization of work: Master – Slave; Access Control: Proxy. T2:CH3	
5	**Designing and Documenting Software Architecture**: Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views. T1:CH7,CH8	7

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes:

After the completion of course the student will be able to:

CO1: Argue the importance and role of software architecture in large scale software systems
CO2: Design and motivate software architecture for large scale software systems
CO3: Recognize major software architectural styles, design patterns, and frameworks
CO4: Describe a software architecture using various documentation approaches and architectural description languages
CO5: Evaluate the coming attractions in software architecture research and practice.

COs	**Mapping with POs**
CO1	PO1,PO2,PO9
CO2	PO1,PO2, PO4,PO5, PO9
CO3	PO1, PO4,PO5, PO9
CO4	PO1,PO2,PO3, PO4, PO9
CO5	PO1, PO4, PO9,PO10

TEXT BOOKS

1. Software Architecture in Practice - Len Bass, Paul Clements, Rick Kazman, 2nd Edition, Pearson Education, 2003.

2. Pattern-Oriented Software Architecture A System of Patterns, Volume 1 - Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal, John Wiley and Sons, 2006

3. Software Architecture- Perspectives on an Emerging Discipline - Mary Shaw and David Garlan, Prentice-Hall of India, 2007.

REFERENCE BOOKS/WEB LINKS:

Design Patterns- Elements of Reusable Object-Oriented Software - E. Gamma, R. Helm, R. Johnson, J. Vlissides, Addison-Wesley, 1995.

Sub Title : BLOCK CHAIN TECHNOLOGY		
Sub Code: 18IS734	**No. of Credits:3=3: 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Understand the fundamentals of BlockChain.
2. Understand the concept of decentralization, its impact, and its relationship with blockchain technology
3. Gain knowledge of the inner workings of blockchain and the mechanisms behind bitcoin and alternative cryptocurrencies.
4. Understand the theoretical foundations of smart contracts
5. Identify and examine applications of the blockchain technology - beyond currencies

UNIT No	Syllabus Content	No of Hours
1	Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain. Text Book 1: Chapter 1	**8**
2	Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys Text Book 1: Chapter 2,Chapter 4	**8**
3	Bitcoin and Alternative Coins A: Bitcoin, Transactions, Blockchain, Bitcoin payments B: Alternative Coins Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash Text Book 1: Chapter 3, Chapter 6, Chapter 8.	**8**
4	Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts. Text Book 1: Chapter 10	**8**
5	Alternative Blockchains: Blockchains Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, 08 Media Text Book 1: Chapter 17	**7**

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4

Assignment -III from Unit 5

Course Outcomes:
After the completion of the course students will be able to

CO1: Comprehend the fundamentals of Blockchain Technology.
CO2: Apply the methods of Decentralization.
CO3: Analyse Bitcoin and alternative coins.
CO4: Analyze the importance of Smart Contracts and Ethereum
CO5: Apply blockchain technology in various fields like Government, Health finance etc.,

COs	**Mapping with POs**
CO1	PO1,PO2,PO3,PO12
CO2	PO2,PO3,PO4,PO12
CO3	PO5,PO9,PO12
CO4	PO2,PO3,PO12
CO5	PO2,PO3,PO12

TEXT BOOKS:

1. Mastering Blockchain - Distributed ledgers, decentralization and smart contracts explained, Imran Bashir, Packt Publishing Ltd, Second Edition, ISBN 978-1-78712-544-5, 2017

REFERENCE BOOKS / WEBLINKS:

1. Blockchain Technology (Concepts and applications), Kumar saurabh, Ashutosh saxena, Wiley, 2020.
2. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten,2016.
3. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, First Edition, 2017.
4. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014.
5. https://www.packtpub.com/in/big-data-and-business-intelligence/mastering-blockchain-second-edition

ELECTIVES-4

Sub Title : **STORAGE AREA NETWORKS**		
Sub Code: 18IS741	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week : 3**
Exam Duration : 3 hours	**Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. To understand the fundamentals of storage architecture along with storage virtualization.
2. To understand the metrics used for designing storage area networks.
3. To enable the students to understand RAID concepts.
4. To appreciate the use of cables technologies used in SAN technology.

