Detailed Scheme and Syllabus

ACADEMIC YEAR 2023-2024

III - IV (2022-2026 BATCH) (160Credits)

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

PROGRAM SPECIFIC OUTCOMES(PSOS)

PSO1: Students should be able to develop and optimize solutions for information systems employing fundamentals of mathematics, Hardware, software, data storage, security and communication networks.

PSO2: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.

PSO3: 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-560056
Outcome Based Education(OBE) and Choice Based Credit System
B.E. in Information Science & Engineering
Scheme of Teaching and Examination effective from the Academic Year 2023-24

III SEMESTER

Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	BSC	22MAT301IS	Mathematics for Computer Science	Maths	3	2	0		03	50	50	100	4
2	IPCC	22 ISU302	Digital Design and Computer Organization	ISE	3	0	2		03	50	50	100	4
3	IPCC	22 ISU303	Operating Systems	ISE	3	0	2		03	50	50	100	4
4	PCC	22IST304	Data Structures using C/C++	ISE	3	0	0		03	50	50	100	3
5	PCCL	22ISL305	Data Structures Lab	ISE	0	0	2		03	50	50	100	1
6	ESC	22IST306x	ESC/ETC/PLC	ISE	3	0	0		03	50	50	100	3
7	UHV	22HST307	Social Connect and Responsibility	Any Department	0	0	2		01	100	---	100	1
8	AEC/ SEC	22IST308x or 22ISL308x	Ability Enhancement Course/Skill Enhancement Course – III		If the course is a Theory: 1	0	0		01	50	50	100	1
					If a course is a laboratory: 0	0	2		02				
9	HS	22CDN309	Aptitude and Verbal Ability Skill-I	Placement Cell	2	0	0		--	50	--	50	PP/NP
10	MC	22NSN310	National Service Scheme (NSS)	NSS coordinator	0	0	2		--	100	---	100	PP/NP
		22PEN310	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		22YON310	Yoga	Yoga Teacher									
									Total	550	350	900	21

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: Ability Enhancement Course, **SEC**: Skill Enhancement Course, **L:** Lecture, **T**: Tutorial, **P**: Practical, S= Self-Study, **CIE**: Continuous Internal Evaluation, **SEE**:Semester End Evaluation. K: This letter in the course code indicates common to all the streams of Engineering. ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course

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Engineering Science Course (ESC/ETC/PLC) 22XXT306x			
22IST306A	OOPs with Java	22IST306C	
22IST306B	OOPs with C++	22IST306D	
Ability Enhancement Course – III 22XXT308x **OR** 2XXL308x			
22ISL308A	Data analytics with excel	22IST308C	Version Controlling with GIT
22ISL308B	R Programming	22IST308D	Data Visualization with Python

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching– Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education(PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first Week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the Degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of Degree.

Dr.Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education(OBE) and Choice Based Credit System
B.E. in Information Science & Engineering
Scheme of Teaching and Examination effective from the Academic Year 2023-24

IV SEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory	Tutorial	Practical/ Drawing	Self - Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC	22IST401	Analysis & Design of Algorithms	ISE	3	0	0		03	50	50	100	3
2	IPCC	22ISU402	Advanced Java	ISE	3	0	2		03	50	50	100	4
3	IPCC	22ISU403	Data Base Management Systems	ISE	3	0	2		03	50	50	100	4
4	PCCL	22ISL404	Analysis & Design of Algorithms Lab	ISE	0	0	2		03	50	50	100	1
5	ESC	22IST405x	ESC/ETC/PLC	ISE	3	0	0		03	50	50	100	3
6	AEC/ SEC	22IST406x or 22ISL406x	Ability Enhancement Course/Skill Enhancement Course- IV	TD and PSB: Concerned department	If the course is Theory				01	50	50	100	1
					1	0	0						
					If the course is a lab				02				
					0	0	2						
7	BSC	22BIT407	Biology For Engineers	TD / PSB: BT, CHE,	2	0	0		03	50	50	100	2
8	UHV	22HST408	Universal human values course	Any Department	1	0	0		01	50	50	100	1
9	HS	22CDN409	Aptitude and Verbal Ability Skill-II	Placement Cell	2	0	0		--	50	--	50	PP/ NP
10	MC	22NSN410	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	PP/ NP
		22PEN410	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		22YON410	Yoga	Yoga Teacher									
								Total		500	400	900	19

PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, MC: Mandatory Course (Non-credit), AEC: Ability Enhancement Course, SEC: Skill Enhancement Course, L: Lecture, T: Tutorial, P: Practical, S= Self-Study, CIE: Continuous Internal Evaluation, SEE: Semester End Evaluation. K : This letter in the course code indicates common to all the stream of engineering.

Engineering Science Course (ESC/ETC/PLC) 22XXT405x OR 22XXL405x			
22IST405A	Discrete Mathematical Structure	22IST405E	Optimization Techniques
22IST405B	Unix Shell Programming	22IST405D	Graph Theory and Networks
Ability Enhancement Course / Skill Enhancement Course – IV 22XXT405x OR 22XXL406x			
22ISL406A	Green IT and Sustainability	22ISL406C	Technical writing using LATEX
22IST406B	UI/UX	22XXX406D	

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not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses is mandatory for the award of Degree.

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

III Semester

Course Title	**Mathematics-1II for Computer Science and Engineering stream/AIML Probability and Statistical Inference.**							
Course Code	**22MAT301B**							
Category	**ASC (Applied Science Course)**							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	03	02	00	00	04	50	00	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks = 100**		**Duration of SEE: 03 Hours**			

COURSE LEARNING OBJECTIVES
This course is proposed to impart to the students the skills to identify and solve real life problems in their field of study involving the application of the concepts of probability, statistical inferences and ANOVA testing.

Unit	Syllabus content	No. of hours	
		Theory	**Tutorial**
I	**Probability Distributions:** Recap of Random Variables. Probability generating function, moment generating function, expectations. Discrete probability distributions-Binomial, Poisson and Geometric distributions; Continuous probability distributions-Exponential, Normal and Weibull distributions. **Self-study*:*** Gamma distributions. **Applications**: Transmission errors in noise media. (RBT levels: **L1, L2, L3, L4**)	04	04
II	**Two dimensional Random variables:** Joint probability mass function, Marginal probability function,conditional probability function. **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. **Self-study**: Joint density function, marginal density function, conditional probability density function, covariance, correlation coefficient. **Application**: Bayesian network. (RBT levels: **L1, L2, L3, L4**)	04	04
III	**Statistical Inference:** Introduction sampling distribution standard errors, level of significance, confidence limits for sampling of attributes, test of significance for large samples. Comparison of large samples, central limit theorem, confidence limit for unknown mean, testing of mean of large two samples, students *t*-distribution , chi-square distribution. **Self-study:** *F*-distribution. **Application:** Goodness of fitness	04	04

	(RBT levels: **L1, L2, L3, L4**)		
IV	**Markov Chain:** Introduction to Stochastic Process, Probability Vectors, Stochastic matrices, Markov chains, Higher transition probabilities, Stationary distribution of Regular Markov chains and absorbing states. **Self-study:** Regular stochastic matrices **Applications**: model the behaviour of stock prices, spread of a disease through a population, birth-death process. (RBT levels: **L1, L2, L3, L4**)	04	04
V	**Design of Experiments & ANOVA :** Principles of experimentation in design, Analysis of completely randomized design, randomized block design. The ANOVA Technique, basic principle of ANOVA, One way ANOVA, Two-way ANOVA. **Self-study**: latin-square design. **Applications**: to determine the best materials to use to build a product for a customer, to test effectiveness of different marketing strategies. (RBT levels: **L1, L2, L3, L4**)	04	04

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

CO1	**Learn** a mathematical tool to estimate the life time for a system and also time of failure.
CO2	**Predict** most suitable distributions, happening of favorable event**.**
CO3	**Analyze** the statistical inferences and the basics of Hypothesis testing with emphasis on some commonly encountered hypothesis.
CO4	**Employ** the knowledge of probability, joint probability distributions, Markov chain in pattern recognition.
CO5	**Apply** ANOVA testing to determine significant effect of input on the system's response.

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

Assignment: Python programmers on in Units-I to V to be given as assignment using the Textbook indicated in item 5 below.

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TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers 44th Ed., 2018.
2. Kishore S. Trivedi, Probabilty and Statistics with Reliability, Queuing and Computer Science Applications, Wiely India publication, 2nd ED., 2008
3. Sundaran Pillai, Probabililty, Statistics and Queuing theory, PHI, 2009.
4. G. Haribaskaran, Prbabiltly Queuing Theory and Reliability Engineering, 2nd Ed., 2006.
5. Peter Bruce, Andrew Bruce and Peter Gedeck, Practical Statistics for Data Scientists, O'REILLY, 2Ed., 2020.

REFERENCE BOOKS

1. V. Ramana, Higher Engineering Mathematics, McGraw–Hill Education, 11th Ed., 2017.
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 3rd Ed., 2016.
3. C. Ray Wylie, Louis C. Barrett**,** Advanced Engineering Mathematics, McGraw Hill Book Co., New York, 6th Ed., 2017.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publication, 3rd Ed., 2014.

Web links and Video Lectures (e-Resources)

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU e-Shikshana Program
5. VTU EDUSAT Program

CO-PO MAPPING

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DIGITAL DESIGN AND COMPUTER ORGANIZATION**						
Course Code	**22 ISU302**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**02**	**00**	**05**	**60**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. To understand and apply minimization techniques for designing optimized digital
2. To analyze and design cost effective combinational and sequential circuits for given problems.
3. To understand basic structure of computer , instruction execution and addressing modes .
4. Gain knowledge of memory system

UNIT I **08 hours**

Boolean function Simplification : Karnaugh Map: Pairs, Quads, and Octets , Karnaugh Simplifications for 4 variables, Don't-care Conditions, Product-of-Sum, Product-of-sums Simplification, Quine McCluskey method .

Data-Processing Circuits: Multiplexers, Demultiplexers, 1-of-16 Decoder, Encoders, Magnitude Comparator.

Text book 1: Ch 3: 3.1 to 3.9. Ch 4:4.1,4.2,4.3,4.6,4.9,4.14

Laboratory Components:

1. Simplify given boolean function using K-Map method and verify the truth table.
2. Given any 4-variable logic expression, simplify using multiplexer IC and verify truth table.
3. Design full adder using 3-to-8 decoder IC and 4 input NAND gates and verify truth table.
4. Design 1 bit magnitude comparator and verify the truth table.

UNIT II **08 hours**

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 of FLIP-FLOPs:A Synthesis Example, HDL Implementation of Flip-flops.

Text book 1:Ch 8:8.1 to8.8, 8.10,8.12

Registers: Types of Registers, Applications of Shift Registers and Implementation using VHDL.
Text book 1: Ch 9: 9.1,9.7

Laboratory Components

1. Write the VHDL code for D Flip-Flop with positive-edge triggering. Simulate and verify it's working.
2. Write the VHDL code for JK Flip-Flop with negative -edge triggering. Simulate and verify it's working
3. Design and implement a ring counter using 4-bit shift register IC 7495.
4. Write VHDL code for switched tail counter. Simulate and verify it's working.

UNIT III 08 hours

Counters: Asynchronous Counters ,Synchronous Counters, Decade Counters, Counter Design as a Synthesis problem.

T1:Ch10: 10.1,10.3,10.5,10.7,10.9

Laboratory Components:

1. Design and implement an asynchronous counter using decade counter IC 7490 to count up from 0 to 9 Display the count value on 7 segment LED display using BCD to 7 segment code converter IC.
2. Write VHDL code for mod-8 up counter. Simulate and verify it's working.

UNIT IV 08 hours

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Instruction Set: CISC and RISC. Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Assembly Language.

Text book 2:Chapter 1-1.1,1.2,1.3,1.4,1.6.5

Chapter 2- 2.2,2.3,2.4,2.5,2.6

Laboratory Component:

1. Demonstration of parts of computer.

UNIT V 07 hours

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.

Text book 2: Ch 5 – 5.1 to 5.7, 5.9.

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

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

CO1: Apply K-map/Quine McClusky minimization methods to simplify Boolean functions .

CO2: Design and analyze working of combinational /data processing circuits.

CO3 : Design and analyze working of sequential circuits & their VHDL implementation.

CO4: Analyze functional units of a computer, its operational concepts, addressing modes, internal organization of a system through an assembly language.

CO5: Analyze memory unit including SRAM, DRAM, cache mapping techniques and basics of virtual memory.

TEXT BOOKS:

1.Donald P Leach, Albert Paul Malvino & Goutam Saha: DigitalPrinciples and Applications,7th Edition,Tata McGraw Hill, 2011

2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition,TataMcGrawHill, 2002

REFERENCE BOOKS:

1. Stephen Brown, ZvonkoVranesic:FundamentalsofDigital Logic Design with VHDL, 2nd Edition, Tata McGraw Hill, 2005.

2. Charles H.Roth: Fundamentals of Logic Design, Jr., 5th Edition,Thomson,2004

EBOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in
2. http://freevideolectures.com/Course/2277/Computer-Organization#

SCHEME FOR EXAMINATIONS:

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3										2		2
CO2		3	3	3									2		2
CO3		3	3	3			2						2	1	2
CO4	3	3											2		
CO5	2	3	3	3									2		

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**OPERATING SYSTEMS**						
Course Code	**22ISU303**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**02**	**00**	**05**	**60**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. 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 I : **07 hours**

Introduction: What operating systems do, Computer-System Architecture, Operating System Structure, Operating System Operations, Process Management, Memory Management, Storage Management, Protection and Security.
T1:1.1 to 1.9.

System Structures: Operating System Services, User Operating System Interface, System Calls, Types of System Calls, System Programs, Operating System Structure;
T1: 2.1 to 2.7.

Processes: Process Concept, Process Scheduling, Operations on Processes, Inter process Communication; Multithreaded Programming: Multithreading Models;
T1: 3.1 to 3.4, 4.1 to 4.3.

Laboratory Component:

1. Implementation of basic UNIX commands using file APIs- Write a program to implement commands ls(-l option), cp, rm and mv using UNIX file APIs.
2. Process control system calls-Application to demonstrate use of fork, execve, wait, getpid, exit system calls

UNIT II **08 hours**

Process Synchronization: The Critical Section Problem, Peterson‟s Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples;
T1:5.1 to 5.9.

CPU Scheduling : Scheduling Criteria , Scheduling Algorithms , Thread Scheduling, Multiple-Processor

Scheduling , Real-Time CPU Scheduling ,Operating-System Examples.
T1: 6.1 to 6.7.

Dead locks: System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance and detection, Recovery from Deadlock

Laboratory Component:

1. Process/Thread synchronization - Application to demonstrate process/thread synchronization using semaphor mutex. Implement Dining philosophers problem, reader-writer and producer-consumer.
2. Write a program that implements the Bankers' algorithm for deadlock avoidance. The program should check for safe sequence and resource request algorithm
3. To write a program for implementation of Priority scheduling algorithms.
4. write a program for implementation of FCFS and SJF scheduling algorithms.

UNIT III **09 hours**

Memory Management Strategies:

Main Memory: Background, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Structure of Page Table.
T1: 8.1 to 8.6.

