Detailed Scheme and Syllabus

ACADEMIC YEAR 2025-2026

VII-VIII (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

PEOs:

PEO 1:

Graduates will acquire strong technical knowledge and problem-solving skills in Information Science and Engineering to develop innovative solutions for engineering challenges in diverse global environments.

PEO 2:

Graduates will pursue continuous professional development through higher education, research activities, and adaptation to emerging technologies to enhance their expertise and contribute to advancements in Information Technology.

PEO 3:

Graduates will demonstrate ethical leadership, effective communication, and teamwork skills while applying their Information Science expertise to address societal and sustainable needs with professional integrity and social commitment

Dr.Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education(OBE) and Choice Based Credit System
B.E in Information Science and Engineering
Tentative Scheme of Teaching and Examination effective from the Academic Year 2025-2026 (2022 Scheme)

VIISEMESTER(SwappableVIIandVIIISEMESTER)

Sl.No	Course andCourseCode		CourseTitle	TeachingDepartment (TD)and QuestionPaper SettingBoard(PSB)	TeachingHours/Week				Examination				Credits
					TheoryLecture	Tutorial	Practical/ Drawing	Self-Study	Durationhours	CIEMarks	SEEMarks	TotalMarks	
					L	T	P	S					
1	IPCC	22ISU701	Big Data Anaytics	ISE	3	0	2		03	50	50	100	4
2	IPCC	22ISU702	Advanced Cloud Computing	ISE	3	0	2		03	50	50	100	4
3	PCC	22IST703	Deep Learning	ISE	3	2	0		03	50	50	100	4
4	PEC	22IST704x	Professional Elective Course	ISE	3	0	0		03	50	50	100	3
5	OEC	22IST705x	Open Elective Course - 2	ISE	3	0	0		01	50	50	100	3
6	PROJ	22ISP706	Major Project Phase-II	ISE	0	0	12		03	100	100	200	6
										400	300	700	24

PCC: Professional Core Course,**PCCL**:Professional Core Course laboratory,**PEC**:ProfessionalElective Course,**OEC**:OpenElectiveCoursePR:ProjectWork,**L:**Lecture,**T**:Tutorial,**P**:PracticalS= Self-Study,**CIE**:ContinuousInternalEvaluation,**SEE**:SemesterEndEvaluation.**TD-**TeachingDepartment,**PSB**:PaperSettingdepartment,**OEC**:OpenElective Course,**PEC**:ProfessionalElectiveCourse.**PROJ**:Projectwork

Professional Elective Course 22XXT704x			
22IST704A	Information & Network Security	**22IST704C**	Digital Image Processing
22IST704B	Data Science	**22IST704D**	
Open Elective Course 22XXT705x			
22IST705A	Software Testing	**22IST705C**	
22IST705B	Web Technologies	**22IST705D**	

Note:VII and VIII semesters of IV years of the program

(1) InstitutionscanswaptheVIIandVIIISemesterSchemesofTeachingandExaminationstoaccommodateresearchinternships/industryinternshipsaftertheVI semester**.**

(2)CreditsearnedforthecoursesofVIIandVIIISemesterSchemeofTeachingandExaminationsshallbecountedagainst the correspondingsemesterswhetherthe VII orVIIIsemesters iscompletedduringthe beginningoftheIVyearorthelater partofIVyearsof the program.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the EngineeringandTechnologycurriculum.Multidisciplinarycoursesthatareaddedsupplementthelatesttrendandadvancedtechnologyintheselectedstreamof Engineering.Eachgroupwillprovideanoptiontoselect onecourse.Theminimumnumberofstudents'strengthsfor offeringprofessionalelectivesis10.However,thisconditionalshall notbeapplicabletocaseswherethe admissiontotheprogram is less than10.

OpenElectiveCourses:

Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they canopt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under theguidance of the Program Coordinator/ Advisor/Mentor. The minimum numbers of students' strength for offering Open Elective Course is 10. However, this conditionshallnot beapplicabletoclass wheretheadmissiontotheprogramis lessthan10.

PROJECT WORK(21XXP75): TheobjectiveoftheProjectwork is

(i) Toencourageindependentlearningandthe innovativeattitudeofthestudents.

(ii) Todevelopinteractiveattitude,communicationskills,organization,timemanagement,andpresentationskills.

(iii) Toimpartflexibilityandadaptability.

(iv) Toinspireteamworking.

(v) Toexpandintellectualcapacity,credibility,judgmentandintuition.

(vi) Toadheretopunctuality,settingandmeetingdeadlines. To installresponsibilitiestooneselfandothers.

(vii) Totrainstudentstopresentthetopicofprojectworkinaseminarwithoutanyfear,facetheaudienceconfidently,enhancecommunicationskills,involveingroupdiscussiontopresent andexchangeideas.

CIEprocedureforProjectWork:

(1) Singlediscipline: TheCIEmarksshallbeawardedbyacommitteeconsistingoftheHeadoftheconcernedDepartmentandtwoseniorfacultymembersoftheDepartment,oneofwhomshallbe theGuide.

TheCIEmarksawardedfortheprojectwork,shallbebasedontheevaluationoftheprojectworkReport,projectpresentationskill,andquestionandanswersessioninthe ratio50:25:25.Themarksawarded fortheprojectreportshallbethe samefor allthebatchmates.

(2) Interdisciplinary: ContinuousInternalEvaluationshallbegroup-wiseatthecollegelevelwiththeparticipationofallguidesofthecollege.Participationofexternal guide/s,ifany,isdesirable.TheCIEmarksawardedfortheprojectwork,shallbebasedontheevaluationofprojectworkReport,projectpresentationskill,andquestionandanswer sessionin theratio50:25:25.Themarksawardedfor theprojectreport shallbe thesameforallthebatch mates.

SEEprocedureforProjectWork:SEEforprojectworkwillbeconductedbythetwoexaminersappointedbytheUniversity.TheSEEmarksawardedfortheprojectworkshallbebasedontheevaluationofprojectworkReport,projectpresentationskill,andquestionandanswersessionintheratio50:25:25.

Dr.Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education(OBE) and Choice Based Credit System
B.E in Information Science and Engineering
Tentative Scheme of Teaching and Examination effective from the Academic Year 2025-2026 (2022 Scheme)

VIIISEMESTER(SwappableVIIandVIIISEMESTER)

Sl.No	Course andCourseCode		CourseTitle	TeachingDepartment (TD)and QuestionPaper SettingBoard(PSB)	TeachingHours/Week				Examination				Credits
					TheoryLecture	Tutorial	Practical/ Drawing	Self-Study	Duration inhours	CIEMarks	SEEMarks	TotalMarks	
					L	T	P	S					
1	PEC	22IST801x	ProfessionalElective (OnlineCourses)		3	0	0		-	-	-	-	3
2	OEC	22IST802x	OpenElective(OnlineCourses) - 3		3	0	0		-	-	-	-	3
3	INT	22ISI803	Internship(Industry/Research) (14-20Weeks)		0	0	12		03	100	100	200	10
										200	200	400	16

L:Lecture,**T**:Tutorial,**P**:PracticalS= Self-Study,**CIE**:ContinuousInternalEvaluation,**SEE**:SemesterEndEvaluation.**TD-**TeachingDepartment,**PSB**:PaperSettingdepartment,**OEC**:OpenElectiveCourse,**PEC**:ProfessionalElectiveCourse.**PROJ**:Projectwork,**INT**:IndustryInternship/ResearchInternship/Rural Internship.