Unit No.	Syllabus Content	No. of Hours
1	**Storage System** Introduction to Information Storage: Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing.Data Center Environment: Application, Host (Compute), Connectivity, Storage.Data Protection: RAID: RAID Implementation Methods, RAID Techniques,RAID Levels, RAID Impact on Disk Performance. Intelligent Storage Systems:Components of Intelligent Storage System, Storage Provisioning. **T1: Ch1: 1.2 to 1.4, Ch2: 2.1, 2.3 to 2.5, Ch3: 3.1, 3.3 to 3.5, Ch4: 4.1 and 4.2**	8
2	**Storage Networking Technologies** Fibre Channel Storage Area Networks: Components of FC SAN, FC connectivity, Fibre Channel Architecture, Zoning,FC SAN Topologies, Virtualization in SAN. IP SAN and FCoE: iSCSI, FCIP,FCoE. Network Attached Storage: Components of NAS, NAS I/O Operation,NAS File-Sharing Protocols, File-Level Virtualization, Object-Based Storage and Unified Storage: Object-Based Storage Devices, Content-Addressed Storage,Unified Storage. T1 :Ch5: 5.3, 5.4, 5.6, 5.9 to 5.11, Ch6: 6.1 to 6.3, Ch7: 7.4, 7.5, 7.7 and 7.9 Ch 8: 8.1, 8.2 and 8.4	8
3	**Backup, Archive and Replication** Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, BC Technology Solutions. Backup and Archive: Backup Methods, Backup Topologies, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive. Local Replication: Replication Terminology, Uses of Local Replicas, Local Replication Technologies, Local Replication in a Virtualized Environment. Remote Replication: Remote Replication Technologies, Three-Site Replication,	8

	Remote Replication and Migration in a Virtualized Environment. T1: Ch10: 10.5, 10.8, 10.10 to 10.13, Ch11: 11.1, 11.2, 11.4 and 11.8,Ch12: 12.2, 12.3 and 12.5	
4	**Cloud Computing and Virtualization** Cloud Enabling Technologies, Characteristics of Cloud Computing, Benefits of Cloud Computing, Cloud Service Models, Cloud Deployment Models, Cloud Computing Infrastructure,Cloud Challenges and Cloud Adoption Considerations. Virtualization Appliances: Black Box Virtualization, In-Band Virtualization Appliances, Outof-Band Virtualization Appliances, High Availability for Virtualization Appliances, Appliances for Mass Consumption. Storage Automation and Virtualization**:** Policy-Based Storage Management, Application-Aware Storage Virtualization, Virtualization-Aware Applications. T1: Ch13: 13.1 to 13.8. T2: Ch9: 9.1 to 9.5 Ch13: 13.1 to 13.3	8
5	**Securing and Managing Storage Infrastructure** Securing and Storage Infrastructure: Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments. **Managing the Storage Infrastructure** Monitoring the Storage Infrastructure, Storage Infrastructure Management activities, Storage Infrastructure Management Challenges,Information Lifecycle management, Storage Tiering. T1 : Ch14: 14.1 to 14.5, Ch15: 15.1 to 15.3, 15.5 and 15.6	7

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4

Assignment -III from Unit 5

Course Outcomes:

After the completion of course, the students will be able to:

CO1: Identify the need for storage networks and its advantages.

CO2: Recognize various RAID levels.

CO3: Apply the concept of storage virtualization and recognize steps for Business continuity planning in an Enterprise.

CO4: Analyze SAN architecture along with the use of cables technologies.

CO5: Realize the concept of management of storage network.

COs	**Mapping with POs**
CO1	PO1, PO2, PO12
CO2	PO1, PO2
CO3	PO1,PO2,PO11
CO4	PO1,PO2,PO12
CO5	PO1, PO2,PO11, PO12

TEXT BOOKS:

1. Information Storage and Management,Author :EMC Education Services, Publisher: Wiley ISBN: 9781118094839
2. Storage Virtualization, Author: Clark Tom, Publisher: Addison Wesley Publishing Company ISBN : 9780321262516

REFERENCE BOOKS/WEB LINKS:

1.Robert Spalding: "Storage Networks The Complete Reference", Tata McGraw-Hill, 2011.
2. Marc Farley: Storage Networking Fundamentals – An Introduction to Storage Devices, Subsystems, Applications, Management, and File Systems, Cisco Press, 2005.
3. Richard Barker and Paul Massiglia: "Storage Area Network Essentials A Complete Guide to understanding and Implementing SANs", Wiley India, 2006