Virtual Memory Management: Background, Demand Paging, Copy on Write, Page Replacement, Allocation of frames, Allocating Kernel Memory.
T1: 9.1 to 9.8

Laboratory Component:

1. Memory management: Write a program to simulate Buddy memory allocation algorithm.
2. write a program to implement IPC using shared memory.
3. write a program to implement LRU page replacement algorithm.

UNIT IV **07 hours**

File System: File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection;
T1: 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: 12.1 to 12.7.

Mass storage structures, protection: Mass storage structures; Disk structure; Disk attachment, Disk scheduling; Disk management; Swap space management.
T1: 10.1 to 10.6

Laboratory Component:

1. Write a program to organize the file using single level directory.
2. Write a program for sequential file for processing the student information.

UNIT V **08 hours**

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: 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
T1:15.1 to 15.8

Laboratory Component:

1. Write a program to Simulate disk scheduling algorithms- Scan,C-Scan.

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

COURSE OUTCOMES: On completion of the course, student should 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 Storage Structures and Implement Customized Case study.
CO5: Apply various protection and security techniques.

TEXT BOOK:

1. 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.

SCHEME FOR EXAMINATIONS:

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MAPPING of COs with POs and PSOs

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	DATA STRUCTURES WITH C						
Course Code	**22IST304**						
Category	Professional Core Course (PCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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 I **7 hours** **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**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**
UNIT II **7 hours** **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 **Queues:** Definition, Array Representation, Queue Operations, Circular Queues, Circular queues using Dynamic arrays, Dequeues, Priority 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**
UNIT III **9 hours** **Linked Lists:** Definition, Representation of linked lists in Memory, Memory allocation; 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**
UNIT IV **8 hours** **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

UNIT V **8 hours**

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.

T 1: Ch 7, Ch 8: 8.1,Ch 9: 9.1, 9.2, 9.3

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

COURSE OUTCOMES:

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.

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:

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.

EBOOKS/ONLINE RESOURCES

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

SCHEME FOR EXAMINATIONS:

Professional Core Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		3						3		3	3		
CO2	3	3		3						3		3	3		
CO3	3	3		3						3		3	3		
CO4	3	3		3						3		3	3		
CO5	3	3		3						3		3	3		
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	DATA STRUCTURES LAB						
Course Code	**22ISL305**						
Category	Professional Core Course (PCCL)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. To understand design and implement the concept of stack using recursive techniques.
2. Implement the application of stacks in converting an expression from infix to postfix notation and evaluate postfix
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 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.
ii. Display the status of SLL and count the number of nodes in it
iii. Perform Insertion at End of SLL
iv. Perform Deletion at End of SLL
v. Exit

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

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.*
ii. Display the status of SLL and count the number of nodes in it
iii.Perform Insertion at End of SLL
vi. Perform Deletion at front end of SLL
v. 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 operationson 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*.
ii.Display the status of DLL and count the number of nodes in it.
iii.Perform Insertion and Deletion at End of DLL.
iv.Perform Insertion and Deletion at Front of DLL.
v.Exit

9. Design, Develop and Implement a menu driven Program in C for the following operationson Binary Search Tree (BST) of Integers .

i.Create a BST of N Integers: 6, 9, 5, 2, 8, 15, 24, 14, 7, 8, 5, 2
ii.Traverse the BST in Inorder, Preorder and Post Order
iii.Search the BST for a given element (KEY) and report the appropriate message
iv.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://cs1-iith.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

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

COURSE OUTCOMES:

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.

SCHEME FOR EXAMINATIONS:

Professional Core Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3		3						3		3	3		
CO2	3	3		3						3		3	3		
CO3	3	3		3						3		3	3		
CO4	3	3		3						3		3	3		
CO5	3	3		3						3		3	3		
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**OOPs with Java**						
Course Code	**22IST306A**						
Category	**Engineering Science Course (ESC/ETC/PLC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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 I :

07 hours

Introduction to Java, Classes,: 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. Classes: Classes fundamentals; Declaring objects **T1:Ch1,2,3,4,5,6**

UNIT II: **08 hours**

Classes: Constructors, this keyword, garbage collection.
Inheritance: inheritance basics, using super, creating multi-level hierarchy, method overriding. **Exception handling:** Exception handling in Java. **T1: T1 :Ch 6 , Ch 7, Ch 8 , Ch10**

UNIT III: **09 hours**

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

UNIT IV: **07 hours**

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; 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 Fra Windows, Introducing Graphics, Working with Color **T1:**Ch 22 , Ch 23

UNIT V : **08 hours**

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**

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

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

CO1: To understand OOPs concepts/ principles in JAVA.
CO2: To identify java languge components & how they work together in application
CO3: To design and program stand alone java application .
CO4: To apply knowledge of AWT to develop UI.
CO5: To design graphical UI with JAVA swings .

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.
6. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies

SCHEME FOR EXAMINATIONS:

Engineering Science Course (ESC/ETC/PLC) shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO	PO	PO4	PO5	PO6	PO	PO	PO9	PO10	PO1	PO1	PSO	PSO	PSO
CO	2	2	2		2								2	2	
CO	2	2	2		2	2							2	2	
CO			2		2	2							2	2	
CO	2	2	2	2	2								2	2	
CO	2	2	2	2	2								2	2	
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**OOPs with C++**						
Course Code	22IST306B						
Category	**Engineering Science Course (ESC/ETC/PLC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. Understand concepts of Object Oriented Programming and design programs using classes and objects for C++ .
2. Construct applications to provide flexible options for the creation of new definitions for some of the operators.
3. Specifying mechanism of deriving a new class from older classes through inheritance.
4. Implement methods to select appropriate member function during run time.
5. Design programs using Templates, exceptions and handle file I/Os

UNIT I **08 hours**

Introduction: Overview of C++, Sample C++ program, Console I/O , variables in C++, statements, arrays and strings, pointers & user-defined types, Function Components, argument passing, inline functions, function overloading. **Classes & Objects**–I: Class Specification, Class Objects, Scope resolution operator, Access members, Defining member functions, Data hiding, Constructors, Destructors, Parameterized constructors, Static data members and static member Functions.**T1: Ch 11, Ch 12,Ch 14 (selective topics only)**

UNIT II **08 hours**

Classes & Objects –II: Friend functions, Passing objects as arguments, Returning objects, Arrays of objects, Dynamic objects, Pointers to objects, Copy constructors, Generic functions and classes, Applications.**Operator overloading** : operator member functions to overload +, - , pre-increment, post-increment, pre-decrement, post decrement operators , friend operator function to overload << and >> operators T1: Ch 12 & Ch 13, Ch 15 , Ch 20 **(selective topics only)**

UNIT III **08 hours**

Inheritance-I: Base Class Access control , Inheritance and protected members, Protected base class inheritance, Inheriting multiple base classes, Constructors, Destructors and Inheritance, Passing parameters to base class constructors, Granting access, Virtual base classes.T1:Ch16

UNIT IV **08 hours**

Virtual functions: Virtual function, Calling a Virtual function through a base class reference, Virtual attribute is inherited, Virtual functions are hierarchical, Pure virtual functions, Abstract classes, Using virtual functions.**Polymorphism:** Early and late binding. T1:Ch17

UNIT V **07 hours**

Exception Handling: Exception handling fundamentals, Exception handling options.**C++ File I/O:** fstream and the File Classes, Opening and Closing a File, Reading and Writing Text Files, Unformatted and Binary I/O, Characters vs. Bytes, put( ) and get( ), read( ) and write( ), More get( ) Functions, getline( ) , Detecting EOF, The ignore( ) Function, peek( ) and putback( ), flush( ), Random Access, Obtaining the Current File Position , I/O Status, Customized I/O and Files.Introducing the Standard Template Library: An overview of STL : containers, vectors, lists, maps.T1: Ch 19, Ch 21,Ch 24(selective topics only)

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

Course Outcomes:

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

CO1: Understand principles of Object Oriented Programming.
CO2: Identify classes and objects in real world applications.
CO3: Develop applications by providing new definitions for some of the operators/functions.
CO4: Design and develop applications through inheritance, Virtual Base classes and dynamic polymorphism.
CO5: Apply concepts of Templates, Exceptions and File handling in designing programs.

TEXT BOOKS:

Herbert Schildt: C++ The Complete Reference, 4th Edition, Tata McGraw Hill, 2014

REFERENCE BOOKS:

1. Stanley B.Lippmann, Josee Lajore: C++ Primer, 4th Edition, Addison Wesley, 2005.
2. Paul J Deitel, Harvey M Deitel: C++ for Programmers, Pearson Education, 2009.
3. K R Venugopal, Rajkumar Buyya, T Ravi Shankar: Mastering C++, Tata McGraw Hill, 1999.
4. Sourav Sahay: Object-Oriented Programming with C++, Oxford University Press, 2006.

EBOOKS/ONLINE RESOURCES

1. http://www.nptel.ac.in

SCHEME FOR EXAMINATIONS:

Engineering Science Course(ESC/ETC/PLC) shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3	3										2		2
CO2		3	3	3									2		2
CO3		3	3	3									2	1	2
CO4		3											2		
CO5		3	3	3									2		
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DATA ANALYTICS WITH EXCEL**						
Course Code	**22IST308A**						
Category	**Ability Enhancement Course -III(AEC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	00	00	00	01	15	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVE:

1. Create flexible data aggregations using pivot tables.
2. Represent data visually using pivot charts.
3. Calculate margins and other common ratios using calculation on pivot table.
4. Filter data using slicers in multiple pivot tables.
5. Create aggregate reports using formula based techniques.

UNIT I **3 hours**

Introduction to Excel: About Excel & Microsoft, Uses of Excel, Excel software, Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, the Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook & sheets

Columns & Rows: Selecting Columns & Rows, Changing Column Width & Row Height, Autofitting Columns & Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and paste special

UNIT II **3 hours**

Functionality Using Ranges: Using Ranges, Selecting Ranges, Entering Information Into a Range, Using AutoFill

Creating Formulas: Using Formulas, Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum,

UNIT III **3 hours**

Advance Formulas : Concatenate, Vlookup, Hlookup, Match, Countif, Text, Trim

Spreadsheet Charts: Creating Charts, Different types of chart, Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table

UNIT IV **3 hours**

Data Analysis: Sorting, Filter, Text to Column, Data Validation

PivotTables: Creating PivotTables, Manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, Displaying a PivotChart, Setting PivotTable Options, . Adding Subtotals to PivotTables

UNIT V **3 hours**

Spreadsheet Tools: Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting Spreadsheets Renaming Spreadsheets, Splitting the Screen, Freezing Panes, Copying and Pasting Data

between Spreadsheets, Hiding , Protecting worksheets
Making Macros: Recording Macros, Running Macros, Deleting Macros

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

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

CO 1: Apply analytical excel skills and tools in business problem solving.
CO 2: Organize the data for effective analysis.
CO 3: Help in identifying and forecasting trends.
CO 4: Make graphical representation that provides real insight for taking decisions.
CO 5: Equip the students for better internship offers and self-employement.

TEXT BOOKS:

1. A to Z of MS EXCEL: A book for learners and trainers kindle edition by Rinkoo Jain ASIN: B08WPMFWXM.

REFERENCE BOOKS:

2. Excel 20019 All-in-one: Master the new features of Excel 2019/Office 365 paperback by Lokesh Lalwani BPB Publication.
3. Microsoft Excel 2019: Data Analysis & Business Model Paperback by L Winston Wayner PHI.

EBOOKS/ONLINE RESOURCES

Weblinks and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=9AOHwmmq5ug&list=PLNLDEHOJTZSjcyfFIwPP1g31WLoJCyTPw
2. https://www.youtube.com/watch?v=v2oNWja7M2E&list=PLmejDGrsgFyBCxF37lewZtX6c1kJXyLt3
3. https://www.youtube.com/watch?v=OOWAk2aLEfk&pp=ygUbZGF0YSBhbmFseXRpY3MgdXNpbmcgZXhjZWwg
4. **https://www.youtube.com/watch?v=s1v5UwM56yM&pp=ygUbZGF0YSBhbmFseXRpY3MgdXNpbmcgZXhjZWwg**

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	2	-	-	-	-	-	-	1	2	-	1
CO2	1	3	-	-	2	-	-	-	-	-	-	1	2	-	1
CO3	1	3	1	-	2	-	-	-	-	-	-	1	2	-	1
CO4	1	-	3	-	2	-	-	-	-	-	-	1	2	-	1
CO5	1	-	2	-	1	-	-	-	-	-	-	1	2	-	1

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**R PROGRAMMING**						
Course Code	**22IST308B**						
Category	**Ability Enhancement Course-III(AEC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	**00**	**00**	**00**	**01**	**15**	**01**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVES:

1. Explore and understand how R and R Studio interactive environment.
2. To learn and practice programming techniques using R programming.
3. Read Structured Data into R from various sources.
4. Understand the different data Structures, data types in R.
5. To develop small applications using R Programming

UNIT I	**3 hours**
Setting up :Installing R, Starting R, Working directory, Writing scripts. R as a calculating Environment, Arithmetic, Variables, Functions, Vectors, Expressions and assignments, Logical expressions, Matrices	
UNITII	**3 hours**
Basic programming: Introduction, Branching with if, Looping with for, Looping with while, Vector-based programming, Input and output:Text ,Input from a file, Input from the keyboard, Output to a file ,Plotting,	
UNITIII	**3 hours**
Programming with functions, Functions, Scope and its consequences, Arguments, Vector-based programming using functions, Recursive programming. Sophisticated data structures: Factors, Dataframes ,Lists, The apply family	
UNITIV	**3 hours**
Better graphics: Introduction, Graphics parameters, Graphical augmentation, Mathematical typesetting, Permanence, Grouped graphs:lattice,3D plots.	
UNITV	**3 hours**
Pointers to further programming techniques: Packages, Frames and environments, Debugging again, Identifying bottlenecks, Object-oriented programming, Manipulation of data, Compiled code	

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

COURSE OUTCOMES: On completion of the course, student should be able to:
CO1: Understand the fundamental syntax of R through readings, practice exercises.
CO2: Demonstrate, and write R code.

CO3: Apply critical programming language concepts such as data types, iteration,
CO4: Explore control structures, functions, and Boolean operators by writing R rograms
and through examples
CO5: Design and Develop Solutions to problems using R programming

TEXT BOOKS

1. Jones, O., Maillardet. R. and Robinson, A. (2014). Introduction to Scientific Programming and Simulation Using R. Chapman & Hall/CRC, The R Series.

REFERENCE BOOKS

1. Michael J. Crawley, "Statistics: An Introduction using R", Second edition, Wiley,2015

ONLINE RESOURCES

1. Wickham, H. & Grolemund, G. (2018). for Data Science. O'Reilly: New York. Available for free at
http://r4ds.had.co.nz

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2		2	-	-	-	-	-	-	-	1	1	1
CO2	3	3	3	2	3	-	-	-	-	-	-	-	1	1	1
CO3	3	2	2	3	3	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-	1	1	1
CO5	3	3	3	2	3	-	-	-	-	-	-	-	1	1	1

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	Version Controlling with GIT						
Course Code	**22IST308C**						
Category	Ability Enhancement Course -III(AEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	**00**	**00**	**00**	**01**	**15**	**01**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVE:

1. Understand the use of basic GiT Commands and File systems
2. Use of Commits, Diffs , Branches and Altering commands.
3. Use of create a local repository, create a commit, create a remote repository and push commits to aremote repository.
4. Understand to write effective commit messages

UNIT I **3 hours**

Introduction: Basic GiT concepts: Basic Concepts, Repositories, Git Object Types ,Index ,Content Addressable Names ,Git Tracks Content ,Pathname Versus Content Object Store Pictures , Git Concepts at Work Object Store Pictures, Git Concepts at Work: git directory ,Objects, Hashes, and Files and Trees

UNIT II **3 hours**

File management and the Index: File Classifications in Git: Using git add, Using git rm ,Using git mv, A Detailed View of Git's Object Model and Files.**Commits:** Identifying Commits: Absolute Commit Names ,refs and symrefs ,Relative Commit Names, Commit History: Viewing Old Commits, Commit Graphs ,Commit Ranges, Finding Commits: Using git bisect , Using git blame , Using Pickaxe

UNIT III **3 hours**

Branches: Branch Names, Using Branches, Creating Branches, Listing Branch Names ,Viewing Branches ,Checking Out Branches, Deleting Branches.