ProfessionalElectiveCourse(Onlinecourses) 22XXT801x			
22XXT801A	Vtu online course(3 credits)	**22XXT801C**	
22XXT801B		**22XXT801D**	
OpenElectiveCourses(OnlineCourses) 22XXT802x			
22XXT802A	Vtu online course(3 credits)	**22XXT802C**	
22XXT802B		**22XXT802D**	

Note: VII and VIII semesters of IV years of the programSwappingFacility

- InstitutionscanswapVIIandVIIISemesterSchemeofTeachingandExaminationstoaccommodate**researchinternships/industryinternships/RuralInternship**aftertheVIsemester**.**

- Credits earned for the courses of VII and VIII Semester Scheme of Teaching and Examinations shall be counted against the corresponding semesters whether VII orVIIIsemester is completedduringthebeginningof IVyearor later part of IVyearofthe program.

Elucidation:

AtthebeginningofIVyearsoftheprogrami.e.,afterVIsemester,VIIsemesterclassworkandVIIIsemester**ResearchInternship/IndustrialInternship/RuralInternship**shallbepermittedtobeoperatedsimultaneouslybytheUniversitysothatstudentshaveampleopportunityforaninternship.Inotherwords,agoodpercentageoftheclassshall attendVIIsemester classworkandasimilarpercentageofothersshallattendto ResearchInternshiporIndustrial InternshiporRural Internship.

Research/Industrial /Rural Internship shall be carried out at an Industry, NGO, MSME, Innovation center, Incubation center, Start-up, center of Excellence (CoE), StudyCentreestablishedintheparent institute and/or at reputedresearchorganizations/institutes.

The mandatory Research internship /Industry internship / Rural Internship is for 14 to 20 Weeks. The internship shall be considered as a head of passing and shall beconsidered for the award of a Degree. Those, who do not take up/complete the internship shall be declared to fail and shall have to complete it during the subsequentUniversityexaminationafter satisfyingtheinternshiprequirements.

Research internship: A research internship is intended to offer the flavor of current research going on in the research field. It helps students get familiarized with thefieldandimparts theskill requiredforcarryingout research.

Industry internship: Is an extended periodofworkexperienceundertakenbystudents tosupplementtheirDegreeforprofessional development. It also helpsthemlearntoovercomeunexpectedobstaclesandsuccessfullynavigateorganizations,perspectives,andcultures.Dealingwithcontingencieshelpsstudentsrecognize,appreciate,andadapt toorganizational realitiesby temperingtheirknowledgewith practical constraints.

Rural Internship: Rural development internship is an initiative of Unnat Bharat Abhiyan Cell, RGIT in association with AICTE to involve students of all departmentsstudyingin differentacademicyearsforexploringvariousopportunitiesintechno-socialfields,to connectandworkwithRuralIndiafor their upliftment.

The faculty coordinator or mentor has to monitor the student's internship progress and interact with them to guide for the successful completion of the internship.The students arepermitted tocarryouttheinternshipanywhereinIndiaorabroad.Universityshallnotbearany expensesincurredinrespectoftheinternship.

- With the consent of the internal guide and Principal of the Institution, students shall be allowed to carry out the internship at their hometown (**within or outside thestate or abroad**), provided favorable facilities are available for the internship and the student remains regularly in contact with the internal guide. **University/Institute shall notbearanycostinvolvedincarrying outtheinternshipbystudents.**However, studentscanreceiveanyfinancialassistanceextendedbytheorganization

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025 -2026

Course Title	**Big Data Analytics**						
Course Code	**22 ISU701**						
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 implement MapReduce programs for processing big data.*
2. *To realize storage and processing of big data using MongoDB, Pig, Hive and Spark.*
3. *To analyze big data using machine learning techniques.*
4.

UNIT I **08 hours**

Classification of data, Characteristics, Evolution and definition of Big data, What is Big data, Why Big data,Traditional Business Intelligence Vs Big Data,Typical data warehouse and Hadoop environment.
Big Data Analytics: What is Big data Analytics, Classification of Analytics, Importance of Big Data Analytics, Technologies used in Big data Environments, Few Top Analytical Tools , NoSQL, Hadoop.
TB1: Ch 1: 1.1, Ch2: 2.1-2.5,2.7,2.9-2.11, Ch3: 3.2,3.5,3.8,3.12, Ch4: 4.1,4.2

Lab Component:

1. Use CDH (Cloudera Distribution for Hadoop) and HUE (Hadoop User Interface) to analyze data and generate reports for sample datasets
2. Install, configure and run python, numPy and Pandas and Visualize data using basic plotting techniques in Python.

UNIT II **08 hours**

Introduction to Hadoop: Introducing hadoop, Why hadoop, Why not RDBMS, RDBMS Vs Hadoop, History of Hadoop, Hadoop overview, Use case of Hadoop, HDFS (Hadoop Distributed File System),Processing data with Hadoop, Managing resources and applications with Hadoop YARN(Yet Another Resource Negotiator). **Introduction to Map Reduce Programming:** Introduction, Mapper, Reducer, Combiner, Partitioner, Searching, Sorting, Compression.
TB1: Ch 5: 5.1-,5.8, 5.10-5.12, Ch 8: 8.1 - 8.8

Lab Component :

1. Implement the following file management tasks in Hadoop:Adding files and directories,

Retrieving files, Deleting files and directories.
2. Develop a MapReduce program to implement Matrix Multiplication
3. Develop a Map Reduce program that mines weather data and displays appropriate messages indicating the weather conditions of the day.
4. Develop a MapReduce program to find the tags associated with each movie by analyzing movie lens data.

UNIT III 08 hours

Introduction to MongoDB: What is MongoDB, Why MongoDB, Terms used in RDBMS and MongoDB, Data Types in MongoDB, MongoDB Query Language.

TB1: Ch 6: 6.1-6.5

Lab Component:

1.Implement Functions: Count – Sort – Limit – Skip – Aggregate using MongoDB

UNITIV **08 hours**

Introduction to Hive: What is Hive, Hive Architecture, Hive data types, Hive file formats, Hive Query Language (HQL), RC File implementation, User Defined Function (UDF).