Sub Title: ETHICAL HACKING		
SubCode: 18IS742	**No. of Credits:3 = 3: 0 : 0 (L–T– P)**	**No of Lecture Hour/week: 3**
Exam Duration: 3 Hours	**CIE + SEE = CIE+Assignment+Group Activity= 40+5+5+50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

- Learn aspects of security, importance of data gathering, foot printing and system hacking.
- Learn tools and techniques to carry out a penetration testing.
- How intruders escalate privileges
- Explain Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Virus Creation.
- Compare different types of hacking tools..

Unit No	Syllabus Content	No of Hours
1	Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring. **Text Book2: Chapter1:Page 7-42:Chapter2: Page 43-77, Chapter3: Page 79-148**	**8**
2.	Securing permission: Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local Access, After Hacking root. **Text Book2: Chapter5:Page 224-307**	**8**
3.	Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, BruteForce Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media. **Text Book2: Chapter6:Page 315-369,Chapter7: Page 387-439**	**8**
4.	Wireless Hacking: Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS **Text Book2: Chapter8:Page 445-466,Text Book1: Chapter11: Page 459-479, Chapter12: Page 483-504**	**8**
5.	Remote Control Insecurities: Discovering Remote Control Software, Connection,	**7**

	Weakness.VNC, Microsoft Terminal Server and Citrix ICA, Advanced Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking **Text Book1: Chapter13: Page 511-526, Chapter14: Page 529-563, Chapter15: Page 565,Chapter16: Page 601-651**	

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4
Assignment -III from Unit 5

Course Outcomes: After the successful completion of the course the students are able to

CO1: Explain aspects of security, importance of data gathering, foot printing and system hacking
CO2: Explain aspects of security, importance of data gathering, foot printing and system hacking.
CO3: Demonstrate how intruders escalate privileges.
CO4: Demonstrate how intruders escalate privileges
CO5: Demonstrate how intruders escalate privileges.

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

TEXT BOOKS:

1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, 2nd Edition, Tata Mc Graw Hill Publishers, 2010.
2. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 6th Edition, Tata Mc Graw Hill Publishers, 2010.
3. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall

REFERENCE BOOKS/WEB LINKS

1.Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 6th Edition, Tata Mc Graw Hill publishers, 2010.
2. Rafay Baloch, "A Beginners Guide to Ethical Hacking"
3.Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, "Gray Hat Hacking The Ethical Hackers Handbook", 3rd Edition, McGraw-Hill Osborne Media paperback(January 27, 2011)

Sub Title: SOFT AND EVOLUTIONARY COMPUTING		
Sub Code: **18IS743**	**No. of Credits:3=3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100**	**Total No. of Contact Hours : 39**

Course objectives: This course will enable students to:

- Define and understand important concepts in soft computing
- To gain insight onto Fuzzy logic
- To gain knowledge in machine learning through GA
- Analyze the various soft computing techniques

Unit No.	Syllabus Content	No. of Hours
1	**INTRODUCTION TO SOFT COMPUTING**: ANN, FS,GA, SI, ES, Comparing among intelligent systems **ANN**: introduction, biological inspiration, BNN & ANN, classification, first Generation NN, perceptron, illustrative problems **Chapter1: 1.1-1.8(T1), Chapter 2: 2.1-2.6(T1)**	**8**
2	**ADALINE, MADALINE, ANN:** (2 generation), Introduction, BPN, KNN,HNN,BAM, RBF,SVM and illustrative problems **Chapter 2: 3.1,3.2,3.3,3.6,3.7,3.10,3.11(T1)**	**8**
3	**FUZZY LOGIC:** Introduction, human learning ability, undecidability, probability theory, classical set and fuzzy set, fuzzy set operations, fuzzy relations, fuzzy compositions, natural language and fuzzy interpretations, structure of fuzzy inference system, illustrative problems **Chapter 5(T1)**	**8**
4	**GENETIC ALGORITHMS:** Introduction to GAGA, procedures, working of GA, GA applications, applicability, evolutionary programming, working of EP, GA based Machine learning classifier system, illustrative problems **Chapter 7(T1)**	**8**