Diffs: Forms of the git diff Command, examples, Simple git diff Example, git diff and Commit Ranges ,git diffwith Path Limiting , Comparing How Subversion and Git Derive diffs.

UNIT IV **3 hours**

Merges: Merge Examples, Working with Merge Conflicts, Merge Strategies.

Altering Commits: Caution About Altering History: Using git reset ,Using git cherry-pick ,Using git revert,reset, revert, and checkout, Rebasing Commits :Using git rebase -i , rebase Versus merge.

UNIT V **3 hours**

Repository Management: Repository Structure, Living with Distributed Development, Knowing YourPlace, Working with Multiple Repositories.

Patches: Why Use Patches? , Generating Patches., Mailing Patches ,Applying Patches ,Bad Patches , Patching Versus Merging,

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

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

CO1. Illustrate how to use Git for real-world development scenarios
CO2. Gain insight into Git's common use cases, initial tasks, and basic functions.
CO3. Apply how to manage merges, conflicts, patches, and diffs.
CO4: Gain insight into merging and commit altering
CO5:Manage Repository

TEXT BOOKS

Version Control with Git, Prem Kumar Ponuthorai, Jon Loeliger, Publisher(s): O'Reilly Media,Inc. 3rd Edition,2022. ISBN: 9781492091196

REFERENCE BOOKS

1. Version Control with Git, 2nd Edition by Jon Loeliger, Matthew McCullough

ONLINE RESOURCES

1. http://elearning.vtu.ac.in/econtent/courses/video/
2. https://nptel.ac.in/courses/106/101/106101060/.
3. http://cse01-iiith.vlabs.ac.in/

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	1	2	
CO2	3	2	2	-	-	-	-	-	-	-	-	-	1	2	
CO3	3	2	2	-	-	-	-	-	-	-	-	-	1	2	
CO4	3	2	2	-	-	-	-	-	-	-	-	-	1	2	
CO5	3	2	2	-	-	-	-	-	-	-	-	-	1	2	
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DATA VISUALIZATION WITH PYTHON**						
Course Code	22IST308D						
Category	Ability Enhancement Course-III (AEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	00	00	00	01	15	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVE:

1. Use data analysis tools in the pandas library

2. Load, clean, transform, merge and reshape data.

3. Handle external files as well as exceptions.

4. Analyze and manipulate time series data.

5. Solve real world data analysis problems.

UNIT I **3 hours**
Introduction: Introduction to Data Science, Exploratory Data Analysis and Data Science Process. Motivation for using Python for Data Analysis, Introduction of Python shell iPython and Jupyter Notebook. **Essential Python Libraries**: NumPy, pandas, matplotlib, SciPy, scikit-learn, statsmodels.
UNIT II **3 hours**
Getting Started with Pandas: Arrays and vectorized conputation, Introduction to pandas Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics.Data Loading, Storage and File Formats.Reading and Writing Data in Text Format, Web Scraping, Binary Data Formats, Interacting with Web APIs, Interacting with Databases Data Cleaning and Preparation. Handling Missing Data, Data Transformation, String Manipulation
UNIT III **3 hours**
Data Wrangling: Hierarchical Indexing, Combining and Merging Data Sets Reshaping and Pivoting.**Data Visualization matplotlib**: Basics of matplotlib, plotting with pandas and seaborn, other python visualization tools.
UNIT IV **3 hours**
Data Aggregation and Group operations: Group by Mechanics, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation.**Time Series Data Analysis**: Date and Time Data Types and Tools, Time series Basics, date Ranges, Frequencies and Shifting, Time Zone Handling, Periods and Periods Arithmetic, Resampling and Frequency conversion, Moving Window Functions.
UNIT V **3 hours**
Advanced Pandas: Categorical Data, Advanced GroupBy Use, Techniques for Method Chaining.

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

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

CO 1: Comprehend the importance of the exploratory data analysis paradigm
CO 2: Understand the fundamental design principles and different types of data visualization
CO 3: Select appropriate data visualization technique for given data
CO 4: Design visualizations for presenting stories from data
CO 5: Apply the fundamental concepts of data visualization to define a project in your field of study

TEXT BOOKS:

1. McKinney, W.(2019). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media
2. 2.O'Neil, C., & Schutt, R. (2021). Doing Data Science: Straight Talk from the Frontline O'Reilly Media

REFERENCE BOOKS:

1. Allen Downey ,Jeffrey Elkner ,Chris Meyers,: Learning with Python, Dreamtech Press
2. David Taieb ,"Data Analysis with Python: A Modern Approach " 1st Edition, Packt Publishing

EBOOKS/ONLINE RESOURCES

Weblinks and Video Lectures (e-Resources):

5. https://www.youtube.com/watch?v=MiiANxRHSv4
6. **https://www.youtube.com/watch?v=_YWwU-gJI5U**
7. **https://www.youtube.com/shorts/NH8Yk3ChI3Q**
8. **https://www.youtube.com/watch?v=5Zg-C8AAIGg**
9. **https://www.youtube.com/watch?v=YaGqOPxHFkc**
10. **https://www.youtube.com/watch?v=3JWK5gRI9p0**

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			1		1									1	
CO2	1		1		1								1	3	
CO3	1	3			3										
CO4	3	3	3		3	1							3		
CO5		1		2	3										1

Strength of correlation: Low-1, Medium- 2, High-3

IV SEMESTER

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**ANALYSIS & DESIGN OF ALGORITHMS**						
Course Code	**22IST401**						
Category	Professional Core Course (PCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. To introduce the concept of an algorithm and understand the methods for analysis.
2. To represent 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 trade offs.

UNIT I **07 hours**

Introduction: Notion of Algorithm, Methods of specifying algorithm, Important problem types:Sorting searching string processing, graph problems,combinatorial problems,, Asymptotic Notations and Basic efficiency classes: Informal introduction ,O- notation, Ω-notation ,Θ- notation, Basic efficiency classes, Mathematical Analysis of Non-Recursive and RecursiveAlgorithms

Brute Force:Introduction, Bubble Sort, Sequential search

Text Book 1:Chapter 1: 1.1,1.3 Chapter 2:2.2,2.3.2.4, Chapter 3:3.1,3.2

UNIT II **08 hours**

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.

Text Book 1 : Chapter 4, 4.1,4.2,4.3 Chapter 5:5.2,5.

UNIT III **09 hours**

Greedy method: The General Method, Knapsack Problem, Minimum cost spanning trees : Prim's Algorithm, Kruskal'sAlgorithm, Single Source Shortest Paths: Dijikstras Algorithm, Huffman trees

Transform and Conquer: Heaps and Heapsort

Text Book 2: Chapter 4 :4.1,4.2,4.4; Text Book 1: Chapter 9 : 9.1,9.2,9.3,9.4 Chapter 6 : 6.4

UNIT IV **07 hours**

Dynamic Programming: Computing binomial coefficient**,**Warshall's and Floyds algorithms, Knapsack problem, Travelling Sales person problem

Backtracking:N-Queen problem, sum of Subset Problem

Text Book 1:Chapter 8 : 8.1,8.2,8.4, Ch 12:12.1 Text Book 2: Chapter 5: 5.9

UNIT V **08 hours**

Branch-and-Bound: Assignment Problem, Traveling Sales man Problem

Space and Time Tradeoffs: Sorting by Counting : Comparison Counting sort ,Distribution Counting

Horspool's algorithm **NP-Complete and NP Hard problems**: P and NP problems,NP complete problems
Text Book 1: Chapter 11: 11.2 , Chapter 7:7.1,7.2 Chapter 10: 10.3

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

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

CO1: Determine performance of recursive and non- recursive algorithms.

CO2: Develop and analyze algorithms to solve problems using various design techniques.

CO3: Apply different design techniques to solve problems.

CO4: Determine solutions to optimization problems by applying suitable algorithm.

CO5: Solve problems associated with space–time tradeoffs

TEXT BOOK:

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:

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

EBOOKS/ONLINE RESOURCES:

https://onlinecourses.nptel.ac.in/

SCHEME FOR EXAMINATIONS:

PCC shall be evaluated both by CIE and SEE. Both Assigment and Group Activity are evaluated for 5 Marks each.Two CIE are conducted each for 25 marks. Total CIE theory test marks of 50 is reduced to 40 Marks and Assignment & Group Activity Marks are added to get final CIE Marks . SEE Theory exam is conducted for 100 marks and then reduced to 50 Marks.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											2	1	
CO2	3	3	2	3									2	1	
CO3	3	3	2	3									2	1	
CO4	3	3	2	3									2	1	
CO5	3	3	2	3									2	1	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**Advanced Java**						
Course Code	**22ISU402**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**02**	**00**	**05**	**60**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. 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 I **08 hours**

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.
Textbook 1: ch- 12
Lab Components:
1.Write Java Program to illustrate the usage of enumerations.

UNIT II **08 hours**

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.Text Book 1: Ch.17
Lab Components:

1. Write Java Programs to illustrate the collection interface

UNIT III **08 hours**

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, 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 Text Book 1: Ch 15

Lab Components:

1. Write Java Programs to illustrate string handling

UNIT IV **08 hours**

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 Text Book 1: Ch 31 Text Book 2: Ch 11

Lab Components:

Write Java Programs to illustrate servlet

UNIT V **07 hours**

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. Text Book 2: Ch 06

Lab Components:

Write Java Programs to illustrate JDBC connectivity

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

COURSE OUTCOMES: On completion of the course, student should 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

TEXT BOOKS:

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.

EBOOKS/ONLINE RESOURCES

https://www.javatpoint.com/what-is-advance-java

SCHEME FOR EXAMINATIONS

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2		2									2	
CO2	2	2	2		2									2	
CO3	2	2	2		2									2	
CO4	2	2	2		2									2	
CO5	2	2	2		2									2	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DATABASE MANAGEMENT SYSTEMS**						
Course Code	**22ISU403**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**02**	**00**	**05**	**60**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. 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 I : **08 hours**

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.

T1:Ch1,2,7

UNIT II **07 hours**

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**T1: Ch 3 , Ch 6.1-6.5 9.1**

UNIT III **09 hours**

SQL :Schema Definition, Basic Constraints and Queries: SQL Data Definition and Data Types; Specifying basi constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Ins Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) SQL**T1:ch4, ch5**

UNIT IV **07 hours**

Database Design: 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

T1: Ch15, ch16

UNIT V **08 hours**

Introduction to Transaction Processing Concepts and Theory:
Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Transaction Support in SQL

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Two-Phase Locking Techniques for Concurrency Control, Multiversion Concurrency Control Techniques, Validation (Optimistic) Concurrency Control Techniques, Granularity of Data Items and Multiple Granularity Locking

T1: Ch 21, Ch 22

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

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

Lab Component:

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, ba 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

COURSE OUTCOMES: On completion of the course, student should be 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 and perform manipulation operations.
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

TEXT BOOK:

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

REFERENCE BOOKS

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

SCHEME FOR EXAMINATIONS:

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3		2								1	2	
CO2	2		2		2								1	1	
CO3		3	3		2				1				2	2	
CO4	2	1	2										1	1	
CO5	2	1	2		2								2	2	
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**ANALYSIS & DESIGN OF ALGORITHMS Lab**						
Course Code	**22ISL404**						
Category	Professional Core Course Lab (PCCL)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	**00**	**02**	**00**	**02**	**26**	**01**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. To introduce various algorithm design techniques.
2. To design algorithms with specific technique and implement these algorithms using the appropriate technique.
3. To enhance the skill to debug programs.

I. LIST OF PROGRAMS

Implement the following using C/C++/ GO Language :

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 verticesusing 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 dynamicprogramming.

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.

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

OPEN ENDED QUESTIONSDevelop / 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 10QUESTIONS

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

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

CO1: Develop algorithms using different design techniques.

CO2: Implement the algorithms using C/C++.

CO3: Analyze the time complexity of algorithms.

CO4: Solve optimization problems by implementing suitable algorithm.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											2		
CO2	3	3	2	3									2		
CO3	3	3	2	3									2		
CO4	3	3	2	3									2		

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DISCRETE MATHEMATAL STRUCTURES**							
Course Code	**22IST405A**							
Category	**ESC**							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	00	00	04	40	00	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks = 100**		**Duration of SEE: 03 Hours**			

COURSE LEARNING OBJECTIVES

This course is proposed to enhance the student's ability to think logically, mathematically and algorithmically and use the concepts of discrete mathematical structures to solve problems connected to computer and information science & engineering.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	**Fundamentals of Logic:** Propositions-Logical Connectives, Tautologies, Contradictions. Logical Equivalence–The Laws of Logic, Inverse, Converse and Contrapositive. Logical Implication – Rules of Inference. Quantifiers and Types of Quantifiers. **Self-study:** Proofs of theorems - Method of direct and indirect proofs. **Applications:** Applications to Switching Networks. (RBT levels: **L1, L2, L3, L4**)	04	04
II	**Set Theory and Mathematical Induction:** Sets, subsets, set operations, laws of set theory, counting and venn diagram. The well ordering principle, principle of mathematical induction, alternative form of mathematical induction. **Self-study:** Axioms of probability, **Applications:** Applications to recursive relations. (RBT levels: **L1, L2, L3, L4**)	04	04
III	**Relations and Functions:** Cartesian product, relations, Equivalence relation and partition. Partial order, Poset, Hasse diagram. Functions, one-one and onto functions, composition of a function and inverse functions. **Self study:** Pigonhole principle**,** Stirling numbers. **Applications:** Computer recognition-zero-one matrices and directed graphs. (RBT levels: **L1, L2, L3, L4**)	04	04
IV	**Introduction to Graph Theory:** Definition of a graph and examples. Degree of a vertex and degree sequence- Hakim's theorem(no proof). Standard graphs - complete graph, regular graph, Peterson graph, bipartite graph, complete bipartite graph. Compliment of a graph, self-complimentary graphs. Graph	04	04

	isomorphism. Sub graph- proper sub graph, spanning sub graph, induced sub graph. Walk, trial, path, cycle, connectedness, Euler and Hamiltonian graph. **Self-study:** Operation on graphs - union, intersection, ring sum, Cartesian product, deletion & addition of edge/vertex. **Applications:** Konigsberg bridge problem, Seating arrangement problem. (RBT levels: **L1, L2, L3, L4**)		
V	**Trees and Cut-sets:** Trees, Properties, Rooted Tree, Binary tree, Spanning Tree, Minimal Spanning Tree - Prism Algorithm Kruskal's Algorithm, Dijikstra's shortest path algorithm for directed and undirected graph. **Self-study:** Cut Set, Network Flow, Maximum Flow and Minimum cut Theorem. **Applications:** Prefix code: David Huffman Algorithm. (RBT levels: **L1, L2, L3, L4**)	04	04

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

CO1	**Demonstrate** the knowledge of fundamental concepts in discrete mathematics and graph theory.
CO2	**Apply** the concepts of logics, mathematical induction and set theory to solve domain specific problems.
CO3	**Analyze** the given problem to find the solution by suitable discrete mathematical concepts.
CO4	**Examine** the given concepts related to mapping and graph theory.
CO5	**Develop** a variety of algorithms using appropriate technology.