Introduction to Pig: What is Pig, Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Use case for Pig, Pig Latin Overview, Data types in Pig, Running Pig, Execution Modes of Pig, HDFS Commands, Relational Operators, Eval Function, Complex Data Types, Piggy Bank, User Defined Function, Pig Vs Hive.

TB1: Ch 9: 9.1-9.6,9.8, Ch 10: 10.1 - 10.15, 10.22

Lab Component:

1. Write Pig Latin scripts to sort, group, join, project, and filter the data.
2. Use Hive to create, alter, and drop databases, tables, views, functions, and indexes

UNIT V **07 hours**

Spark and Big Data Analytics: Spark, Introduction to Data Analysis with Spark.

Text, Web Content and Link Analytics: Introduction, Text Mining, Web Mining, Web Content and Web Usage Analytics, Page Rank, Structure of Web and Analyzing a Web Graph.

TB2: Ch5: 5.2,5.3, Ch 9: 9.1-9.4

Lab Component:

1. Implement a word count program in Hadoop and Spark.

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 fundamentals of Big Data Analytics.
- **CO2:** Investigate Hadoop Framework and Hadoop Distributed file system.
- **CO3:** Illustrate the concepts of NoSQL using MongoDB for Big Data.
- **CO4:** Demonstrate the Map Reduce Programming model to process Big Data along with Hadoop Tools.
- **CO5:** Use machine learning algorithms for real world big data and analyze web content, social networks to provide analytics with relevant visualization tools

TEXT BOOKS:

1. *Seema Acharya and Subhashini Chellappan "Big data and Analytics" Wiley India Publishers, 2nd Edition,2019.*

2. Rajkamal and Preeti Saxena, "Big Data Analytics: Introduction to Hadoop, Spark and Machine Learning", McGraw Hill, 2nd Edition, 2023.

REFERENCE BOOKS:

1. *Adam Shook and Donald Mine, "MapReduce Design Patterns: Building Effective Algorithms and Analytics for Hadoop and Other Systems" - O'Reilly 2012*
2. *Tom White, "Hadoop: The Definitive Guide" 4th Edition, O'reilly Media, 2015.*
3. *Thomas Erl, Wajid Khattak, and Paul Buhler, Big Data Fundamentals: Concepts, Drivers & Techniques, Pearson India Education Service Pvt. Ltd., 1st Edition, 2016*
4. *John D. Kelleher, Brian Mac Namee, Aoife D'Arcy -Fundamentals of Machine Learning for Predictive Data*

Analytics: Algorithms, Worked Examples, MIT Press 2020, 2nd Edition

EBOOKS/ONLINE RESOURCES

1.https://www.kaggle.com/datasets/grouplens/movielens-20m-dataset
2.https://www.youtube.com/watch?v=bAyrObl7TYE&list=PLEiEAq2VkUUJqp1k-g5W1mo37urJQOdCZ
3.https://www.youtube.com/watch?v=VmO0QgPCblist=PLEiEAq2VkUUJqp1W1mo37urJQOdCZ&in dex=4
4. https://www.youtube.com/watch?v=GG-VRm6XnNk https://www.youtube.com/watch?v=JglO2Nv_92A

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	PO	PO	PO4	PO5	PO6	PO	PO	PO9	PO10	PO1	PO1	PSO	PSO	PSO
CO	3	3											3		
CO	3	2		3	2							1	3		
CO	3	2	2	3	3							1	3		2
CO	3	2	2	3	3							1	3		2
CO	3	3	2	3	3	1						1	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-2025 -2026

Course Title	**Advanced Cloud Computing**						
Course Code	**22 ISU702**						
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 learn how to use Cloud Services.
2. To implement Virtualization
3. To implement Task Scheduling algorithms.
4. Apply Map-Reduce concept to applications.
5. Broadly educate to know the impact of engineering on legal and societal issues involved.

UNIT I **08 hours**

Introduction: Network centric computing and network centric content, Peer-to-peer systems, Cloud Computing: an old idea whose time has come, Cloud Computing delivery models & Services, Ethical issues, Cloud vulnerabilities, Challenges.

Cloud Infrastructure: Amazon, Google, Azure & online services, open source private clouds. Storage diversity and vendor lock-in, intercloud, Energy use & ecological impact of data centers, service level and compliance level agreement, Responsibility sharing, user experience,
Software licensing.

1. Create a web application to enter student details like Name, USN, Semester, Section and CGPA to a database on Salesforce Cloud Platform.
2. Create a web application to implement an online cart for adding items to a shopping cart and deleting it

UNIT II **08 hours**

Cloud Computing: Applications & Paradigms, Challenges, existing and new application opportunities, Architectural styles of cloud applications, Workflows coordination of multiple activities, Coordination based on a state machine model -the Zoo Keeper, The Map Reduce programming model, Apache Hadoop, A case study: the GrepTheWeb application, High performance computing on a cloud, cloud for biological research, Social computing, digital

content, and cloud computing.
Cloud Applications: Scientific Applications, Business and consumer Application
1. Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively.

UNIT III **08 hours**

Cloud Resource Virtualization: definition, merits and demerits, types and techniques, Layering and virtualization, Virtual machine monitors, Virtual machines Full virtualization and paravirtualization, Hardware support for virtualization Case study: Xen -a VMM based on paravirtualization, Optimization of network virtualization in Xen 2.0, vBlades -paravirtualization targeting a x86-64 Itanium processor, A performance comparison of virtual machines, The darker side of virtualization, Software fault isolation.
1. Install VirtualBox/VMware Workstation with different flavors of Linux and execute some C/C++ programs
2. Create a file in one virtual machine and share it on a host machine

UNITIV **08 hours**

Cloud Resource Management and Scheduling: Policies and mechanisms for resource management, Stability of a two-level resource allocation architecture, Feedback control based on dynamic thresholds, Coordination of specialized autonomic performance managers, utility based model for cloud-based web services, Resource bundling, combinatorial auctions for cloud resources, fair queuing, Start time fair queuing, borrowed virtual time.
Python for Cloud: Python for Amazon Web services, Python for Google Cloud platform, Python for Windows Azure, python for map Reduce
Self Study Component:
1. Install Google App Engine. Create hello world app and other simple web applications using python/java

UNIT V **07 hours**

Cloud Security, Cloud Application Development, Storage systems: Storage models, file systems, databases, DFS, General parallel File system, GFS, Apache Hadoop, Locks & Chubby, TPS & NOSQL databases, Bigdata, Mega store.
Cloud Security: Risks, Security, Privacy, Trust, Security of OS, VM, VMM, Shared Image, Management OS, Xoar.
Programs on cloud security
1. Create a RDS and launch in your custom VPC network

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

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

CO1: Analyze the Cloud computing setup with it's vulnerabilities and applications using different architectures.