5	**Swarm Intelligent system:** Introduction, Background of SI, Ant colony system Working of ACO, Particle swarm Intelligence (PSO). **Chapter 8: 8.1-8.4, 8.7(T1)**	**7**

Note 1: All Units will have internal choice.
Note 2: Three assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:

After completion of course students will be able to:

CO1: Apprehend soft computing techniques

CO2: Apply the learned techniques to solve realistic problems

CO3: Differentiate soft computing with hard computing techniques

CO4: Design a Fuzzy expert system and apply GA for various applications

COs	Mapping with POs
CO1	PO1, PO2, PO3
CO2	PO1, PO2, PO3, PO4
CO3	PO3, PO4, PO5,PO6
CO4	PO3, PO4, PO5, P12

TEXT BOOKS:

1.Soft computing : N. P Padhy and S P Simon , Oxford University Press 2015

REFERENCE BOOKS/WEB LINKS:

1.Principles of Soft Computing, Sivanandam, Deepa S. N Wiley India, ISBN 13: 2011

2.Vojislav Kecman, "Learning & Soft Computing Support Vector Machines, Neural Networks, and Fuzzy Logic Models", Pearson Education, New Delhi, 2007.

Sub Title : DEEP LEARNING		
Sub Code: 18IS744	**No. of Credits:3=3: 0 : 0 (L-T-P)**	**No.of Lecture Hours/Week: 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. To understand basics of artificial neural network.
2. To gain knowledge of Deep Learning algorithms.
3. To get acquainted with a usage of TensorFlow tool.
4. To acquire the knowledge of different CNN architectures.
5. TO understand processing sequences using RNN and CNNs.

UNIT No	Syllabus Content	No of Hours
1	**Introduction to Artificial Neural Networks with Keras**- From Biological to Artificial Neurons, Biological Neurons, Logical Computations with Neurons, The Perceptron, MultiLayer Perceptron (MLP) and Backpropagation, Implementing MLP's with Keras, Fine Tuning Neural Network Hyper Parameters.	**8**
2	**Training Deep Neural Networks**- Vanishing/Exploding Gradients, Reusing Pretrained Layers Avoiding Overfitting Through Regularization.	**8**
3	**Custom Models and Training with TensorFlow** - A Quick Tour of TensorFlow, Using TensorFlow like NumPy, Customizing Models and Training Algorithms. **Loading and Preprocessing Data with TensorFlow** – The Data API, The TF Record Format , Preprocessing the Input Features, TF Transform, The TensorFlow Datasets (TFDS) Project.	**8**
4	**Deep Computer Vision Using Convolutional Neural Networks** - Architecture of Visual Cortex, Convolutional Layer, Pooling Layer, CNN Architectures, AlexNet, GoogLeNet Using Pre-trained Models from Keras, Classification and Localization, Object Detection, Fully Convolutional Networks.	**8**
5	**Processing Sequences Using RNNs and CNNs** - Recurrent Neurons and Layers , Training RNNs, Forecasting a Time Series, Baseline Metrics , Implementing a Simple RNN , Handling Long Sequences- Tackling the Short-Term Memory Problem, LSTM Cell.	**7**

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4

Assignment -III from Unit 5

Course Outcomes:
After the completion of the course students will be able to
CO1: Comprehend the fundamentals of deep learning algorithms.
CO2: Apply specific deep learning algorithms to obtain solutions for appropriate problems.
CO3: Identify and analyse deep learning techniques suitable for training the models using tensorflow and keras.
CO4: Conduct various experiments to demonstrate techniques using Deep neural networks, Convolutional neural networks,Recurrent neural networks so on.
CO5: Usage of modern tools for implementing deep learning algorithms using Python.

COs	**Mapping with POs**
CO1	PO1,PO2,PO3,PO12
CO2	PO2,PO3,PO4,PO12
CO3	PO5,PO9,PO12
CO4	PO5,PO9,PO12
CO5	PO5,PO12

TEXT BOOKS:

1. "Hands-On Machine Learning with Scikit-Learn, Keras and Tensor Flow: Concepts, Tools and Techniques to Build Intelligent Systems – September 2019: Second Edition" by Aurelien Geron.