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation,

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. Introduction to graph theory by Gary Chartrand and Ping Zang, Tata McGraw-Hill addition 2006.

REFERENCE BOOKS

1. Narsingh Deo, Graph theory with applications to engineering and computer Science, PHI, 1979.
2. C L Lium& D P Mohapatra, Elements of Discrete Mathematics, A Computer Oriented Approach, The McGraw-Hill Companies.
3. Kenneth H. Rosen: Discrete Mathematics and its Applications, 6th Edition, McGraw Hill, 2007.
4. Graph theory with applications to engineering and computer Science by Narsingh Deo

Web links and Video Lectures (e-Resources)

1. https://onlinecourses.nptel.ac.in/noc20_cs82/preview
2. https://nptel.ac.in/courses/106108227
3. https://archive.nptel.ac.in/courses/111/106/111106102/
4. https://www.youtube.com/watch?v=sWsXBY19o8I
5. https://youtu.be/ZiojZJfQYh0

CO-PO MAPPING

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**UNIX AND SHELL PROGRAMMING**						
Course Code	**22IST405B**						
Category	Engineering Science Course(ESC/ETC/PLC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. To provide introduction to UNIX operating system and its File System.
2. Understand and execute the different types of UNIX commands related to files, processes and security.
3. Develop shell programs using command substitution, positional parameters and control structures.
4. Implementation of SED and AWK commands.
5. Develop simple programs using PERL and AWK scripts.

UNIT I
07 hours

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 , chmod: changing file permission, 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

Text Book1:Ch 1, Ch 2, Ch 3, Ch 4, Ch 5, Ch 6, Ch 7, Ch 8

UNIT II
08 hours

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 shell, 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, **t**he 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.
Text Book1:Ch 9, Ch 10, Ch 11, Ch 12

UNIT III
08 hours
Filters using regular expression: 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: s**hell script, read: making scripts interactive, using command line arguments, exit and exit status of command, logical operator && and || - conditional execution,t he 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, here the document , trap :interrupting a program, debugging shell script with set –x, sample validation and entry scripts.
Text Book1:Ch 13, Ch 14, Ch 21

UNIT IV
08 hours
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.
Text Book1:Ch 18

UNIT V
08 hours
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
Text Book1:Ch 19

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

COURSE OUTCOMES: On completion of the course, student should be able to:
CO1: Describe the architecture and features of the UNIX operating system and distinguish it from other operating systems.

CO2: Demonstrate UNIX commands for file handling and process control
CO3: Analyze a given problem and apply requisite facets of shell programming in order to devise a shell script to solve the problem
CO4: Demonstrate different types of SED addressing and AWK filtering.
CO5: Develop PERL programs for string usage, file concept and arrays handling.

TEXT BOOK:

1.Sumitabha Das., Unix Concepts and Applications.,4th Edition., Tata McGraw-Hill Education 2006,ISBN:0-07-063546-3.

REFERENCE BOOKS:

1.Behrouz A. Forouzan, Richard F. Gilberg : UNIX and Shell Programming,1st Edition,2002-Cengage Learning – India Edition. 2009, ISBN-13: 978-0-534-39155-3.
2.Unix & Shell Programming, M.G. Venkateshmurthy, Pearson Education, 2005.

EBOOKS/ONLINE RESOURCES

1. https://www.tutorialspoint.com/unix_commands/links.htm
2. https://www.geeksforgeeks.org/introduction-to-unix-system/
3. https://www.javatpoint.com/unix-operating-system
4. https://www.youtube.com/watch?v=txRD_bK062Y&list=PLd3UqWTnYXOloH0vWBs4BtSbP84WcC2NY

SCHEME FOR EXAMINATIONS:

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

MAPPING of COs with POs

	PO1	**PO**	**PO**	**PO4**	**PO5**	**PO6**	**PO**	**PO**	**PO9**	**PO10**	**PO1**	**PO1**	**PSO**	**PSO**	**PSO**
CO	3	3	3	1	1	--	--	--	--	--	--	--	1	1	1
CO	3	3	2	1	2	--	--	--	--	--	--	--	1	1	1
CO	3	3	3	3	1	--	--	--	--	--	--	--	2	2	2
CO	2	2	2	2	1	--	--	--	--	--	--	--	1	1	1
CO	2	2	2	2	2	--	--	--	--	--	--	--	2	2	2
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**GRAPH THEORY AND NETWORKS**							
Course Code	**22IST405D**							
Category	**ESC**							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	00	00	04	40	00	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks = 100**		**Duration of SEE: 03 Hours**			

COURSE LEARNING OBJECTIVES

This course is proposed to impart to the students the skills to develop the graph algorithms, networks, and to apply the concepts in complex engineering problems.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	**Graph concepts:** Definition of a graph and examples. Degree sequence - Hakim's theorem (no proof). Handshaking theorem. Standard graphs - complete graph, regular graph, Peterson graph, bipartite graph, complete bipartite graph. Subgraphs - proper subgraph, spanning subgraph, induced subgraph. Isomorphism of graphs. Walk, trial, path, cycle, connectedness, Euler and Hamiltonian graph **Self Study:** Operation on graphs - union, intersection, ring sum, cartesian product, deletion & addition of edge/vertex, complement of a graph, self complimentary graph. **Applications:** Konigsberg bridge problem, Seating arrangement problem. (RBT levels: **L1, L2, L3, L4**)	04	04
II	**Trees and Fundamental circuits**: Definition of a tree, properties and examples. Types of trees - spanning tree, rooted tree, binary tree. Distance and centre. Fundamental circuits. Rank and Nullity. **Self Study:** Line graph, middle graph, total graph and diagraphs. **Applications:** Prefix code: David Huffman Algorithm. (RBT levels: **L1, L2, L3, L4**)	04	04
III	**Matrix representation and Planar graphs:** Incidence matrix, adjacency matrix, path matrix, circuit matrix, fundamental circuit matrix. Planar graphs, Kuratowski's graph, Kuratowski's theorem, Euler's polyhedral formula. **Self Study:** Incidence and adjacency matrix of diagraphs. **Applications:** Detection of planarity using elementary reduction method (RBT levels: **L1, L2, L3, L4**)	04	04

IV	**Graph coloring and Networks:** Vertex coloring, chromatic number, chromatic polynomial, matching, covering, Independent set, domination. Four coloring problem. Cut set, cut vertex, vertex connectivity, edge connectivity, blocks in separable graphs. **Self Study:** Five coloring problem. **Applications:** Simplification of Boolean expression. Network flow, Maximum flow and minimum cut theorem. (RBT levels: **L1, L2, L3, L4**)	04	04
V	**Graph Algorithms:** Dijikstra's shortest path algorithm for directed and undirected graph. Minimal spanning tree algorithm: Kruskal and Prism algorithm. Cyclic exchange algorithm to find all spanning trees. **Self Study:** Algorithm for connectedness. **Applications:** Travelling salesman problem - nearest neighbourhood method. (RBT levels: **L1, L2, L3, L4**)	04	04

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

CO1	**Demonstrate** the knowledge of fundamental concepts in graph theory.
CO2	**Apply** the concepts of graph theory to solve domain specific problems.
CO3	**Analyze** and find the solution by suitable graph theoretical concepts.
CO4	**Examine** for the existence of graph structures by suitable graph algorithms, tree structures, planarity.
CO5	**Develop** a variety of algorithms using appropriate technology

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation,

TEXTBOOKS

1. Gary Chartrand and Ping Zang, Introduction to graph theory, Tata McGraw-Hill addition 2006.
2. Narsingh Deo, Graph theory with applications to engineering and computer Science, PHI, 1979.
3. F. Harary, Graph theory, Narosa publishing house, New Delhi, 2013.

REFERENCE BOOKS

1. Geir Agnarsson and Raymond Greenlaw, Graph theory-Modeling, application and Algorithm, Pearson publications, 1998
2. John Clark, Derem Allan Hollon, Graph theory, Allied Publishers, 1995.

Web links and Video Lectures (e-Resources)

1. https://archive.nptel.ac.in/courses/111/106/111106102/
2. https://www.youtube.com/watch?v=sWsXBY19o8I
3. https://youtu.be/ZiojZJfQYh0

CO-PO MAPPING

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**OPTIMIZATION TECHNIQUE**							
Course Code	**22IST405E**							
Category	**ESC**							
Scheme and Credits	Theory/Practical/Integrated					Total teaching hours	Lab slots	Credits
	L	T	P	SDA	Total			
	02	02	00	00	04	40	00	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks = 100**		**Duration of SEE: 03 Hours**			

COURSE LEARNING OBJECTIVES

This course is proposed to impart to the students the skills to develop the theory of operations research and to obtain optimal solutions for complex engineering problems.

Unit	Syllabus content	No. of hours	
		Theory	Tutorial
I	**Operations Research:** phases, characteristics and limitations, models used in operations research. **Linear Programming Problem:** Definition, Convexity and Basic Feasible Solutions. Formulation and examples, Graphical Solution, Convex and polyhedral sets, Extreme points, Basic solutions, Basic feasible solutions, Correspondence between basic feasible solutions and extreme points. **Self-study:** Computer solution with excel solver and AMPL, Production model, elementary models, bus scheduling model. (RBT levels: **L1, L2, L3, L4**)	04	04
II	**The Simplex method and Sensitivity Analysis** Linear programming model in equation form, transition from graphical to algebraic solution. Simplex method, Canonical and Standard form of Linear programming problem, Optimality criterion, slack and surplus variables, Solutions to LPP by simplex method, Artificial variable, penalty method and two-phase simplex method. **Self-Study:** Degeneracy in LPP. (RBT levels: **L1, L2, L3, L4**)	04	04
III	**Duality and Post-optimal Analysis** Formulation of the dual problem, Duality theorems, Unbounded and infeasible solutions in the primal, Solving the primal problem using duality theory. Post-optimal analysis: changes affecting feasibility and optimality. **Self-study:** Solving LPP by Generalized simplex method. (RBT levels: **L1, L2, L3, L4**)	04	04
IV	**Transportation Problem :** Formulation, methods of finding initial basic feasible solutions: North-west corner rule, Least-cost method, Vogel	04	04

	approximation method, Algorithm for obtaining optimal solution using MODI method. **Assignment Problem:** Formulation, Hungarian method. **Self-study:** Travelling sales man problem. (RBT levels: **L1, L2, L3, L4**)		
V	**Integer Linear Programming** Illustrative applications, integer programming algorithm: branch and bound algorithm, cutting plane algorithm. **CPM and PERT:** Introduction, limitations, applications, basic steps, frame works, network diagram and rules, common errors in drawing a network, critical path in network analysis, PERT. (RBT levels: **L1, L2, L3, L4**)	04	04

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

CO1	**Understand** the meaning, definitions, scope, need, phases and techniques of operations research.
CO2	**Apply** Simplex methods and determine optimal solutions to linear programming problems by graphical method, Simplex method, Big-M method and Dual Simplex method.
CO3	**Formulate** as Transportation and Assignment problems and derive optimum solutions for transportation, Assignment and travelling salesman problems.
CO4	**Analyze** integer linear programming problems and solve.
CO5	**Construct** network diagrams and determine critical path, floats for deterministic and PERT networks including crashing of Networks

TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation,

TEXTBOOKS

1. Hamdy A. Taha, Operations Research-An Introduction, Seventh Edition, , PHI, 2006.
2. S.D.Shama, Operations Research-Theory, methods and applications, Laxmi Publicaitons, 2009.
3. P.K.Gupta and D.S.Hera, Operations Research, S.Chand New Delhi, 2009

REFERENCE BOOKS

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

Web links and Video Lectures (e-Resources)

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU e-Shikshana Program

5. VTU EDUSAT Program

CO-PO MAPPING

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**Green IT and Sustainability**						
Course Code	**22IST406A**						
Category	**Ability Enhancement Course-IV**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	00	00	00	01	15	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

1. To familiarize the students to the area of Green IT and concepts of sustainability engineering.
2. To enable students with an understanding of principles and frame work of sustainable engineering.
3. To provide students with an understanding of Life Cycle Assessment tool in sustainable engineering.
4. To provide students with understanding of integration of sustainability with design.
5. Demonstrate the broad perspective of sustainable practices.

UNIT I **3 hours**

Climate change:

Enterprise IT emits a lot of greenhouse gases and contributes to climate change. Businesses must track and reduce their emissions as well as various types of toxic electronic waste that pollute the environment. Green IT approaches can be a useful part of broader climate strategies in companies.

Benefits of green IT: Benefits of Green Computing & Green IT Practices

UNIT II **3 hours**

Compliance:

Businesses are increasingly under pressure from governments and the public to reduce their environmental impact. Green IT makes more efficient use of resources, reducing waste and emissions and improving recycling rates. This helps businesses comply with government regulations.

Challenges of green IT: Designing energy-efficient computers, servers, printers, projectors, and other digital devices is considered a sustainable and green design.

UNIT III **3 hours**

Sustainable Development and Role of Engineers: Introduction, Sustainable Development, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering.

Sustainable Engineering Concepts: Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy.

UNIT IV **3 hours**

Cleaner Production(CP):

Definition, principles of Cleaner production and its benefits, Role of Industry, Government and Institutions in cleaner production, clean development mechanism, reuse, recovery, recycle, raw material substation Wealth from waste.

UNIT V **3 hours**

Integrating Sustainability in Engineering Design: Problems Solving in Engineering, conventional to Sustainable Engineering Design Process, Design for Life Guidelines and Strategies, Measuring Sustainability, Sustainable Design through sustainable procurement criteria, Case studies on sustainable Engineering Design Process – Sustainable Process Design, Sustainable Production Design Sustainable product design in Electronic Engineering,

TEACHINGLEARNINGPROCESS: Chalk and Talk, power point presentation, animations, videos blended with Practical classes

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

CO1: Understand the Green IT and Sustainability.
CO2: Elucidate the basics of sustainable development, engineering and its role.
CO3: Apply the Principle, and methodology of Life Cycle Assessment Tool
CO4: Understand integration methods of sustainability to Engineering Design
CO5: Develop innovative, reliable, sustainable and economically viable designs

TEXTBOOKS

1. Toolseeram Ramjeawon,"**Introduction to Sustainability for Engineers**", CRC Press, 1st Edn., 2020.
2. Allen, D. T., and Shonnard, D.R., "**Sustainability Engineering: Concepts, Design and Case Studies"**, Prentice Hall, Pearson Education Limited, 2015.
3. Shachi Shah, V. Venkatramanan, Ram Prasad **"Sustainable Green Technologies for Environmental Management"**, Springer Singapore, 2019.
4. Ni bin Chang, "**Systems Analysis for Sustainable Engineering: Theory and Applications**", McGraw-Hill Professional, 2011.