CO2: Design different workflows according to requirements and Apply map reduce programming model.

CO3: Apply and Design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.

CO4: Create combinatorial auctions for cloud resources and Design scheduling algorithms for computing clouds

CO5: Assess cloud Storage systems and Cloud security, the risks involved,its impact and develop cloud application

TEXT BOOKS:

1. Dan C. Marinescu, Cloud Computing: Theory and Practice, Elsevier, 2nd Edition, 2024, Print Book ISBN :9780124046276, eBook ISBN :9780124046412

REFERENCE BOOKS:

1. Rajkumar Buyya , James Broberg, Andrzej Goscinski: Cloud Computing Principles and Paradigms, Willey 2014.

EBOOKS/ONLINE RESOURCES

1. Cloud Computing : A hands on Approach, Arshdeep Bagha - Vijay Bagha Madisetti , 2013, ISBN/EAN13: 1494435144 / 9781494435141.
2. https://nptel.ac.in/content/syllabus_pdf/106104182.pdf
3. https://nptel.ac.in/content/syllabus_pdf/106105167.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	PO	PO	PO4	PO5	PO6	PO	PO	PO9	PO10	PO1	PO1	PSO	PSO	PSO
CO	2	1		1									3		
CO	2	1	2										3		
CO	2	2	2										3		2
CO	2	2	1		1								3		2
CO	2	2			1								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-2025 -2026

Course Title	**DEEP LEARNING**						
Course Code	**22IST703**						
Category	**Professional Core Course**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	04	**00**	**00**	**00**	**04**	**52**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

This course will enable students to:

1. Understand the fundamentals Concepts of Artificial Neural Network and deep learning.
2. Know the theory behind Convolutional Neural Networks, RNN.
3. Illustrate the strength and weaknesses of many popular deep learning approaches.
4. Introduce major deep learning algorithms, the problem settings, and their applications to solve real world problems

UNIT I 10 hours **Fundamental concept of ANN-** Evolution, basic Model of ANN, Terminologies used in ANN, MP model, linear separability, Hebb Network. Perceptual Network,. **Introduction to Deep Learning** Introduction, Shallow Learning, Deep Learning, Why to use Deep Learning, How Deep Learning Works,Deep Learning Challenges,. How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization.
UNIT II 12 hours **Feedforward Networks:** Introduction to feedforward neural networks, Gradient-Based Learning, BackPropagation and Other Differentiation Algorithms. **Optimization for Training Deep Models:** Empirical Risk Minimization, Challenges in Neural Network Optimization, Basic Algorithms: Stochastic Gradient Descent, Parameter Initialization Strategies Algorithms with Adaptive Learning Rates: The AdaGrad algorithm, The RMSProp algorithm
UNIT III 10 hours **Convolutional Networks:** Introduction, Evolution of Convolution Neural Network, Architecture of CNN, Convolution Operation Training Convolution Neural Networks, Gradient Descent-Based Optimization Techniques, Challenges in Training Deep Networks. Supervised Deep Learning Architectures: LetNet-5,AlexNet
UNIT IV 10 hours **Recurrent and Recursive Neural Networks:** Unfolding Computational Graphs, Recurrent Neural Network, Bidirectional RNNs, Deep Recurrent Networks, Recursive Neural Networks, The Long Short-Term Memory and Other Gated RNNs
UNIT V 10 hours **Transformers and Vision transformers:** Self Attention and Multi-Head attention mechanism, positional encoding, residual connection, Encoder and Decoder.Applications: applications of only Encoder, Decoder and Encoder-Decoder type models

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

Course Outcomes:

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

1. Explain the concepts of Artificial Neural networks and Deep learning and its challenges
2. Apply deep feed forward networks and convolutional to solve practical problems.
3. Demonstrate how recurrent and recursive nets function and how practical problems can be mapped to them.
4. Design end-to-end deep learning architectures involving various types of feedforward networks, auto encoders and generative adversarial networks for practical applications

Cos	Mapping with POs
CO1	PO1, PO2,PO3,PO4,PO5,PO6,PO12,PSO1,PSO2,PSO3
CO2	PO1, PO2,PO3,PO4,PO5,PO6,PO12,PSO1,PSO2,PSO3
CO3	PO1, PO2,PO3,PO4,PO5,PO6,PO12,PSO1,PSO2,PSO3
CO4	(PO-1,2,3,4,5,6,12, PSO 1,2,3).

TEXT BOOKS:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MIT Press, 2nd Edition, 2024.
2. M. Arif Wani Farooq Ahmad Bhat Saduf Afzal Asif Iqbal Khan, **Advances in Deep Learning,** Springer, 2020
3. Charu C. Aggarwal, "**Neural Networks and Deep Learning**", Springer, 2018.

REFERENCE BOOKS/WEB LINKS:

1. Bengio, Yoshua. "**Learning deep architectures for AI**." Foundations and trends in Machine Learning, 2009.
2. N.D.Lewis, "**Deep Learning Made Easy with R: A Gentle Introduction for Data Science**", January 2016.
3. Nikhil Buduma, "**Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms**", O'Reilly publications

EBOOKS/ONLINE RESOURCES

- https://faculty.iitmandi.ac.in/~aditya/cs671/index.html
- https://nptel.ac.in/courses/106/106/106106184/
- https://www.youtube.com/watch?v=7x2YZhEj9Dw

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	3	3	3	3						3	3	3	3
CO2	3	3	3	3	3	3						3	3	3	3
CO3	3	3	3	3	3	3						3	3	3	3
CO4	3	3	3	3	3	3						3	3	3	3
Strength of correlation: Low-1, Medium- 2, High-3															

Professional Elective Course:

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025 -2026

Course Title	**Information and Network Security**						
Course Code	**22IST704A**						
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. Understand fundamental concepts of cryptography and classical encryption techniques, including both symmetric and asymmetric models.

2. Explore and evaluate modern encryption algorithms such as DES, RSA, and ECC, understanding their structure, functionality, and security implications.

3. Gain insight into key management and authentication mechanisms, including protocols like Kerberos and the use of digital certificates.

4. Analyze the security challenges in wireless networks, web environments, and email systems, and explore relevant security protocols like SSL/TLS and SSH.

5. Examine IP-level security solutions including IPsec, and understand the structure and function of security associations and key exchange protocols.

UNIT-I **07 hours**

Classical Encryption Techniques: Symmetric Cipher Model, Cryptography, Cryptanalysis and BruteForce Attack, Substitution Techniques, Caesar Cipher, Mono-alphabetic Cipher, Playfair Cipher, Hill Cipher, Poly alphabetic Cipher, One Time Pad.