REFERENCE BOOKS / WEBLINKS:

1. "Python Machine Learning- Third Edition" by Sebastian Raschka and Vahid Mirjalili.
2. e-Books:https://www.oreilly.com/library/view/hands-on-machine learning/9781492032632/

OPEN ELECTIVES -B

Sub Title : MOBILE APPLICATION DEVELOPMENT		
Sub Code:18ISE031	**No. of Credits: 3 =3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks: CIE +Assignment +Group Activity= 40+5+5+50 =100**	**Total No. of Contact Hours :39**

Course Objectives:

1. To understand fundamentals of Android OS, and use appropriate tools for Android Application development.
2. To be familiar with managing of application resources to build elegant user interfaces with views, layouts & fragments
3. To design styling, and common design patterns found among applications
4. To understand storing of application data using preferences, files and directories, SQLite, and content providers.
5. Develop, test, debug and publish mobile applications using android Platform.

UNIT No	Syllabus Content	No of Hours
1	**Platform Overview:** Introducing Android – History of Mobile Software Development, The Open Handset Alliance, Android Platform Uniqueness, The Android Platform, Setting Up Your Android Development Environment - Configuring Your Development environment, Exploring the Android SDK. Creating first android application - Testing Your Development Environment, Building Your First Android Application. **Application Basics :** Understanding Application Components - Mastering Important Android Terminology, The Application Context, Performing Application Tasks with Activities, Organizing Activity Components with Fragments, Managing Activity Transitions with Intents T1: Ch1, Ch2, Ch3,ch4	8
2	**Application Basics Continued** – Defining the Manifest , Managing Application Resources- What Are Resources?, Adding Simple Resource Values in Android Studio, Working with Different Types of Resources, Working with Layouts, Exploring Building Blocks, Positioning with Layouts, Partitioning with Fragments T1: Ch 5,Ch 6,Ch 7, Ch 8, Ch 9	8
3	**Application Design Essentials:** Architecting with Patterns-Architecting Your Application's Navigation, Encouraging Action,, Appealing with	8

	Style-Styling with Support, Themes and Styles, Colors, Layout, Embracing Material Design-Understanding Material, The Default Material Theme, Designing Compatible Applications -Maximizing Application Compatibility, Designing User Interfaces for Compatibility, Providing Alternative Application Resources, Targeting Tablets and TVs, Extending Application to Watches and Cars. T1: Ch 10, Ch11, Ch12, Ch 13	
4	**Application Development Essentials:** Using Android Preferences-Working with Application Preferences, Finding Preferences Data on the File System, Creating Manageable User Preferences, Auto Backup for Android Applications. Accessing Files and Directories: Working with Application Data on a Device, Practicing Good File Management, Understanding Android File Permissions, Working with Files and Directories, Saving with SQLite : Working with Databases Leveraging Content Providers - Exploring Android's Content Providers, Modifying Content Providers Data, Using Third-Party Content Providers T1: Ch 14,Ch15,Ch16, Ch17	8
5	**Application Delivery Essentials:** Testing Your Applications - Best Practices in Testing Mobile Applications, Android Application Testing Essentials, More Android Automated Testing Programs and APIs, Distributing Your Applications - Choosing the Right Distribution Model, Packaging Your Application for Publication, Publishing to Google Play, Google Play Staged Rollouts, Publishing to the Google Play Private Channel, Translating Your Application, Publishing Using Other Alternatives, Self-Publishing Your Application. T1: Ch 21 and Ch 22	7

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After completing the course the students are able to:
CO1: Analyze the fundamentals to build Mobile apps by assessing the basic framework by usage of Android SDK.
CO2: Design Android applications using various resources and built-in classes.
CO3:Apply creative skills in designing and deploying the sophisticated mobile applications.
CO4: Design and deploy Android applications with compelling User Interfaces and databases.
CO5: Develop and publish the Android Application in the global marketplace for download.

COs	Mapping with POs
CO1	PO1, PO2, PO3, PO4
CO2	PO2, PO3, PO4, PO5, PO7
CO3	PO4, PO5, PO6, PO8, PO9
CO4	PO4, PO5, PO9, PO10
CO5	PO6, PO7, PO8, PO11

TEXT BOOK:

1. Joseph Annuzzi, Jr., Lauren Darcey, and Shane Conder - Introduction to Android Application Development - Android Essentials, Fifth Edition, Pearson education, 2016.