REFERENCEBOOKS

1. UNESCO, International Centre for Engineering Education, "**Engineering for Sustainable development: Delivery a sustainable development goals**", France, 1st Edn., 2021

ONLINERESOURCES

1. Business and Sustainable Development, IIT Bombay, Prof. Trupti Mishra https://nptel.ac.in/courses/110101153
2. https://www.techtarget.com/searchcio/definition/green-IT-green-information-technology
3. https://nptel.ac.in/courses/107103081/www.macf
4. https://engineeringforoneplanet.org/

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	3	-	-	-	-	2	1		
CO2	-		-	-	-	2	3	-	-	-	-	2	1		
CO3	-	-	-	-	-	2	3	-	-	-	-	2	1		
CO4	-	-	-	-	-	2	3	-	-	-	-	2	1		
CO5	-	-	-	-	-	2	3	-	-	-	-	2	1		
Strengthofcorrelation: Low-1, Medium-2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**UI/UX**						
Course Code	**22IST406B**						
Category	**Ability Enhancement Course-IV**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	00	00	00	01	15	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. To Understand user interface
2. To understand user interface design process
3. To understand UX design process
4. To find user experience

UNIT I **3 hours**

The User Interface: The User Interface-Introduction, Overview, The importance of user interface – Defining the user interface, The importance of Good design, Characteristics of graphical and web user interfaces, Principles of user interface design.

UNIT II

The User Interface Design process: 3**hours**.

The User Interface Design process- Obstacles, Usability, Human characteristics in Design, Human Interaction speeds, Business functions-Business definition and requirement analysis, Basic business functions, Design standards.

UNIT III **3 hours**

System menus and navigation schemes:

System menus and navigation schemes- Structures of menus, Functions of menus, Contents of menus, Formatting of menus, Phrasing the menu, Selecting menu choices, Navigating menus, Kinds of graphical menus.

UNIT IV **3 hours**

Defining UX and the Process : What Is UX, Really, The Promise of Good UX Design, UX Components, How UX and Usability Work Together, Necessary UX Inputs, Considerations before Beginning UX, How a Typical Project Works.

Examining Why You Should Use UX

UNITV **3 hours**

Determining Your Users: Modeling the Experience

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

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

CO1: Explain about the user interfaces
CO2: Design the interface, menu creation
CO3: Analyze the usage of UX
CO4 : Create a compelling portrait of a sample user

TEXT BOOKS:

1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", John Wiley & Sons, Second Edition 2002.
2. UX for dummies a Wiley publication by Donald chesnut and kevin Nichols , 2014
.

REFERENCE BOOKS:

1.William Buxton, Sketching user experiences-getting the design right and the right design, Elsevier-Morgan Kaufmann, 2007.
2.Don Norman, The Design of Everyday Things - Revised and Expanded Edition, 2013.
3.Jesse James Garrett - The Elements of User Experience-User-Centered Design for the Web and Beyond, 2nd Edition, New Riders Press, 2010.
4.ACM, International Journal of Human-Computer Studies.

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2		2										
CO2	2		2		2								1	1
CO3	2	2												1
CO4	2				2									2
Strength of correlation: Low-1, Medium- 2, High-3														

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	Technical writing using LATEX						
Course Code	**22ISL406C**						
Category	**Ability Enhancement Course-IV**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVES:

1. Understand the use of basic installation process and environment
2. Understand editing text documents using latex packages and commands.
3. Understand to create and edit mathematical formulae and Tables
4. Understand to insert and edit images using latex packages
5. Understand to write article/letters/resumes using Latex

List of Programs

1. **Introduction:** Installation of Latex and usage, Demonstrate usage of Class and packages Latex programming and commands, sample packages, Latex Error messages.

2. **Latex Programs for the following:**
   Fonts, symbols, indenting, paragraphs, line spacing, word spacing, titles and subtitles.
   Document class, page style, parts of the documents, table of contents.

3. **Latex Programs for the following:**
   Command names and arguments, environments, declarations.
   Theorem like declarations, comments within text.

4. **Latex Programs for the following:**
   Mathematical environments, math mode ,mathematical symbols
   Graphic package, multivalued functions, drawing matrices

5. **Latex Programs for the following:**
   Tables, tables with captions .
   References to figures and tables in text

6. **Latex Programs for the following:**
   Mathematical environments, math mode ,mathematical symbols

Graphic package, multivalued functions, drawing matrices

7. **Latex Programs for the following:**
   Tables, tables with captions
   References to figures and tables in text

8. **Latex Programs for the following:**
   picture environments
   extended pictures, other drawing packages
   Preparing book, project report in LaTeX.

9. **Latex Programs for the following:**
   Editing articles
   Creating resumes

10. **Latex Programs for the following:**
    Letters wring
    Managing references

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

CO1. Install Latex software's and use the environment comfortably
CO2. Edit text documents using latex packages and commands.
CO3. Create and edit mathematical formulae and Tables
CO4. Insert and edit images using latex packages
CO5. Write article/letters/resumes using Latex

REFERENCE BOOKS

1. Guide to LaTeX, Fourth Edition by Helmut Kopka, Patrick W. Daly, Released November 2003 Publisher(s): Addison-Wesley Professional, ISBN: 9780321173850

ONLINE RESOURCES

1. https://latex-tutorial.com/tutorials/
2. https://www.javatpoint.com/latex

MAPPING of COs with POshttps

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

Detailed Scheme and Syllabus

ACADEMIC YEAR 2023-2024

V-VI (2021-2025 BATCH) (160Credits)

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

PROGRAM SPECIFIC OUTCOMES(PSOS)

PSO1: Students should be able to develop and optimize solutions for information systems employing fundamentals of mathematics, Hardware, software, data storage, security and communication networks.

PSO2: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.

PSO3: 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-560056
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)(AsperNEP2020)
B.E. INFORMATION SCIENCE AND ENGINEERING
Scheme of Teaching and Examination effective from the Academic Year 2023-24

V Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department (TD)/ Paper setting Board(PSB)	Teaching Hrs / Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	PCC	21IST501	Operating System	ISE	3	1	0	0	04	03	50	50	100	3
2	IPCC	21IST502	Object Oriented Programming with Java	ISE	3	0	2	0	05	03	50	50	100	4
3	PCC	21IST503	Software Engineering	ISE	3	0	0	0	03	03	50	50	100	3
4	PCC	21IST504	Database Management Systems	ISE	3	0	0	0	03	03	50	50	100	3
5	PCCL	21ISL505	Database Management Systems Lab	ISE	0	0	2	0	02	03	50	50	100	1
6	AEC	21IST506	Research Methodology &Intellectual property rights	TD:Any department PSB: As identified by the Institute	2	0	0	0	02	02	50	50	100	2
7	HSSC	21CVT507	Environmental Studies	TD: Civil/Chemistry PSB: Civil Engg.	1	0	0	0	01	01	50	50	100	1
8	AEC	21IST508X	Ability enhancement course – V	Concerned Board	If offered as Theory courses					01	50	50	100	1
					1	0	0	0						
					If offered as Lab Courses					02				
					0	0	2							
9	HSSC	21HSN509	Aptitude and Verbalability skills	HSS	1	0	1	0	02	02	50	--	PP/ NP	0
										Total	450	400	800	18

Ability Enhancement Course-V			
Code	**Course title**	**Code**	**Course title**
21IST5081	Android Programming	21ISL5083	Advanced Web Technology
21**IS**T5082	Data Visualization		

Note: BSC: Basic Science Course, PCC: Professional Core Course, IPCC: Integrated Professional Core Course, AEC –Ability Enhancement Course INT – Internship, **HSSC:** Humanity and Social Science Courses.
L–Lecture,T –Tutorial,P-Practical/Drawing,S–SelfStudyComponent,CIE:ContinuousInternalEvaluation,SEE:SemesterEndExamination.

Integrated Professional Core Course (IPCC): refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L:T:P) can be considered as (3:0:2) or (2:2:2). The theory part of the IPCC shall be evaluated bothbyCIEandSEE.ThepracticalpartshallbeevaluatedbyCIEonlyandthereshallbenoSEE.
For moredetailstheregulationgoverningtheDegreeofBachelorofEngineering/Technology (BE/B.Tech.)2021-22maybe referred.

Dr.Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)(AsperNEP2020)
B.E. INFORMATION SCIENCE AND ENGINEERING
Scheme of Teaching and Examination effective from the Academic Year 2023-24

VI Semester

Sl. No.	Course Category	Course Code	Course Title	Teaching Department	Teaching Hrs / Week					Examination				Credits
					L	T	P	S	Total	Duration (Hrs)	CIE Marks	SEE Marks	Total Marks	
1	HSSC	21IST601	Project Management	Any department (ISE)	3	0	0	0	3	03	50	50	100	3
2	IPCC	21IST602	Cloud Computing	ISE	3	0	2	0	5	03	50	50	100	4
3	PCC	21IST603	Machine Learning	ISE	3	0	0	0	3	03	50	50	100	3
4	PEC	21IST604X	Professional Elective course –I	ISE	3	0	0	0	3	03	50	50	100	3
5	OEC	21IST605X	Open Elective course- I	Concerned department	3	0	0	0	3	03	50	50	100	3
6	PCC	21ISL606	Machine Learning Lab	ISE	0	0	2	0	2	03	50	50	100	1
7	MP	21ISM607	Mini Project	ISE	Two contact hours/week for interaction between the faculty and students					----	100	---	100	2
8	INT	21ISI608	Innovation/Entrepreneurship/ Societal internship	Completed during the intervening period of IV and V semesters.						----	100	----	100	3
9	HSSC	21HSN609	Analytical and reasoning skills	Placement cell	2	0	0	-	02	---	50	--	PP/ NP	0
Total											**550**	**300**	**800**	**22**

Note:HSSC: HumanityandSocialScienceCourses,**IPCC:**IntegratedProfessionalCoreCourse,**PCC:**ProfessionalCoreCourse,
EC: Professional Elective Courses, O**EC**–Open Elective Course, **MP**–Mini Project, INT –Internship.
ure,**T**–Tutorial,**P**-Practical/Drawing,**S**–SelfStudyComponent,**CIE**:ContinuousInternalEvaluation,**SEE**:SemesterEndExamination.

Integrated Professional Core Course (IPCC): Refers to Professional Theory Core Course Integrated with Practical of the same course. Credit for IPCC can be 04 and its Teaching – Learning hours (L:T:P) can be considered as(3:0:2) or (2:2:2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by CIE only and there shall be no SEE.

For more details, the regulation governing the Degree of Bachelor of Engineering/Technology (BE/) 2021-22may be referred.

Professional Elective Courses(PEC):

A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option select one course out of five courses The minimum students strength for offering professional electives is10.However,this conditional shall not be applicable to cases where the admission to the programme is less than10.

Open Elective Courses:

Students belonging to particular stream of Engineering and Technology are not entitled for the open electives offered by their parent Department. However, they can opt an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under the guidance of the Program Coordinator/Advisor/Mentor.

Selection of an open elective shall **not be allowed** if,

(i) The candidate has studied the same course during the previous semesters of the program.

(ii) The syllabus content of open electives is similar to that of the Departmental core courses or professional electives.

(iii) A similar course under any category is prescribed in the higher semester of the program.

In case, any college is desirous of offering a course (not included in the Open Elective List of the University) from streams such as Law, Business(MBA), Medicine, Arts, Commerce, etc., can seek permission, at least one month before the commencement of the semester, from the University by submitting a copy of the syllabus along with the details of expertise available to teach the same in the college.

The minimum students' strength for offering open electives is 10.However this conditional shall not be applicable to cases where the admission to The programme is less than 10.

Mini-project work: Mini Project is a laboratory-oriented course which will provide a platform to students to enhance the practical knowledge and skills by the development of small systems/applications.

Based on the ability/abilities of the student/s and recommendations of the mentor, a single discipline or a multidisciplinary Mini-project can be assigned to an individual student or to a group having not more than 4 students.

CIE procedure for Mini-project:

(i) Single discipline: The CIE marks shall be awarded by a committee consisting of the Head of the concerned Department and two faculty members of the Department, one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio of 50:25:25. The marks awarded for the project report shall be the same for all the batch mates.

(ii) Interdisciplinary: Continuous Internal Evaluation shall be group-wise at the college level with the participation of all the guides of the project.

The CIE marks awarded for the Mini-project, shall be based on the evaluation of project report, project presentation skill, and question and answer session in the ratio 50:25:25.The marks awarded for the project report shall be the same for all the batch mates.

No SEE component for Mini-Project.

VII semester Class work and Research Internship/Industry Internship(21ISI802)

Swapping Facility:

(1) Institutions can swap VII and VIII Semester Scheme of Teaching and Examinations to accommodate research internship/industry internship after the VI semester**.**

(2) Credits earned for the courses of VII and VII or VIII semester is completed during the beginning of IV year or later part of IV year of the program.

Elucidation:

At the beginning of IV year of the programme i.e., after VI semester, VII semester classwork and VIII semester Research Internship /Industrial Internship shall be permitted to be operated simultaneously by the University so that students have ample opportunity for internship. In other words, a good percentage of the class shall attend VII semester classwork and a similar percentage of others shall attend to Research Internship or Industrial Internship.

Research/Industrial Internship shall be carried out at an Industry, NGO, MSME, Innovation centre, Incubation centre, Start-up, Centers of Excellence (CoE), Study Centre established in the parent institute and /or at reputed research organizations / institutes. The internship can also be rural internship.

The mandatory Research internship /Industry internship is for **24 weeks**. The internship shall be considered as a head of passing and shall be considered for the award of degree. Those, who do not take up/complete the internship shall be declared fail and shall have to complete during the subsequent Institute/University examination after satisfying the internship requirements.

21ISI802 Research Internship/Industry Internship/ Rural Internship:

Research internship: A research internship is intended to offer the flavor of current research going on in the research field. It helps student's get familiarized with the field and imparts the skill required for carrying out research.

Industry internship: Is an extended period of work experience undertaken by students to supplement their degree for professional development. It also helps them learn to overcome unexpected obstacles and successfully navigate organizations, perspectives, and cultures. Dealing with contingencies helps students recognize, appreciate, and adapt to organizational realities by tempering their knowledge with practical constraints.

The faculty coordinator or mentor has to monitor the students 'internship progress and interact with them to guide for the successful completion of the internship.

The students are permitted to carry out the internship any where in India or abroad .University shall not be are annexpansies in corroding respect to internship.

Professional Elective Courses-I		**Open Elective Courses-I**	
Subject Code	**Title**	**SubjectCode**	**Title**
21**IS**T6041	Automata Theory & Compiler Design	21**IS**T6051	Internet of Things
21**IS**T6042	Artificial Intelligence	21**IS**T6052	Python Programming
21**IS**T6043	Network and Cyber Security	21**IS**T6053	Software Engineering
21**IS**T6044	Internet of Things	21**IS**T6054	Web Technology

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**OPERATING SYSTEMS**						
Course Code	**21IST501**						
Category	Professional Core Course (PCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	01	0	00	04	39	03
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVES:

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

UNIT I : 09 hours

Introduction: What operating systems do, Computer-System Architecture, Operating System Structure, Operating System Operations, Introduction to 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; T T1: Ch 3: 3.1 to 3.4, Ch 4: 4.1 to 4.3.

UNIT II 08 hours

Process Synchronization: The Critical Section Problem, Peterson‟s Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization T1: Ch 5: 5.1 to 5.9.