Block Ciphers and the data encryption standard: Traditional block Cipher structure, stream Ciphers and block Ciphers, Motivation for the Feistel Cipher structure, the Feistel Cipher, The data encryption standard, DES encryption, DES decryption, A DES example, results, the avalanche effect, the strength of DES, the use of 56-Bit Keys, the nature of the DES algorithm, timing attacks, Block cipher design principles, number of rounds, design of function F, key schedule algorithm

UNIT- II **08 hours**

Public-Key Cryptography and RSA: Principles of public-key cryptosystems. Public-key cryptosystems. Applications for public-key cryptosystems, requirements for public-key cryptosystems. Public-key cryptanalysis. The RSA algorithm, description of the algorithm, computational aspects, the security of RSA.

Other Public-Key Cryptosystems: DiffieHellman key exchange, The algorithm, key exchange protocols, man in the middle attack, Elgamal Cryptographic systems, Elliptic curve arithmetic, abelian groups, elliptic curves over real numbers, elliptic curves over Zp, elliptic curves overGF(2m), Elliptic curve cryptography, Analog of Diffie-Hellman key exchange,

Elliptic curve encryption/ decryption, security of Elliptic curve cryptography, Pseudorandom number generation based on an asymmetric cipher, PRNG based on RSA.

UNIT -III **09 hours**

Key Management and Distribution: Symmetric key distribution using Symmetric encryption, A key distribution scenario, Hierarchical key control, session key lifetime, a transparent key control scheme, Decentralized key control, controlling key usage, Symmetric key distribution using asymmetric encryption, simple secret key distribution, secret key distribution with confidentiality and authentication, A hybrid scheme, distribution of public keys, public announcement of public keys, publicly available directory, public key authority, public keys certificates, X-509 certificates. Certificates, X-509 version 3, public key infrastructure.

User Authentication: Remote user Authentication principles, Mutual Authentication, one way Authentication, remote user Authentication using Symmetric encryption, Mutual Authentication, one way Authentication, Kerberos, Motivation , Kerberos version 4, Kerberos version 5, Remote user Authentication using Asymmetric encryption, Mutual Authentication, one way Authentication, federated identity management, identity management, identity federation, personal identity verification.

UNIT - IV **07 hours**

Wireless network security: Wireless security, Wireless network threats, Wireless network measures, mobile device security, security threats, mobile device security strategy, IEEE 802.11 Wireless LAN overview, the Wi-Fi alliance, IEEE 802 protocol architecture. Security, IEEE 802.11i services, IEEE 802.11i phases of operation, discovery phase, Authentication phase, key management phase, protected data transfer phase, the IEEE 802.11i pseudorandom function.

Web Security Considerations: Web Security Threats, Web Traffic Security Approaches.

Secure Sockets Layer: SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, and shake Protocol, Cryptographic Computations. Transport Layer Security: Version Number, Message Authentication Code, Pseudorandom Functions, Alert Codes, Cipher Suites, Client Certificate Types, Certificate Verify and Finished Messages, Cryptographic Computations, and Padding. HTTPS Connection Initiation, Connection Closure.

Secure Shell(SSH) Transport Layer Protocol, User Authentication Protocol, Connection Protocol

UNIT-V **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, enhanced security services, Domain keys identified mail, internet mail architecture, E-Mail threats, DKIM strategy, DKIM functional flow.

IP Security: IP Security overview, applications of IPsec, benefits of IPsec, Routing applications, IPsec documents, IPsec services, transport and tunnel modes, IP Security policy, Security associations, Security associations database, Security policy database, IP traffic processing, Encapsulating Security payload, ESP format, encryption and authentication algorithms, Padding, Anti replay service, transport and tunnel modes, combining security associations, authentication plus confidentiality, basic combinations of security associations, internet key exchange, key determinations protocol, header and payload formats, cryptographic suits.

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

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

CO1: Apply classical and modern encryption techniques to secure data and analyze their effectiveness against various types of attacks.

CO2: Demonstrate a solid understanding of public-key cryptographic techniques such as RSA, Diffie-Hellman, and ECC.

CO3: Design and implement secure key distribution and user authentication mechanisms using both symmetric and asymmetric cryptography.

CO4: Evaluate and implement security protocols for wireless networks, web applications, and secure email communication.

CO5: Analyze and apply IP-level security mechanisms, including the configuration and deployment of IPsec for network security

TEXT BOOK:

1. William Stallings, "Cryptography and Network Security", Pearson, 8th Edition, 2023

REFERENCE BOOKS:

1. Cryptography and Information Security, V K Pachghare PHI, 2nd edition, 2015

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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	PSO
C	3	3											2	1	
C	3	3	2	3									2	1	
C	3	3	2	3									2	1	
C	3	3	2	3									2	1	
C	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-2025 -2026

Course Title	**DATA SCIENCE**						
Course Code	**22IST704B**						
Category	Professional Elective Courses						
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 concepts of Data science.
2. To apply the inferential statistics after preprocessing techniques are used.
3. To implement modelling methods for real world problems.
4. Analyzing data from files and visualizing graphical presentations using tableau.

UNIT I: Introduction to Data Science **07 hours**

Introduction, Evolution of data science, Data science process – roles, stages in data science project – components of the Data Science lifecycle, data analytics, exploring data – managing data – cleaning and sampling for modeling and validation.

UNIT II: Data Pre-processing and Data Wrangling **07 hours**

Loading from different files, Accessing datasets. Data Pre-processing: Data Cleaning, stripping out extraneous information, Find and treat missing values, Identify and treat outliers

Data Wrangling: Grouping, merging, combining, concatenating, Reshaping(pivoting), Data Transformation –Mapping. Implementations with python.

UNIT III: Statistics and Hypothesis Testing **09 Hours**

Inferential Statistics-Measurement scales, Point estimates, Confidence Interval, Central limit theorem, Normalizing data using z-score, Normal Distributions, Hypothesis testing -ANOVA test, Correlation - Person correlation coefficient.

UNIT IV: Data Science Algorithms **07 hours**

Understanding Linear regression, making prediction-hypothesis on regression coefficients, Adding best fit. Multiple Linear Regression, Polynomial Regression, Logistic Regression, Implementation in python Model Evaluation-Confusion matrix, Implementation in python.

UNIT V: Data Visualization-Tableau **09 hours**

Introduction, Techniques used for visual data representation, Types of data visualization

Introduction to tableau software-connecting to data, architecture of Tableau, dimension Vs measure, data types, data filters, Tableau calculations, function used in tableau, Maps, Dashboard.

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

COURSE OUTCOMES:

CO1: Outline the role of data science and the significance of exploratory data analysis
CO2: Explain the basic terms of Linear Algebra and Statistical Inference.
CO3: Illustrate data preprocessing techniques and perform computational analysis
CO3: Apply basic data science algorithms for predictive modelling and analysis.
CO4: Formulate and use appropriate models of data analysis and visualize them.