REFERENCE BOOKS:

1 Reto Meier: Professional Android 4 Application Development , Wrox Publication,2015

Sub Title : PYTHON PROGRAMMING		
Sub Code: 18ISE032	**No. of Credits: 3 = 3 : 0 : 0 (L-T-P)**	**No. of lecture hours/week : 3**
Exam Duration : 3 hours	**Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100**	**Total No. of Contact Hours : 39**

Course Objectives:

1. Understanding the syntax and semantics of the Python language.
2. To create Functions in Python.
3. To handle Files & Regular expressions in Python.
4. To apply Object Oriented Programming concepts in Python.
5. To create Threaded and Networking applications in Python .

UNIT No	Syllabus Content	No of Hours
1	Introduction to Python, Writing Our First Python Program, Datatypes in Python, Operators in Python, Input and Output, Control Statements T1: **Ch 1, Ch 2, Ch 3, Ch 4,Ch 5 , Ch 6**	**8**
2	Arrays in Python, Strings and Characters, Functions, Lists and Tuples, Dictionaries T1: **Ch 7,Ch 8,Ch 9, Ch 10, Ch 11**	**8**
3	Introduction to OOPS, Classes and Objects, Inheritance and Polymorphism, Exceptions C**h12,Ch13,Ch14,Ch16**	**8**
4	Files in Python, Regular Expressions in Python, Data Structures in Python, Date and Time T1: C**h 17, Ch 18 ,Ch 19, Ch 20**	**8**
5	Threads, Graphical User Interface, Networking in Python, Python's Database Connectivity T1: C**h 20 ,Ch 21, Ch 22, Ch 23**	**7**

Note 1: All units will have internal choice

Note 2: Three Assignments are evaluated for 5 marks:

Assignment – I from Units 1 and 2.

Assignment – II from Units 3 and 4

Assignment -III from Unit 5

Course Outcomes:

After the completion of the above course students will be able to

CO1: Demonstrate the understanding and usage of core python scripting elements python constructs, data types.

CO2 : Demonstrate the understanding and usage of functions ,lists, tuples and dictionaries.

CO3: Demonstrate the understanding and usage of modules, packages and regular expressions.

CO4: Demonstrate usage of object oriented features such as Inheritance, Polymorphism, operator overloading.

CO5:Apply the knowledge of python and use the language scripting elements and constructs to develop threaded and networking applications

Text Books:

1. Core Python Programming: Dr.R.Nageshwara Rao,Dreadm Tech Press 2018

Reference Books:

1. Think Python, Allen Downey, Green Tea Press.
2. Learning Python, Mark Lutz, Orielly.

COs	**Mapping with POs**
CO1	PO1,PO2,PO4
CO2	PO1,PO2,PO4
CO3	PO1,PO2,PO4,PO5,PO8
CO4	PO1,PO2,PO4,PO5,PO8
CO5	PO1,PO2,PO4,PO5,PO8

Sub Title : ARTIFICIAL INTELLIGENCE		
Sub Code: 18ISE033	**No. of Credits:3=3: 0 : 0 (L-T-P)**	**No. of Lecture Hours/Week :3**
Exam Duration : 3 hours	**Exam Marks:CIE +Assignment +Group Activity+ SEE = 40 + 5+5 + 50 =100**	**Total No. of Contact Hours :39**

Course Objectives:

1. Understand about agent, behavior and structure
2. Learn different AI models and search strategies
3. Representation of knowledge and reasoning
4. Gain knowledge about learning strategies

Unit No	Syllabus Content	No of Hours
1	What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving: Problem-solving agents; Example problems	8
2	Knowledge representation issues: Representations and mappings approaches to knowledge representation, Issues in knowledge representation.	8
3	Logical Agents: Knowledge based agents, The Wumpus world, Logic-Propositional logic Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic. Using predicate logic: Representing simple facts in logic	8
4	Resolution, Natural Deduction, Learning: Forms of Learning; Inductive learning; Learning decision trees; Ensemble learning; Computational learning theory	8
5	Statistical learning, Maximum likelihood parameter learning, Bayesian parameter learning, passive reinforcement learning, active reinforcement learning	7

Note 1: All units will have internal choice
Note 2: Three Assignments are evaluated for 5 marks:
Assignment – I from Units 1 and 2.
Assignment – II from Units 3 and 4 .
Assignment -III from Unit 5