CPU Scheduling : Scheduling Criteria , Scheduling Algorithms , Thread Scheduling, Multiple-Processor Scheduling , Real-Time CPU Scheduling . 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 DeadlockT T1:Ch 7: 7.1 to 7.7.

UNIT III 07 hours

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 T1: Ch 9: 9.1 to 9.5

UNIT IV 08 hours

System: File Concept, Access Methods, Directory Structure, 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. T1: Ch 12: 12.1 to 12.5

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

UNIT V **07 hours**

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, Firewalling to Protect Systems and Networks, Computer-Security Classifications T1:Ch 15 : 15.1 to 15.8

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

COURSE OUTCOMES: On completion of the course, student should 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**.**

TEXT BOOK:

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

REFERENCE BOOKS:

D.M Dhamdhere – **Operating Systems:A Concept Based Approach**, 2nd Edition, Tata McGraw- Hill, 2002.

1. P.C.P. Bhatt **- Operating Systems**, 2nd Edition, PHI, 2006.
2. Harvey M Deital **- Operating Systems** –, 3rd Edition Wesley, 1990.

EBOOKS/ONLINE RESOURCES

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

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

COs Mapping with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											2		2
CO2	3	3	3											2	
CO3	3		2	3										2	2
CO4	2	2	3	3									2		
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**Object Oriented Programming with Java**						
Course Code	**21IST502**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**02**	**00**	**05**	**60**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. 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 I : **07 hours**

Introduction to Java, Classes,: 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. Classes: Classes fundamentals; Declaring objects

T1:Ch1,2,3,4,5,6

Laboratory Component:

1. Design and develop a program to implement calculator.
2. Create a program using objects.

UNIT II **08 hours**

Classes: Constructors, this keyword, garbage collection.

Inheritance: inheritance basics, using super, creating multi-level hierarchy, method overriding. **Exception handling:** Exception handling in Java. **T1: T1 :Ch 6 , Ch 7, Ch 8 , Ch10**

Laboratory Component:

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 Overloading and method overloading

b. Develop a Java/c++ Program to implement Inner class and demonstrate its Access Protections.

3. 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.

4. 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.

UNIT III **09 hours**

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

Laboratory Component:

1. Design a JA program using Synchronized Threads, which demonstrates Producer Consumer concept.
2. Wr 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.

UNIT IV **07 hours**

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

Laboratory Component:

1.Develop JAVA Applet programs which handle Key Board Event.

2. Develop JAVA Program using AWT.

UNIT V **08 hours**

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**

Laboratory Component:

1. Develop JAVA program using swings.

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

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

CO1: To understand OOPs concepts/ principles in JAVA.

CO2: To identify java languge components & how they work together in application

CO3: To design and program stand alone java application .

CO4: To apply knowledge of AWT to develop UI.

CO5: To design graphical UI with JAVA swings .

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.
6. E Balagurusamy, Programming with Java A primer, Tata McGraw Hill companies

SCHEME FOR EXAMINATIONS:

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2		2								2	2	
CO2	2	2	2		2	2							2	2	
CO3			2		2	2							2	2	
CO4	2	2	2	2	2								2	2	
CO5	2	2	2	2	2								2	2	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**SOFTWARE ENGINEERING**						
Course Code	**21IST503**						
Category	Professional Core Course (PCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. To provide the idea of decomposing the given problem into Analysis, Desing, Implementation, Testing and Maintenance phases. .
2. To provide an idea of using various process models in the software industry according to given circumstances..
3. To gain the knowledge of how Analysis, Design, Implementation, Testing and Maintenance processes are conducted in a software project.

UNIT I : **07 hours** Overview: FAQ about software engineering, Professional and ethical responsibility, Case studies.Socio-Technical systems: Systems engineering, system procurement, system development and operation. Software Processes: Process activities; The Rational Unified Process; Agile methods, Plan-driven and agile development, XP, Scrum T1:Ch1,Ch2,Ch3,Ch10
UNIT II **08 hours** Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The softwarerequirements document. Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management. **Introduction, Modelling Concepts and Class Modelling:** What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models. Class Modelling: Object and Class Concept; Link and associations concepts; Generalization and Inheritance; A sample class model; Navigation of class models; T1:Ch4, T2:1,2,3
UNIT III **09 hours** System modelling: System Models: Context models; Behavioral models; Object models; Structured methods. Architectural Design: Architectural design ,Architectural views, patterns and architecture. Design patterns ,Implementation issues, Design evolution. Development: Rapid Software Development:

Rapid application development. Open source development

T1: Ch 5 ,Ch 6,Ch 7

UNIT IV **07 hours**

Software Testing: Development testing ,Test-driven development ,Release testing, User testing. Test Automati

Evolution processes. Program evolution dynamics. Software maintenance, Legacy system managemen

T1: Ch 8 , Ch 9

UNIT V **08 hours**

Project Management; Risk management. Project planning: software pricing; Project scheduling; Agile Planning; Estimation techniques.

Quality management: Software quality Reviews and inspections . Software measurement and metrics . Software standards.

T1: Ch 22, Ch 23,Ch 24

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

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

CO1: Design a software system, component, or process to meet desired needs within realistic constraints.
CO2: Assess professional and ethical responsibility
CO3 Use the techniques, skills, and modern engineering tools necessary for engineering practice
CO4: Analyze, design, implement, verify, validate, implement, apply, and maintain software systems or parts of software systems

TEXT BOOK:

1.Ian Sommerville: Software Engineering, 10E, Pearson Education, 2017. (Listed topics only from Chapters 1,2,3,4, 5,6, 7, 8, 9,10,11, 22, 23 and 24)

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

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.

EBOOKS/ONLINE RESOURCES

1.http://agilemanifesto.org/
2. http://www.jamesshore.com/Agile-Book

SCHEME FOR EXAMINATIONS:

The theory part of the PCC shall be evaluated both by CIE and SEE.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					3		3				3	3		3
CO2	3	3	3									3		3	3
CO3	3	3	3		3								2	2	2
CO4	3	3	3							3			2	2	2
CO5	3					3				3	3	3	3	3	3
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DATABASE MANAGEMENT SYSTEMS**						
Course Code	**21IST504**						
Category	Professional Core Course (PCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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 I : 08 hours

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.

T1:Ch1,2,7

UNIT II 07 hours

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

T1: Ch 3 , Ch 6.1-6.5 9.1

UNIT III 09 hours

SQL :Schema Definition, Basic Constraints and Queries: SQL Data Definition and Data Types; Specifying basi

constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Ins Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) SQL

T1:ch4, ch5

UNIT IV **07 hours**

Database Design: 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

T1: Ch15, ch16

UNIT V **08 hours**

Introduction to Transaction Processing Concepts and Theory:

Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing Schedules Based on Serializability, Transaction Support in SQL

Concurrency Control Techniques: Two-Phase Locking Techniques for Concurrency Control, Two-Phase Locking Techniques for Concurrency Control, Multiversion Concurrency Control Techniques, Validation (Optimistic) Concurrency Control Techniques, Granularity of Data Items and Multiple Granularity Locking

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

T1: Ch 21, Ch 22

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

COURSE OUTCOMES: On completion of the course, student should be 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 and perform manipulation operations.
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

TEXT BOOK:

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

REFERENCE BOOKS

1. Raghu Ramakrishna and Johannes Gehrke: Database Management Systems, 3rd Edition, McGraw-Hill, 2003.
2. Silberschatz, Korth and Sudharshan: Data base System Concepts, 5th Edition, Mc-GrawHill, 2006.

3. C.J. Date, A. Kannan, S. Swamynatham: A Introduction to Database Systems, 8th Edition, Pearson education, 2006·
4. www.w3resources.com

SCHEME FOR EXAMINATIONS:

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	3		2								1	2	
CO2	2		2		2								1	1	
CO3		3	3		2				1				2	2	
CO4	2	1	2										1	1	
CO5	2	1	2		2								2	2	
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DATABASE MANAGEMENT SYSTEMS LAB**						
Course Code	**21ISL505**						
Category	Professional Core Course Lab (PCCL)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	**00**	**02**	**00**	**02**	**12**	**01**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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.

Lab Component:

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, ba 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.

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	2										2	2	
CO2			2	1	2				2				2	2	
CO3				2	2				2			2	2	2	
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**ANDROID PROGRAMMING**						
Course Code	**21IST5081**						
Category	Ability Enhancement Course (AEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	00	00	00	01	15	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVE:

1. Learn to setup Android application development environment
2. Illustrate user interfaces for interacting with apps and triggering actions
3. Interpret tasks used in handling multiple activities
4. Identify options to save persistent application data
5. Appraise the role of security and performance in Android applications

UNIT I Get started, Build your first app, Activities, Testing, debugging and using support Libraries	**3 hours**
UNIT II User Interaction, Delightful user experience, Testing your UI	**3 hours**
UNIT III Background Tasks, Triggering, scheduling and optimizing background tasks	**3 hours**
UNIT IV All about data, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders	**3 hours**
UNIT V Permissions, Performance and Security, Firebase and AdMob, Publish	**3 hours**

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

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

CO 1: Build an application using Android development environment.
CO 2: Experiment with the method of storing, sharing and retrieving the data in Android Applications.
CO 3: Examine responsive user interface across wide range of devices.

CO 4: Create a mobile Application by using various components like activity, views, services, content providers and receivers.

CO 5: Analyze performance of android applications and understand the role of permissions and security

TEXT BOOKS:

1.Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley India Pvt Ltd, 2014.

REFERENCE BOOKS:

2. Dawn Griffiths and David Griffiths, "Head First Android Development", 1st Edition, O'Reilly SPD Publishers, 2015.
3. J F DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
4. Anubhav Pradhan, Anil V Deshpande, " Composing Mobile Apps" using Android, Wiley 2014, ISBN: 978-81-265-4660-2

EBOOKS/ONLINE RESOURCES

Weblinks and Video Lectures (e-Resources):

1. https://www.youtube.com/watch?v=EknEIzswvC0&list=PLS1QulWo1RIbb1cYyzZpLFCKvdYV_yJ-E
2. **https://www.youtube.com/watch?v=u64gyCdqawU**
3. **https://www.youtube.com/watch?v=fis26HvvDII**
4. **https://www.youtube.com/watch?v=6fGp_Ko-bIQ&list=PLsyeobzWxl7p-lZvWabkVJdM_UVURhUh4**

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	2	-	-	-	-	-	-	1	2	-	1
CO2	1	3	-	-	2	-	-	-	-	-	-	1	2	-	1
CO3	1	3	1	-	2	-	-	-	-	-	-	1	2	-	1
CO4	1	-	3	-	2	-	-	-	-	-	-	1	2	-	1
CO5	1	-	2	-	1	-	-	-	-	-	-	1	2	-	1

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**DATA VISUALIZATION**						
Course Code	**21IST5082**						
Category	Ability Enhancement Course (AEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	01	00	00	00	01	15	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVE:

1. Use data analysis tools in the pandas library
2. Load, clean, transform, merge and reshape data.
3. Handle external files as well as exceptions.
4. Analyze and manipulate time series data.
5. Solve real world data analysis problems.

UNIT I **3 hours**
Introduction: Introduction to Data Science, Exploratory Data Analysis and Data Science Process. Motivation for using Python for Data Analysis, Introduction of Python shell iPython and Jupyter Notebook. **Essential Python Libraries**: NumPy, pandas, matplotlib, SciPy, scikit-learn, statsmodels.
UNIT II **3 hours**
Getting Started with Pandas: Arrays and vectorized conputation, Introduction to pandas Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics.Data Loading, Storage and File Formats.Reading and Writing Data in Text Format, Web Scraping, Binary Data Formats, Interacting with Web APIs, Interacting with Databases Data Cleaning and Preparation. Handling Missing Data, Data Transformation, String Manipulation
UNIT III **3 hours**
Data Wrangling: Hierarchical Indexing, Combining and Merging Data Sets Reshaping and Pivoting.**Data Visualization matplotlib**: Basics of matplotlib, plotting with pandas and seaborn, other python visualization tools.
UNIT IV **3 hours**
Data Aggregation and Group operations: Group by Mechanics, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation.**Time Series Data Analysis**: Date and Time Data

Types and Tools, Time series Basics, date Ranges, Frequencies and Shifting, Time Zone Handling, Periods and Periods Arithmetic, Resampling and Frequency conversion, Moving Window Functions.
UNIT V **3 hours** **Advanced Pandas**: Categorical Data, Advanced GroupBy Use, Techniques for Method Chaining.

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

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

CO 1: Comprehend the importance of the exploratory data analysis paradigm
CO 2: Understand the fundamental design principles and different types of data visualization
CO 3: Select appropriate data visualization technique for given data
CO 4: Design visualizations for presenting stories from data
CO 5: Apply the fundamental concepts of data visualization to define a project in your field of study

TEXT BOOKS:

1. McKinney, W.(2019). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media
2. 2.O'Neil, C., & Schutt, R. (2021). Doing Data Science: Straight Talk from the Frontline O'Reilly Media

REFERENCE BOOKS:

1. Allen Downey ,Jeffrey Elkner ,Chris Meyers,: Learning with Python, Dreamtech Press
2. David Taieb ,"Data Analysis with Python: A Modern Approach " 1st Edition, Packt Publishing

EBOOKS/ONLINE RESOURCES

Weblinks and Video Lectures (e-Resources):

5. https://www.youtube.com/watch?v=MiiANxRHSv4
6. **https://www.youtube.com/watch?v=_YWwU-gJI5U**
7. **https://www.youtube.com/shorts/NH8Yk3ChI3Q**
8. **https://www.youtube.com/watch?v=5Zg-C8AAIGg**
9. **https://www.youtube.com/watch?v=YaGqOPxHFkc**
10. **https://www.youtube.com/watch?v=3JWK5gRI9p0**

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			1		1									1	
CO2	1		1		1								1	3	
CO3	1	3			3										
CO4	3	3	3		3	1							3		
CO5		1		2	3										1
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**ADVANCE WEB TECHNOLOY LAB**						
Course Code	21ISL5083						
Category	Ability enhancement course (AEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	2	01
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 02 Hours**		

COURSE OBJECTIVE:
CO1: Create a web page with text, images, links, lists, tables, and frames
CO2: To use Cascading style sheet in designing web pages
CO3: To use Javascript create registration page
CO4: To create XML schema
CO5: To create and execute PHP to access database, cookies and do session tracking.

List of Programs

1. Design the following static web pages required for an online book store web site. 1) HOME PAGE: The static home page must contain three frames. 2) LOGIN PAGE 3) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. 4) REGISTRATION PAGE
2.Design a web page using the different styles using inline, external & internal style sheets
3. Write JavaScript to validate the following fields of the Registration page. 1. First Name (Name should contains alphabets and the length should not be less than 6 characters). 2. Password (Password should not be less than 6 characters length). 3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com) 4. Mobile Number (Phone number should contain 10 digits only). 5. Last Name and Address (should not be Empty).
4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
5. Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, and Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

6. Develop and demonstrate JavaScript with POP-UP boxes and functions for the following problems: a) Input: A number n obtained using prompt Output: A multiplication table of numbers from 1 to 10 of n using alert b) Input: A number n obtained using prompt and add another number using confirm Output: Sum of the entire n numbers using alert
7.Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings
8. Write a PHP program to display a digital clock which displays the current time of the server
9.Write a PHP Program to sort the student records which is stored in the databases using selection sort
10 Write a program to design a simple calculator using (a) JavaScript (b) PHP

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 Classify and use different levels of style sheets

CO2 : Validate and provide user functionality using JavaScript

CO3 : Design and develop XML document and use the style sheet to display.