TEXT BOOKS

1. Joel Grus, Data Science from Scratch, O'Reilly Media, 2nd Edition, 2023.
2. David Dietrich, Barry Heller," Data Science & Big Data Analytics: Discovering, Analysing, Visualizing and Presenting Data",Wiley,2015
3. Joshua N. Milligan, Blair Hutchinson, Mark Tossell and Roberto Andreoli, Learning Tableau 2022 - Fifth Edition, O'Reilly Media

REFERENCE BOOKS

1. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013.
2. Ryan Sleeper, Practical Tableau, O'Reilly Media, Inc., Copyright © 2018
3. Communicating Data with Tableau, Ben Jones, O'Reilly Media, Inc.,

EBOOKS/ONLINE RESOURCES

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

SCHEME FOR EXAMINATIONS

Each full question consists of 20 marks.
Questions are set covering all the topics under each module

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	2	3											1		
CO2	1	2			1										
CO3	1	2		3	2								1		
CO4		2		3	3		3			2			1		
CO5				2	3		3			2	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-2025 -2026

Course Title	**Digital Image Processing**						
Course Code	**22IST704C**						
Category	**Professional Core Course**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	04	**00**	**00**	**00**	**04**	**52**	**04**
CIE Marks: 50	**SEE Marks: 50**		**Total Max. marks=100**		**Duration of SEE: 03 Hours**		

Course Objectives:

This course will enable students to:

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study image restoration procedures.
4. To study the image compression procedures.

UNIT I **08 hours**

Introduction: Fundamental Steps in Digital Image Processing, Components of an Image Processing System, Sampling and Quantization, Representing Digital Images (Data structure), Some Basic Relationships Between Pixels- Neighbours and Connectivity of pixels in image, Applications of Image Processing: Medical imaging, Robot vision, Character recognition, Remote Sensing.

UNIT II **08 hours**

Image Enhancement in The Spatial Domain: Some Basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods,

UNIT III 07 hours

Image Enhancement In Frequency Domain: Introduction, Fourier Transform, Discrete Fourier Transform (DFT), properties of DFT , Discrete Cosine Transform (DCT), Image filtering in frequency domain

UNIT IV **08 hours**

Image Segmentation: Introduction, Detection of isolated points, line detection, Edge detection, Edge linking, Region based segmentation- Region growing, split and merge technique, local processing, regional processing, Hough transform, Segmentation using Threshold.

UNIT V **08 hours**

Image Compression: Introduction, coding Redundancy, Inter-pixel redundancy, image compression model, Lossy and Lossless compression, Huffman Coding, Arithmetic Coding, LZW coding, Transform Coding, Sub-image size selection, blocking, DCT implementation using FFT, Run length coding.

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

Course Outcomes:

At the end of the course, students should be able to:

1.Examine various types of images, intensity transformations and applying various filtering techniques.

2.Understand image enhancement in frequency and spatial domain

3.Manipulate both binary and grayscale digital images using morphological filters and operators to achieve a desired result

4.Apply the image concepts such as edge detection, segmentation representation can be implemented and used

Cos	Mapping with POs
CO1	PO1, PO3,PO4,PSO1,PSO2
CO2	PO1,PO3, PO4,PO5,PSO1,PSO2
CO3	PO1,PO3, PO4,PSO1,PSO2
CO4	PO1,PO3, PO4,PSO1,PSO2

TEXT BOOKS:

1. Rafael C Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing", Pearson, 4th Edition, 2023.

REFERENCE BOOKS/WEB LINKS:

1. Milan Sonka,‖ Image Processing, analysis and Machine Vision‖, Thomson Press India Ltd, Fourth Edition.

2. Fundamentals of Digital Image Processing- Anil K. Jain, 2nd Edition, Prentice Hall of India.

S. Sridhar, Digital Image Processing, Oxford University Press, 2nd Ed, 2016

EBOOKS/ONLINE RESOURCES

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	3									3	3	
CO2	3		3	3	3								3	3	
CO3	3		3	3									3	3	
CO4	3		3	3									3	3	
Strength of correlation: Low-1, Medium- 2, High-3															

Open Elective Course:

Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025 -2026

Course Title	**Software Testing**						
Course Code	**22IST705A**						
Category	**Open 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. 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 I **08 hours**

Basics of Software Testing: Basic definitions, Software Quality , Requirements, Behaviour and Correctness, Correctness versus Reliability, Testing and Debugging, Test cases, Identifying test cases, Test-generation Strategies, Test Metrics, Error and fault taxonomies, 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.

UNIT II **08 hours**

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, Decision tables, Test cases for the triangle problem, Next Date function, and the commission problem,.

T1: Chapter 5,Chapter 6,Chapter7,

UNIT III 07 hours

Fault Based Testing: Overview, Assumptions in fault based testing, Mutation analysis, Fault-based adequacy criteria, Variations on mutation analysis.

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:

T1:Chapter 9,Chapter10, T2: Chapter 16,Chapter 17, T3:Section 6.2.1, T3:Section 6.2.

UNIT IV **08 hours**

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,:
T2: Chapter 3, Chapter 4, Chapter 20, Chapter 24. .

UNIT V **08 hours**

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, T1 : Chapter 12,Chapter 13 T2: Chapter 21,Chapter 22

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

At the end of the course, students should 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
CO2	PO3, PO4
CO3	PO2,PO3, PO5,PO12
CO4	PO4, PO9, PO12

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/WEB LINKS:

. 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.

EBOOKS/ONLINE RESOURCES

https://www.softwaretestingmaterial.com/software-testing/
https://www.guru99.com/software-testing-introduction-importance.html

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		
CO4	3	3	3	3	3										3
CO5					3		3		3	3	3				3
Strength of correlation: Low-1, Medium- 2, High-3															

Course Title	**WEB TECHNOLOGY**						
Course Code	**22IST705B**						
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. To teach students the basics of server side scripting using PHP
CO2. To explain web application development procedures
CO3. To impart servlet technology for writing business logic
CO4. To facilitate students to connect to databases using JDBC
CO5. To familiarize various concepts of application development using JSP

UNIT I :	**07 hours**
Introduction to PHP: Declaring variables, data types, arrays, strings, operations, expressions, control structures, functions, Reading data from web form controls like Text Boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (My SQL as reference), executing simple queries, handling results, Handling sessions and cookies	
UNIT II	**08 hours**
Client side Scripting: Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. Simple AJAX applications	
UNIT III	**08 hours**
XML: Introduction to XML, Defining XML tags, their attributes and values, Document type definition, XML Schemas, Document Object model, XHTML Parsing XML Data - DOM and SAX parsers in java**.**	
UNIT IV	**08 hours**
Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.	
UNIT V	**8 hours**
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP	