Course Outcomes:
After the completion of course, the students will be able to:

CO1: Describe the modern view of AI as the study of agents that receive percepts and perform actions.
CO2: Apply AI search Models and Generic search strategies.
CO3: Write Logic for representing Knowledge and Reasoning of AI systems.
CO4: Design different learning algorithms for improving the performance of AI systems.
CO5: Implement projects using different AI learning techniques

COs	**Mapping with POs**
CO1	PO1,PO2,PO12
CO2	PO1,PO2,PO12
CO3	PO1,PO2,PO4,PO6,PO12
CO4	PO1,PO2,PO3,PO4,PO12
CO5	PO1,PO2,PO3,PO4,PO6,PO12

TEXT BOOKS:

1."Artificial Intelligence: A Modern Approach " by Stuart Russel, PeterNorvig, 2nd Edition, Pearson Education, 2003.

2."Artificial Intelligence" by Elaine Rich, Kevin Knight, Shivashankar B Nair: Tata MCGraw Hill 3rd edition. 2013

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).

E Books:

1. Practical Artificial Intelligence Programming With Java,Third Edition ,Mark Watson
2. Artificial Intelligence Lecture Notes MIT.

MOOCs:1. Artificial Intelligence -http://www.nptelvideos.in/2012/11/artificial-intelligence.html

Sub Title : BIG DATA AND ANALYTICS LAB		
Sub Code:18ISL75	**No of Credits : 0:0:1(L:T:P)**	**No. of Lecture Hours/Week : 02**
Exam Duration : 3hours	**Exam Marks :CIE + SEE = 50 + 50 =100**	

Course Objectives:

1. To understand the concept of Big data with hands on.
2. Understand installation of various Big data tools under Hadoop.
3. To apply Hadoop concepts to various applications and NoSQL implementation.

I. LIST OF PROGRAMS

1.Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system. You will use the hadoop fs command when interacting with HDFS.

a. Review the commands available for the Hadoop Distributed File System:
b. Copy file foo.txt from local disk to the user's directory in HDFS
c. Get a directory listing of the user's home directory in HDFS
d. Get a directory listing of the HDFS root directory
e. Display the contents of the HDFS file user/fred/bar.txt

2. Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system. You will use the hadoop fs command when interacting with HDFS.

a. Move that file to the local disk, named as baz.txt
b. Create a directory called input under the user's home directory
c. Delete the directory input old and all its contents
d. Verify the copy by listing the directory contents in HDFS.

3. Demonstrate word count on an input file using MapReduce program.

4. Using movie ratings data, Develop the queries in Hive for the following-

a. List all the Users who have rated the movies (Users who have rated at least one movie)
b. List of all the User with the max, min, average ratings they have given against any movie
c. List all the Movies with the max, min, average ratings given by any user

5. In this program you will use HiveQL to filter and aggregate click data to build facts about user's movie preferences. The query results will be saved in a staging table used to populate the Oracle Database.

The moveapp_log_json table contains an activity column. Activity states are as follows:

- RATE_MOVIE
- COMPLETED_MOVIE
- PAUSE_MOVIE
- START_MOVIE
- BROWSE_MOVIE
- LIST_MOVIE
- SEARCH_MOVIE
- LOGIN
- LOGOUT
- INCOMPLETE_MOVIE.
- PURCHASE_MOVIE

a. Write a query to select only those clicks which correspond to starting, browsing, completing, or purchasing movies. Use a CASE statement to transform the RECOMMENDED column into integers where 'Y' is 1 and 'N' is 0. Also, ensure GENREID is not null. Only include the first 25 rows.

b. Write a query to select the customer ID, movie ID, recommended state and most recent rating for each movie.

6. The moveapp_log_json table contains an activity column. Activity states are as follows:

- RATE_MOVIE
- COMPLETED_MOVIE
- PAUSE_MOVIE
- START_MOVIE
- BROWSE_MOVIE
- LIST_MOVIE
- SEARCH_MOVIE
- LOGIN
- LOGOUT
- INCOMPLETE_MOVIE.

a. Load the results of the previous two queries into a staging table. First, create the staging table:

b. Next, load the results of the queries into the staging table.