CO5: Design and develop PHP programs to perform database access, session tracking

MAPPING of COs with POs

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	**3**	**3**	**2**		**2**								**2**	**2**	
CO2	**2**	**2**	**2**		**2**	**3**							**2**	**2**	
CO3			**2**		**2**	**3**							**2**	**2**	
CO4	**2**	**2**	**2**	**2**	**2**								**2**	**2**	
CO5	**2**	**3**	**2**	**3**	**2**								**2**	**2**	
Strength of correlation: Low-1, Medium- 2, High-3															

VI SEMESTER

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**PROJECT MANAGEMENT**						
Course Code	**21IST601**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. To understand the fundamental principles of software project management.
2. To outline the need for Project Management.
3. To highlight different techniques of activity planning.
4. Project Planning & Management.
5. To have a good knowledge of responsibilities of project manager.

UNIT I : **07 hours**

Introduction : Foundational Elements, projects, the importance of project management, relationship of project, program, portfolio, and operations management. The role of the project manager: project manager competences, performing integration

T1:Ch1,2,3,4,5,6

UNIT II : **08 hours**

Project Integration Management: Develop project charter, develop project management plan, direct & manage project work, monitor & control project work, perform integrated change control, close project or phase.

Project Scope Management: Plan scope management, collect requirements define scope, create validate scope, control scope.

UNIT III **09 hours**

Project Schedule Management: Plan schedule management, define activities, sequence activities, estimate activity resources, estimate activity durations, develop schedule, control schedule.

Project Cost management: Project Cost management, estimate cost, determine budget, control costs.

UNIT IV **07 hours**

Project Quality management: Plan quality management, perform quality assurance, control quality.

Project Risk Management: Plan risk management, identify risks, perform qualitative risk analysis, perform quantitative risk analysis, plan risk resources, control risk.

UNIT V **08 hours**

Project Procurement Management: Project Procurement Management, conduct procurements, control procurements, close procurement

Project Stakeholder Management: Identify Stakeholders, Plan Stakeholder Engagement, Manage Stakeholder Engagement, Monitor Stakeholder Engagement

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

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

CO1: Apply the knowledge of project management foundational elements and techniques for managing large projects
CO2: Analyze and evaluate risks in large and complex project environments
CO3: Investigate various processes and sub processes in the project management frameworks.
CO4: Design and implement project plans for real-time applications
CO5: Demonstrate ethical practices in effective project management to attain lifelong learning

TEXT BOOK:

1. A Guide to the Project Management Body of Knowledge(PMBOK Guide), Project Management Institute, 7th Edition, 2021, ISBN: 978-1-62825-184-5

REFERENCE BOOKS

1. Project Planning Analysis Selection Financing Implementation & Review, Prasanna Chandra, 9th Edition, 2019, Tata McGraw Hill Publication, ISBN: 978-8194113836
2. Project Management A System approach to Planning Scheduling & Controlling, Harold Kerzner, 12th Edition, 2017, CBS Publishers and Distributors, ISBN: 978-1119165354.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1							3	1	3	3	1		1
CO2	3	1		2							3	3	1	1	2
CO3	3	1		2							3	3	1	1	
CO4	3	1	1	0						1	3	3	1	1	1
CO5	3	1	1	0					1	2	1	3	1	1	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**CLOUD COMPUTING**						
Course Code	**21IST602**						
Category	Integrated Professional Core Course (IPCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**02**	**00**	**05**	**60**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. 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

UNIT I : **08 hours**

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

Lab Component:

1. Design and demonstrate the usage of Google Form, Google Access.
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.

UNIT II **09 hours**

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

Lab Component:

1. Demonstrate Virtualization by installing Virtual box/VMware Workstation with different flavors of Operating System on Windows 10.

2. Demonstrate the working of Docker Containers to build a custom app using open source - Play With Docker (PWD).

UNIT III **07 hours**

Cloud Computing Architecture: Introduction, Cloud Reference Model, Types of Clouds, Economics of the cloud, Open challenges.

T1: Ch 4: 4.1-4.5

Lab Component:

1. Develop a web application project using Codeanywhere.com and collaborate with backend database.
2. Demonstrate a file handling program on Codeanywhere.com.

UNIT IV **08 hours**

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

Lab Component:

1. Demonstrate the working of Git and Github.
2. Demonstrate a procedure to (launch virtual machine) to execute bash program.

UNIT V **07 hours**

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

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

COURSE OUTCOMES: On completion of the course, student should 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.

TEXT BOOK:

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.

SCHEME FOR EXAMINATIONS:

The theory part shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				3	3					3	3	3		3	
CO2	3	3		3			3	3	3					2	3
CO3		3	3	3	3				3	3				3	
CO4			3	3	3		3	3	3	3	3	3		2	3
CO5				3	3	3	3	3	3	3	3	3		2	3
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**Machine Learning**						
Course Code	**21IST603**						
Category	Professional Core Course (PCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. 1.Basics on what is learning machine
2. Basic mathematics behind learning algorithms
3. Different types of learning

UNIT I : 07 hours

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; perspectives and 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
T1- **chapter 1(**1.1-1.3),chapter 2(2.1-2.5),T2- **chapter 1(1.1- 1.5 ,1.7,1.8)**

UNIT II 08 hours

Regression: example of regression, common regression algorithms, maximum likelihood estimation.

Decision Tree Learning: Decision tree representation; Appropriate problems for decision tree learning; Basic decision tree learning algorithm; Issues in decision tree learning.
T1: chapter 3(3.1-3.4,3.7),T2- chapter 8(8.1-8.3)

UNIT III 08 hours

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,EM algorithm.
T1: chapter 4(4.1-4.5),chapter6 (6.1-6.3,6.7,6.9,6.11,6.12)

UNIT IV 08 hours

Classification:example of supervised learning, classification model, learning steps, common classification algorithms. Unsupervised learning: Applications, clustering. Case Studies Of Applications: Weather forecasting, Stock market prediction, Real Time Sentiment Analysis,etc Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes.

T2: chapter 7(7.1-7.5),chapter 8 (9.1-9.4)

UNIT V **08 hours**

Evaluating Hypothesis:
Motivation, Estimating hypothesis accuracy, Basics of sampling theorem, General approach for deriving confidence intervals, Difference in error of two hypothesis, Comparing learning algorithms.
Instance Based Learning:: Introduction, k-nearest neighbor learning, locally weighted regression, radial basis function, cased-based reasoning, Ensemble learning algorithm**.**

Reinforcement Learning: Introduction, Learning Task, Q LearningT1- **chapter 5(**5.1-5.6), **chapter 8(**8.1-8.5), **chapter 13(**13.1-13.3),T2-chapter11(11.4,11.6)

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

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

CO1: Learn the basics of learning problems with hypothesis and version spaces.
CO2: Characterize the machine learning algorithms as supervised learning and unsupervised learning .
CO3: Apply and analyse the various algorithms of supervised and unsupervised learning
CO4: Understand the features of machine learning to apply on real world problems
CO5: Learn the concepts in Bayesian analysis from probability models and methods.

TEXT BOOK:

1. Tom M. Mitchell, "Machine Learning", McGraw Hill Education. India Edition 2017.
2.Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, "Machine Learning" , Pearson India Education Services Pvt. Ltd., 2019.

REFERENCE BOOKS

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.

EBOOKS/ONLINE RESOURCES

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

SCHEME FOR EXAMINATIONS:

The theory part of the PCC shall be evaluated both by CIE and SEE.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		3												
CO2			3	3											
CO3		3	3		3							3			
CO4															
CO5				3					3			3			
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**AUTOMATA THEORY AND COMPILER DESIGN**						
Course Code	**21IST6041**						
Category	Engineeering Science Courses(ESC/ETC/PLC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**3**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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 I : **07 hours**

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, Properties of Regular Languages: Regular expressions; Finite Automata and Regular Expressions; Minimization of automata

T1: Ch 1-Ch 4

UNIT II **08 hours**

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

UNIT III **09 hours**

. **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

UNIT IV **07 hours**

Introduction, Lexical analysis: Language processors; The structure of a Compiler.

Lexical analysis: The Role of Lexical Analyzer.
Syntax Analysis – 1: Introduction; Top-down Parsing: Recursive descent parser and Predictive parser.
T2: Ch 1, T2: Ch 3, Ch 4: 4.1, 4.3-4.4

UNIT V **08 hours**

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

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

COURSE OUTCOMES: On completion of the course, student should 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

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

SCHEME FOR EXAMINATIONS:

The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE).However, questions from the practical part of IPCC shall be Included in these question paper.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2			2										
CO2		2	2	2	2										
CO3			2	2	2										
CO4			2	2	2										
CO5		2	2	2											
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**ARTIFICIAL INTELLIGENCE**						
Course Code	**21IST6042**						
Category	Professional Elective Courses-I (PEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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 I : **07 hours** What is AI,history,applications of AI ,Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents.Problem solving:Problem solving agents;Example problems,searching for solutions --- T1.CH1,CH2,CH3
UNIT II **08 hours** Knowledge representation issues: Representations and mappings approaches to knowledge representation, Is knowledge representation.Using Predicate Logic, Representing knowledge using T2-CH4,CH5,CH6
UNIT III **08 hours** Logical Agents: Knowledge based agents, The Wumpus world, Logic-Propositional logic Propositional theorem proving, Effective propositional model checking, Agents based on propositional logic.symbolic reasoning under uncertainity,statistical reasoning T1&T2-CH7,CH8
UNIT IV **08 hours** **So** Game playing,The minimax search procedure,adding alpha beta cutoffs,Additional refinements Iterative deepening,references on specific games. Natural language processing introduction,syntactic processings,semantic analysis,discourse and pragmatic processing,statistical natural language processing. T2-12&15
UNIT V **08 hours** Learning-role learning ,learning by taking advice,problem solving,learning from examples,explanation based

learning formal learning theory Expert systems-representing and using domain knowledge,expert system shells,knowledge acquisition.
T2-CH17,CH 20

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

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

CO1: Understand the informed and uninformed problem types and apply search strategies to solve them..
CO2: Apply difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing
CO3: Examine the issues involved in knowledge bases, reasoning systems and planning.
CO4: Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques

TEXT BOOK:

1."Artificial Intelligence: A Modern Approach "by Stuart Russel, PeterNorvig, 2nd Edition, Pearson Education, 2010.
2."Artificial Intelligence" by Elaine Rich, Kevin Knight, Shivashankar B Nair: Tata MCGraw Hill 3rd edition. 2013

REFERENCE BOOKS

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).

EBOOKS/ONLINE RESOURCES

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

SCHEME FOR EXAMINATIONS:

The theory part of the PCC shall be evaluated both by CIE and SEE.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											3		
CO2	3	3										3	3	3	
CO3	3	3		3		3			3		3	3	3		3
CO4	3	3	3	3								3		3	
CO5	3	3	3	3		3			3		3	3		3	3
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**NETWORK and CYBER SECURITY**						
Course Code	21IST6043						
Category	**PROFESSIONAL ELECTIVE COURSE**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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 gain knowledge about web security.
5. To introduce the area of cybercrime and Cyber security to students.

UNIT I : **07 hours**

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

UNIT II **08 hours**

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.

1.

h 17: 1,2,3

UNIT III **09 hours**

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

1. T1 :Ch 18:1,2,3

UNIT IV **07 hours**

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

1. T1 : Ch 1,2,3,4,5

UNIT V **08 hours**

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 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

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

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

CO1: Apply the knowledge of 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.

TEXT BOOK:

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

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2		2							2	2	2	
CO2	2	2	2		2	2							2	2	
CO3			2		2	2							2	2	
CO4	2	2	2	2	2							2	2	2	
CO5	2	2	2	2	2							2	2	2	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**INTERNET OF THINGS**						
Course Code	**21IST6044**						
Category	Professional Elective Courses-I						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

1. To Learn the characteristics, designs,and challenges in the IoT
2. To Understand the IOT and M2M Communication
3. To Analyze various Layers connectivity and motivation of IPV6
4. To Illustrate the role of IoT in various domains of Industry
5 To Infer the role of Data Analytics in IOT.

UNIT I : **07 hours**
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,Levels of IOT. **T1:Chapter1-1.1,1.2,1.3,1.4**
UNIT II **08 hours**
loT and M2M Communication: Introduction, M2M, Difference between loT and M2M, SDN & NFV for loT, Need for loT Systems Management, Simple Network Management Protocol, Network Operator Requirements, **T1:Chapter3-3.1,3.2,3.3,3.4 Chapter 4: 4.1,4.2**
UNIT III **08 hours**
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**
UNIT IV **08 hours**
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**
UNIT V **08 hours**

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

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

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 .

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

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2	2	2	2			2	2			2	2	
CO2			2	2	2	2	2		2	2			2	2	
CO3				2	2	2	2	2	2	2			2	2	
CO4				2	2			2	2	2	2		2	2	
CO5				2	2	2	2		2	2			2	2	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**INTERNET OF THINGS**						
Course Code	**21IST6051**						
Category	OpenElective course- I(OEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

5. To Learn the characteristics, designs,and challenges in the IoT
6. To Understand the IOT and M2M Communication
7. To Analyze various Layers connectivity and motivation of IPV6
8. To Illustrate the role of IoT in various domains of Industry

5 To Infer the role of Data Analytics in IOT.

UNIT I : **07 hours**

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,Levels of IOT.

T1:Chapter1-1.1,1.2,1.3,1.4

UNIT II **08 hours**

loT and M2M Communication: Introduction, M2M, Difference between loT and M2M, SDN & NFV for loT, Need for loT Systems Management, Simple Network Management Protocol, Network Operator Requirements,

T1:Chapter3-3.1,3.2,3.3,3.4 Chapter 4: 4.1,4.2

UNIT III **08 hours**

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

UNIT IV **08 hours**

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

UNIT V **08 hours**

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

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

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 .

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

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			2	2	2	2			2	2			2	2	
CO2			2	2	2	2	2		2	2			2	2	
CO3				2	2	2	2	2	2	2			2	2	
CO4				2	2			2	2	2	2		2	2	
CO5				2	2	2	2		2	2			2	2	

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**Python Programming**						
Course Code	**21IST6052**						
Category	Engineering Science Course(ES)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

COURSE OBJECTIVE:

1. To acquire programming skills in core Python.
2. To present Object Oriented concepts and implementation skills in Python.
3. To develop the skills of designing Graphical user Interfaces in Python.
5. To develop the ability to write database and threaded applications in Python.