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

COURSE OUTCOMES:

On successful completion of the course, the student will be able to

CO1. Analyze functions using PHP
CO2. Understand the concept of JavaScript language, Document Object Model, Form validations. Simple AJAX applications.
CO3. Identify the engineering structural design of XML and parse tree
CO4. Analyze the concept of Servlets.
CO5. Understand the concept of JSP

TEXT BOOKS:

1. Uttam K. Roy, "Web Technologies", Oxford University Press, 2nd Edition, 2023
2. Steven Holzner, "The Complete Reference PHP", McGraw Hill, Revised Edition, 2022

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech
2. Java Server Pages – Hans Bergsten, SPD O'Reilly
3. Java Script, D.Flanagan, O'Reilly, SPD.
4. Beginning Web Programming-Jon Duckett WROX.
5. Programming world wide web, R.W. Sebesta. Fourth Edition, Pearson.
6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

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

Detailed Scheme and Syllabus

ACADEMIC YEAR 2025-2026

V- VI (2023-2027 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

PEOs:

PEO 1:

Graduates will acquire strong technical knowledge and problem-solving skills in Information Science and Engineering to develop innovative solutions for engineering challenges in diverse global environments.

PEO 2:

Graduates will pursue continuous professional development through higher education, research activities, and adaptation to emerging technologies to enhance their expertise and contribute to advancements in Information Technology.

PEO 3:

Graduates will demonstrate ethical leadership, effective communication, and teamwork skills while applying their Information Science expertise to address societal and sustainable needs with professional integrity and social commitment.

Dr.Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education(OBE) and Choice Based Credit System
B.E in Information Science and Engineering
Tentative Scheme of Teaching and Examination effective from the Academic Year 2025-26
2022 Scheme

VSEMESTER

Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	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	HSMS	22IST501	Software Engineering & Project Management	ISE	3	0	0		03	50	50	100	3
2	IPCC	22ISU502	Computer Networks	ISE	3		2		03	50	50	100	4
3	PCC	22IST503	Theory of computation and compiler Design	ISE	4	0	0		03	50	50	100	4
4	PCCL	22ISL504	Mobile Application development lab	ISE	0	0	2		03	50	50	100	1
5	PEC	22IST505x	Professional Elective Course	ISE	3	0	0		03	50	50	100	3
6	PROJ	22ISM506	Mini Project	ISE	0	0	4		03	100		100	2
7	AEC	22RMT507	Research Methodology and IPR	EEE department	2	2	0		02	50	50	100	3
8	MC	22CVT508	Environmental Studies	TD:CVPSB:CV	2	0	0		02	50	50	100	2
9	HS	22CDN509	Aptitude and Verbal Ability Skills	Placement Cell	2	0	0		--	50	--	50	PP/ NP
10	MC	22NSN510	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	PP/ NP
		22PEN510	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		22YON510	Yoga	Yoga Teacher									
								Total		500	300	800	22

PCC: Professional Core Course, PCCL: Professional Core Course laboratory, UHV: Universal Human Value Course, MC: Mandatory Course (Non-credit), AEC: AbilityEnhancement Course, SEC:Skill Enhancement Course, L: Lecture, T: Tutorial, P: Practical, S= Self-Study CIE: Continuous Internal Evaluation, SEE:SemesterEndEvaluation.K:Theletterinthecourse code indicates commonto althe streamof Engineering.PROJ:Project/MiniProject. PEC:ProfessionalElective Course

ProfessionalElectiveCourse 22IST505x

22IST505A	**Python programming**	**22IST505C**	**Network and cyber security**
22IST505B	**Artificial Intelligence**	**22IST505D**	**Unix System Programming**

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practicals 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 beevaluatedbyonlyCIE(noSEE).However,questionsfromthepracticalpartofIPCCshallbeincludedintheSEEquestionpaper.Formoredetails,theregulationgoverningtheDegree ofBachelorofEngineering/Technology(B.E./B.Tech.) 2022-23

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), andYoga(YOG) with the concerned coordinator of the course during the first Week of III semesters.Activities shall be carried out betweenIII 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. TheeventsshallbeappropriatelyscheduledbythecollegesandthesameshallbereflectedinthecalendarpreparedfortheNSS,PE,andYogaactivities.Thesecoursesshall notbeconsideredforverticalprogressionaswell as forthecalculationof SGPAandCGPA, butcompletionofthecourseismandatoryfortheawardofDegree.

Mini-projectwork: MiniProjectisalaboratory-oriented/handsoncoursethatwillprovideaplatformtostudentstoenhancetheirpracticalknowledgeandskillsbythedevelopmentofsmallsystems/applicationsetc.Basedontheability/abilitiesofthestudent/sandrecommendationsofthementor,asingledisciplineoramultidisciplinaryMini- projectcanbe assignedtoan individual studentortoagrouphavingnotmorethan4 students.

CIEprocedureforMini-project:

(i) Singlediscipline: TheCIEmarksshallbeawardedbyacommitteeconsistingoftheHeadoftheconcernedDepartmentandtwofacultymembersoftheDepartment,one of them being the Guide. The CIE marks awarded for the Mini-project work shall be based on the evaluation of the project report, project presentation skill, andquestionandanswersessionin the ratioof50:25:25.Themarksawardedfor theproject reportshallbe thesameforall thebatchesmates.

(ii) Interdisciplinary: ContinuousInternalEvaluationshallbegroup-wise atthecollegelevelwiththeparticipationofalltheguidesofthe project.

The CIE marks awarded for the Mini-project, shall be based on the evaluation of the project report, project presentation skill, and question and answer session in theratio50:25:25.Themarksawardedfor theprojectreport shallbe thesameforallthebatch mates.

NoSEEcomponentforMini-Project.

Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the EngineeringandTechnologycurriculum.Multidisciplinarycoursesthatareaddedsupplementthelatesttrendandadvancedtechnologyintheselectedstreamof Engineering.Eachgroupwillprovideanoptionto selectone course.Theminimumnumberofstudents'strengthsforofferingaprofessionalelectiveis10.However,thisconditionalshall notbeapplicabletocaseswherethe admissionto theprogramislessthan10.