7. Write R program to:

a. Create two matrices and perform multiplication & division on those matrices.

b. Create a data frame and print the: data frame, structure of data frame and summary of data frame.

c. Create a Bar chart and sketch the Bar chart by taking months as input & plot it against revenue. Also, add legend to the chart that includes regions.

II. OPEN ENDED QUESTIONS

1. Installation and Configuration of Hadoop software on stand alone system.
2. Installation and Configuration of Hadoop software on Ubuntu cluster system.
3. Highest temperature year wise using MapReduce.

NOTE:

1. **STUDENT IS PERMITED TO SUBMIT OPEN ENDED SOLUTION TO ANY OTHER OPEN ENDED QUESTION APART FROM THE LIST ABOVE . BUT IT HAS TO BE APPROVED BY THE STAFF IN CHARGE.**

2. **STUDENT IS REQUIRED TO EXECUTE ONE PROGRAM FROM PART A and ONE PROGRAM FROM PART B .**

Course Outcomes:
After the completion of course, the students will be able to:
CO1: Elucidate installation of various Big data tools under Haoop.
CO2: Implement HiveQL statements.
CO3: Differentiate between SQL and NoSQL commands.

COs	**Mapping with POs**
CO1	PO2,PO5,PO7,PO11
CO2	PO5, PO7,PO12
CO3	PO7,PO9,PO10,PO12

Subject : SOFTWARE TESTING LAB.		
Sub Code:18ISL76	**No. of Credits : 0:0:1**	**No. of lecture hours/week : 02**
Exam Duration : 3 hours	**CIE + SEE = 50 + 50 =100**	

Course objectives:

1. Analyse the requirements for the given problem statement
2. Design and implement various solutions for the given problem
3. Employ various design strategies for problem solving.
4. Construct control flow graphs for the solution that is implemented
5. Create appropriate document for the software artifact

I. LIST OF PROGRAMS

1. Design and develop a program in a language of your choice to solve the triangle problem.

1. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on boundary-value analysis, execute the test cases and discuss the results.

2. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.

3. Design, develop, code and run the program in any suitable language to implement the NextDate function. Analyze it from the perspective of boundary value testing, derive different test cases, execute these test cases and discuss the test results.

4. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle,isosceles triangle, scalene triangle, or they do not form a triangle at all. Assume that the upper limit for the size of any side is 10. Derive test cases for your program based on equivalence class partitioning, execute the test cases and discuss the results.

5. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of equivalence class testing,derive different test cases, execute these test cases and discuss the test results.

6. Design, develop, code and run the program in any suitable language to implement the NextDate function. Analyze it from the perspective of equivalence class value testing, derive different test cases, execute these test cases and discuss the test results.

7. Design and develop a program in a language of your choice to solve the triangle problem defined as follows: Accept three integers which are supposed to be the three sides of a triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all. Derive test cases for your program based on decision-table approach, execute the test cases and discuss the results.

8. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of decision table-based testing, derive different test cases, execute these test cases and discuss the test results.

9. Design, develop, code and run the program in any suitable language to solve the commission problem. Analyze it from the perspective of dataflow testing, derive different test cases, execute these test cases and discuss the test results.

10. Design, develop, code and run the program in any suitable language to implement the binary search algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.

11. Design, develop, code and run the program in any suitable language to implement the quicksort algorithm. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results.

12. Design, develop, code and run the program in any suitable language to implement an absolute letter grading procedure, making suitable assumptions. Determine the basis paths and using them derive different test cases, execute these test cases and discuss the test results

II. OPEN ENDED QUESTIONS

1. Study of testing tool (e.g. winrunner)
2. Study of web testing tool (e.g. selenium)
3. Study of bug tracking tool (e.g. bugzilla)
4. Study of any test management tool (e.g. test director)
5. Study of any open source testing tool (e.g. test link)

NOTE :

1. Student is permitted to submit open ended solution to any other open ended question apart from the list above . but it has to be approved by the staff in charge.
2. In the examination each student picks one question from a lot of all 12 questions.

Sub Title : PROJECT WORK PHASE -I		
Sub Code:18 ISP77	**No. of Credits: 2**	

Sub Title : INTERNSHIP		
Sub Code:18 ISI78	**No. of Credits: 2**	

VIII SEMESTER

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.