UNIT I **07 Hours**

Introduction to Python: Features of Python, Python Virtual Machine (PVM), Writing Our First Python Program, Executing a Python Program, Getting Help in Python, Comments in Python, Doc Strings. **Datatypes in Python:** Built-in datatypes, The None Type, bool Datatype, Sequences in Python, Sets, Literals in Python, Determining the Datatype of a Variable, Characters in Python, User-defined Datatypes, Constants in Python, Identifiers and Reserved words, Naming Conventions in Python. **Operators in Python**: Arithmetic Operators, Assignment Operators, Unary minus Operator, Relational Operators, Logical Operators, Boolean Operators, Membership Operators, Identity Operators, Operator Precedence and Associativity, Mathematical Functions. **Input and Output:** Output statements, Various formats of The print(), Input Statements, Command Line Arguments. **Control Statements**: If Statement, If … else Statement, If … elif … else Statement, While Loop, For Loop, Infinite Loops, Nested Loops, Else Suite, Break Statement, Continue Statement, Pass Statement, Assert Statement, Return Statement. **Text Book1: Ch 1, Ch 2, Ch 3, Ch 4,Ch 5 , Ch 6**

UNIT II **07 Hours**

Arrays in Python: Creating an Array, Importing the Array Module, Indexing and Slicing on Arrays, Types of Arrays, Working with Arrays using numpy, Creating Arrays using linspace, logspace, arrange function, Creating Arrays using zeros() and ones() Functions, Mathematical Operations on Arrays, Comparing Arrays, Aliasing the Arrays, Slicing and Indexing in numpy Arrays, Dimensions of Arrays, Attributes of an Array, Reshape() Method, Flatten() Method, Working with Multi-dimensional Arrays, The array() Function, The ones() and zeros() Functions, The eye() Function, The reshape() Function, Matrices in numpy. **Strings and Characters**: Creating Strings, Length of a String, Indexing in Strings, Repeating the Strings, Concatenation of Strings, Checking Membership, Comparing Strings, Finding Sub Strings, Strings are Immutable, Replacing a String with another String, Splitting and Joining Strings, Checking Starting and Ending of a String, String Testing Methods, Formatting the Strings, Sorting Strings. **Functions**: Defining a Function, Calling a Function, Returning Results from a Function, Returning Multiple Values from a Function, Positional Arguments, Default Arguments, Variable Length Arguments, Local and Global Variables, The Global Keyword, Passing a Group of Elements to a Function, Recursive Functions, Lambdas, Using Lambdas with filter(),map(),reduce() Function, Function Decorators, Generators. Structured Programming: Creating our Own Modules in Python, The Special Variable __name__, **Text Book1: Ch 7,Ch 8,Ch 9**

UNIT III **09**

Hours

Lists and Tuples: Creating Lists using range() Function, Updating the Elements of a List, Concatenation of Two Lists, Repetition of Lists, Membership in Lists, Aliasing and Cloning Lists, Methods to Process Lists, Nested Lists, List Comprehensions, Tuples, Creating Tuples, Accessing the Tuple Elements, Basic Operations on Tuples, Functions to Process Tuples, Nested Tuples, **Dictionaries:** Operations on Dictionaries, Dictionary Methods, Using for Loop with Dictionaries, Sorting the Elements of a Dictionary using Lambdas, Converting Lists into Dictionary, Converting Strings into Dictionary, Ordered Dictionaries. **Introduction to OOPS**: Problems in Procedure Oriented Approach, Features of Object Oriented Programming System (OOPS), Classes and Objects, Encapsulation, Abstraction, Inheritance, Polymorphism, Classes and Objects, Self Variable, Constructor, Types of Variables, Namespaces, Types of Methods, Passing Members of One Class to Another Class, Inner Classes, **Inheritance and Polymorphism**: Constructors in Inheritance, Overriding Super Class Constructors and Methods, Super() Method, Types of Inheritance, Method Resolution Order (MRO), Operator Overloading, Method Overloading, Method Overriding, Abstract Classes and Interfaces in Python.

Text Book1: Ch 10,Ch 11,Ch12,Ch13,Ch14,Ch15

UNIT IV **09**

Hours

Exceptions: Errors in a Python Program, Exceptions, Exception Handling, Types of Exceptions, The Except Block, Assert Statement, User-Defined Exceptions, Logging the Exceptions. **Files in Python**: Types of Files in Python, Working with Text Files, Working with Binary Files, Pickle in Python, seek() and tell() Methods, Random Accessing of Binary Files using mmap, Running Other Programs from Python Program. **Regular Expressions in Python**: Sequence Characters in Regular Expressions, Quantifiers in Regular Expressions, Special Characters in Regular Expressions, Using Regular Expressions on Files, Data Structures in Python. **Date and Time**: The epoch, Date and Time Now, Formatting Dates and Times, Finding Durations using time delta, Comparing Two Dates, Sorting Dates, Stopping Execution Temporarily, Knowing the Time taken by a Program, Working with Calendar Module. **Text Book1: Ch 16,Ch 17, Ch 18 ,Ch 19, Ch 20**

UNIT V **07**

hours

Threads: Differences between a Process and a Thread, Concurrent Programming and GIL, Uses of Threads, Creating Threads in Python, Thread Class Methods, Single Tasking using a Thread, Multitasking using Multiple Threads, Thread Synchronization, Avoiding Deadlocks in a Program, Communication between Threads, Thread Communication using nofity() and wait() Methods, , Daemon Threads, Networking in Python **Graphical User Interface**: GUI in Python, The Root Window, Fonts and Colors, Working with Containers, Canvas, Frame, Widgets, Button Widget, Label Widget, Message Widget, Text Widget, Scrollbar Widget, Checkbutton Widget, Radiobutton Widget, Entry Widget, Spinbox Widget, Listbox Widget, Menu Widget, **Python's Database Connectivity**: Advantages of a DBMS over Files, Working with MySQL Database, Operations on rows of a Table, Creating Database Tables through Python, Working with Oracle Database in Python, Stored Procedures. **Text Book1: Ch 21, Ch 22, Ch 23,Ch 24**

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

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

- **CO1**: Demonstrate the understanding and usage of 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, files, exceptions and regular expressions.
- **CO4**: Implement object oriented concepts, database applications.
- **CO5**: Apply the knowledge of python and use the language scripting elements and constructs to develop threaded and GUI applications.

Textbooks:

1. Dr. R. Nageswawa Rao, Core Python Programming, Dreamtech press, 2nd Edition 2018 (Chapter Numbers: 3,4,5,6,7, 8,9,10,11,16,17,18,22).

Reference Books:

1. Gowrishankar S. Veena A, Introduction to Python Programming, CRC Press Taylor & Francis Group, 1st Edition 2019.
2. Michael Urban and Joel Murach, Mike Murach Elizabeth Drake, Python Programming, 1st Edition, 2016.

EBOOKS/ONLINE RESOURCES

1. http://www.w3schools.com
2. http://docs.python.org
3. http://www.tutorialspoint.com
4. http://www.learnpython.org

MAPPING of COs with POs

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

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**SOFTWARE ENGINEERING**						
Course Code	**21IST6053**						
Category	Open Elective Courses-I(OEC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

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,

UNIT I : **07 hours**
Overview: FAQ about software engineering, Professional and ethical responsibility,Case studies.Socio-Technical systems: Systemsengineering,system procurement,system development and operation.Software Processes: Process activities; The Rational Unified Process; Agile methods, Plan-driven and agile development, XP, Scrum T1:Ch1,Ch2,Ch3,Ch10
UNIT II **08 hours**
Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The softwarerequirements document. Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management. **Introduction, Modelling Concepts and Class Modelling:** What is Object orientation? What is OO development? OO Themes; Evidence for usefulness of OO development; OO modelling history. Modelling as Design technique: Modelling; abstraction; The Three models. Class Modelling: Object and Class Concept; Link and associations concepts; Generalization and Inheritance; A sample class model; Navigation of class models; T1:Ch4, T2:1,2,3
UNIT III **09 hours**
System modeling: System Models: Context models; Behavioral models;Object models; Structured methods. Architectural Design:Architectural design ,Architectural views,patterns and architecture. Design patterns ,Implementation issues, Design evolution.Development: Rapid Software Development: Rapid application development. Open source development

T1: Ch 5 ,Ch 6,Ch 7

UNIT IV **07 hours**

Software Testing: Development testing ,Test-driven development ,Release testing,User testing. Test Automatio
Evolution processes. Program evolution dynamics. Software maintenance,
Legacy system management
T1: Ch 8 , Ch 9

UNIT V **08 hours**

Project Management; Risk management.Project planning: software pricing; Project scheduling; Agile Planning; Estimation techniques.

Quality management: Software quality Reviews and inspections . Software measurement and metrics . Software standards.

T1: Ch 22, Ch 23,Ch 24

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

COURSE OUTCOMES: On completion of the course, student should 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 testing techniques, modern engineering tools necessary for engineering practice
CO5:Demonstrate the knowledge of project management to ensure good quality software

TEXT BOOK:

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

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.

EBOOKS/ONLINE RESOURCES

1.http://agilemanifesto.org/
2. http://www.jamesshore.com/Agile-Book

SCHEME FOR EXAMINATIONS:

The theory part of the PCC shall be evaluated both by CIE and SEE.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					3		3				3	3		3
CO2	3	3	3									3		3	3
CO3	3	3	3		3								2	2	2
CO4	3	3	3							3			2	2	2
CO5	3					3				3	3	3	3	3	3
Strength of correlation: Low-1, Medium- 2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**WEB TECHNOLOGY**						
Course Code	**21IST6054**						
Category	**Open Elective course- I(OEC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	**00**	**00**	**00**	**03**	**39**	**03**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

CO1: Learn HTML , Learn XHTML tags with utilizations.
CO2:Know CSS with dynamic document utilizations.
CO3:Learn JavaScript with Element access in JavaScript.
CO4: Logically plan and develop web pages.

UNIT I : **07 hours** Internet, WWW, Web Browsers, and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox
UNIT II **08 hours** HTML and XHTML-I : Origins of HTML and XHTML, Basic syntax, Standard XHTML document structure, Basic text markup, Images, Hypertext Links.
UNIT III **08 hours** HTML and XHTML-II **:** Lists, Tables, Forms, Frames in HTML and XHTML, Syntactic differences between HTML and XHTML**.**
UNIT IV CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, Background images**.** **8 hours**
UNIT V Java Script – I: Object orientation and JavaScript; General syntactic characteristics; Primitives**,** Operations, and expressions; Screen output and keyboard input, Control statements, Object creation and Modification, Functions; **8 hours**

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

COURSE OUTCOMES:

On successful completion of the course, the student 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: Interpret CSS for dynamic documents

CO4: Design a small project with JavaScript and XHTML.

TEXT BOOKS:

1. Robert W Sebesta, "Programming the World Wide Web", 6th Edition, Pearson Education, 2008.

REFERENCE BOOKS:

1. M.Deitel, P.J.Deitel, A.B.Goldberg, "Internet & World Wide Web How to program", 3rd Edition, Pearson Education / PHI, 2004.
2. Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.
3. Xue Bai et al, "The Web Warrior Guide to Web Programming", Thomson, 2003.

EBOOKS/ONLINE RESOURCES

1. Fundamentals of WEB Programming: https://www.youtube.com/watch?v=DR9dr6gxhDM
2. HTML and XHTML: https://www.youtube.com/watch?v=A1XlIDDXgwg
3. CSS: https://www.youtube.com/watch?v=J35jug1uHzE
4. Java Script and HTML Documents: https://www.youtube.com/watch?v=Gd0RBdFRvF0

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1		1								2	1	1
CO2		2	2		2	1							2	1	1
CO3		2	2		1								2	1	1
CO4		1	1		1	1							2	1	1
CO5		2	2		2	2			1				2	1	1

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2023 -2024

Course Title	**Machine Learning Lab**						
Course Code	**21ISL606**						
Category	**Professional Core Course-(PCC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	**00**	**02**	**00**	**02**	**26**	**01**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course 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

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 the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets..

9. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select the appropriate data set for your experiment and draw graphs.

10. Implement the EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using the k-Means algorithm.

Course Outcomes:

After completion of course students will be able to:

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

CO2: Apply appropriate 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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											3	3	3
CO2			3	3										3	
CO3		3		3	3							3	3		3
CO4				4					3			3	3		3
Strength of correlation: Low-1, Medium- 2, High-3															

Detailed Scheme and Syllabus

ACADEMIC YEAR 2023-2024

VII - VIII (2020-2024 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 skillsto promote lifelong learning.

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

PROGRAM SPECIFIC OUTCOMES (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 2023-2024

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	18IS75X	Open-Elective C	ISE	3	--	--	03	50	50	100	3
7	PC	18ISL76	Big Data Analytics Lab	ISE	--	--	2	03	50	50	100	1
8	PC	18ISL77	Software Testing Lab		--	--	2	03	50	50	100	1
9	Project	18ISP78	Project Work Phase-1	ISE	--	--	2	03	50	50	100	2
10	INT	18ISI79	Internship	(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**	**450**	**450**	**900**	**23**

Note: PC: Professional core, PE: Professional Elective, OE: Open Elective, MC: MandatoryCourse , 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 SEE examination will be conducted during VIII semester and prescribed credits shall be added to VIII semester. Internship is considered as a head of passing and is considered for the award of degree. Those, who do not take-up/complete the internship will be declared as failed and have to complete during subsequent SEE examination after satisfy the internship requirements.

<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>18IS751</td><td>Mobile Application Development</td></tr>
<tr><td>18IS752</td><td>Python Programming</td></tr>
<tr><td>18IS753</td><td>Artificial Intelligence</td></tr>
<tr><td colspan="3">CMEP: Cost Management of Engg.Projects, OSHA: Occupational Safety and Health Administration</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 2023-2024

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	18HS81	CMEP / OSHA	IM/CV	4	--	--	03	50	50	100	2
2	Project	18ISP81	Project Work phase-2	ISE		-	2	03	50	50	100	10
3	Seminar	18ISS82	Technical Seminar	ISE	-	--	2	03	50	--	50	1
4	INT	18ISI83	Internship	ISE	(Completed during the intervening vacations of VI and VII semesters and /or VII and VIII semester)			03	50	50	100	2
				TOTAL	**04**		**4**	**12**	200	**150**	**350**	**15**

Note: INT: Internship, MC: Mandatory Course

Electives

Internship: Those, who have not pursued /completed the internship will be declared as failed and have to complete duringsubsequent 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

SubTitle :ARTIFICIAL NEURAL NETWORKS		
SubCode: 18IS731	**No. ofCredits:3 =3 : 0 :0 (L-T-P)**	**No. oflectureh**
ExamDuration : 3 hours	**Exam Marks: CIE +Assignment + Group Activity + SEE = 40 + 5 +5+ 50 =100**	**TotalNo. ofContact**

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

TEXTBOOKS:

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:18IS751	**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: 18IS752	**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: 18IS753	**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:18ISL76	**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:18ISL77	**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 triangleproblem defined as follows: Accept three integers which are supposed to be the threesides 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 theupper limit for the size of any side is 10. Derive test cases for your program based onboundary-value analysis, execute the test cases and discuss the results.

2. Design, develop, code and run the program in any suitable language to solve thecommission problem. Analyze it from the perspective of boundary value testing, derivedifferent 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 theNextDate function. Analyze it from the perspective of boundary value testing, derivedifferent 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 triangleproblem defined as follows: Accept three integers which are supposed to be the threesides 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 theupper limit for the size of any side is 10. Derive test cases for your program based onequivalence class partitioning, execute the test cases and discuss the results.

5. Design, develop, code and run the program in any suitable language to solve thecommission 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 theNextDate 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 triangleproblem defined as follows: Accept three integers which are supposed to be the threesides 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 ISP78	**No. of Credits: 2**	

Sub Title : INTERNSHIP		
Sub Code:18 ISI79	**No. of Credits: 2**	

VIII SEMESTER

Sub Title :CMEP/OSHA		
SubCode: 18IM81 / 18CV81	**No. of Credits: 2**	