Dr.Ambedkar Institute of Technology, Bengaluru-560056
Outcome Based Education(OBE) and Choice Based Credit System
B.E. in Information Science and Engineering
Tentative Scheme of Teaching and Examination effective from the Academic Year 2025-26
2022 Scheme

VISEMESTER

Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	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					
IPCC	22ISU601	Full stack development		3	0	2		03	50	50	100	4
PCC	22IST602	Machine Learning		3	2	0		03	50	50	100	4
PEC	22IST603x	Professional Elective Course		3	0	0		03	50	50	100	3
OEC	22IST604x	Open Elective Course-I		3	0	0		03	50	50	100	3
PROJ	22ISP605	Major Project Phase I		0	0	4		03	100	--	100	2
PCCL	22ISL606	Machine Learning Lab		0	0	2		03	50	50	100	1
AEC/SDC	22IST607x OR 22ISL607x	Ability Enhancement Course/ Skill Development Course V		If the course is offered as a Theory: 1	0	0		01	50	50	100	1
				If course is offered as a practical: 0	0	2						
HS	22CDN608	Analytical and Reasoning Skills	Placement Cell	2	0	0		--	50	--	50	PP/ NP
MC	22NSN609	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	PP/ NP
	22PEN609	Physical Education (PE) (Sports and Athletics)	Physical Education Director									

	22YON609	**Yoga**	**YogaTeacher**								
								Total	**500**	**300**	**800**	**18**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: AbilityEnhancement Course, **SEC**:Skill Enhancement Course, **L:** Lecture, **T**: Tutorial, **P**: Practical, **S**= Self-Study, **CIE**: Continuous Internal Evaluation, **SEE**:SemesterEndEvaluation.**K:**Theletterinthecoursecodeindicatescommontoallthestreamof Engineering.**PROJ**:Project/MiniProject.**PEC**:ProfessionalElective Course.**PROJ**:ProjectPhase -I,**OEC**:OpenElectiveCourse.

ProfessionalElectiveCourse: 22IST603x			
22IST603A	Cloud Computing	**22IST603C**	Blockchain Technology
22IST603B	Internet of Things	**22IST603D**	

OpenElectiveCourse 22IST604x			
22IST604A	Introduction to Data Structures	**22IST604C**	Software engineering
22IST604B	Fundamentals of Operating Systems	**22IST604D**	Introduction to Artificial Intelligence

Ability Enhancement Course / Skill Enhancement Course-V 22IST607x OR 22ISL607x			
22IST607A	Robotics and automation	**22IST607C**	Software Testing Automation Using Selenium
22IST607B	Tosca – Automated Software Testing	**22IST607D**	DevOps
		22IST607E	Generative Artificial Intelligence

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practicals 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 beevaluatedbyonlyCIE(noSEE).However,questionsfromthepracticalpartofIPCCshallbeincludedintheSEEquestionpaper.Formoredetails,theregulationgoverningthe DegreeofBachelorofEngineering/Technology(B.E./B.Tech.) 2022-23 **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), andYoga(YOG) with the concerned coordinator of the course during the first Week of III semesters.Activities shall be carried out betweenIII 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. TheeventsshallbeappropriatelyscheduledbythecollegesandthesameshallbereflectedinthecalendarpreparedfortheNSS,PE,andYogaactivities.Thesecoursesshall notbeconsideredforvertical progressionas wellas for thecalculationofSGPAandCGPA,butcompletionof thecourseismandatoryfor theawardofDegree.
Professional Elective Courses (PEC): A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the EngineeringandTechnologycurriculum.Multidisciplinarycoursesthatareaddedsupplementthelatesttrendandadvancedtechnologyintheselectedstreamof Engineering. Eachgroupwillprovideanoptiontoselect onecourse.Theminimumnumberofstudents'strengthsfor offeringprofessionalelectivesis10.However,thisconditionalshall notbeapplicabletocaseswherethe admissiontotheprogram is less than10.
OpenElectiveCourses: Students belonging to a particular stream of Engineering and Technology are not entitled to the open electives offered by their parent Department. However, they canopt for an elective offered by other Departments, provided they satisfy the prerequisite condition if any. Registration to open electives shall be documented under theguidanceoftheProgramCoordinator/Advisor/Mentor.Theminimumnumbersofstudents'strengthforofferingOpenElectiveCourseis10.However,thiscondition shallnotbe applicabletoclasswhere theadmissiontotheprogramisless than10.
ProjectPhase-I: Studentshave to discusswiththementor/guide andwiththeirhelphe/shehastocompletetheliteraturesurvey andpreparethe reportandfinally definetheproblem statementfortheprojectwork.

V Semester

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025 -2026

Course Title	SOFTWARE ENGINEERING & PROJECT MANAGEMENT						
Course Code	**22IST501**						
Category	HSMS						
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 the concepts of project management, methods and management practices.
5. Understanding software quality, quality management and its metrics.

UNIT I : 07 hours

Overview: FAQ's about software engineering, Professional and ethical responsibility.**Socio-Technical systems:** Emergent system properties; Systems engineering.**Software Processes:** Process activities; The Rational Unified Process; Agile methods, Plan-driven and agile development, XP, Scrum, Computer Aided Software Engineering

T1: Ch 1, Ch 2, Ch 3

UNIT II 08 hours

Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; The software requirements document. **Requirements Engineering Processes:** Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.

. T1: Ch 4

UNIT III 08 hours

System modeling: System Models: Context models; Behavioral models; Object models; Structured methods.**Software Design:** Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles.**Object-Oriented design:** Objects and Object Classes; An Object-Oriented design process; Object-oriented design using the UML

T1: Ch 5 ,Ch 6

UNIT IV	**08 hours**
Introduction to Project Management: Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Some ways of categorizing Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices. Textbook 2: Chapter 1: 1.1 to 1.17	
UNIT V	**8 hours**
Software Quality: Introduction, The place of software quality in project planning, Importance of software quality, Defining software quality, quality models, ISO 9126, product and process metrics, product versus process quality management, Quality Management systems, process capability models, techniques to enhance software quality, testing, Software reliability, quality plans. Textbook 2: Chapter 13: (13.1 to 13.14)	

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

COURSE OUTCOMES: Attheendofthecourse,thestudentwillbeableto:

CO 1. Understand the activities involved in software engineering and analyze the role of various process models

CO 2. Explain the basics of software requirements and requirement engineering process.

CO 3. Explain the basics of object-oriented concepts and build a suitable class model using modelling techniques

CO 4. Illustrate the role of project planning and quality management in software development

CO 5. Understand the importance of activity planning and different planning models

TextBooks

1. Ian Sommerville: Software Engineering, 10th Edition, Pearson Education, 2015. (Listed topics only from Chapters 1,2,3,4, 5,6, 7, 8, 9,10,11, 22, 23 and 24)

2.Bob Hughes, Mike Cotterell, Rajib Mall: Software Project Management, 7th Edition, McGraw Hill Education, 2020.

REFERENCE BOOKS

1.Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill. 30.04.2024

2.Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India.

WeblinksandVideoLectures(e-Resources)

1. https://onlinecourses.nptel.ac.in/noc20_cs68/preview
2. https://www.youtube.com/watch?v=WxkP5KR_Emk&list=PLrjkTql3jnm9b5nrggx7Pt1G4UAHeFlJ
3. http://elearning.vtu.ac.in/econtent/CSE.php.
4. http://elearning.vtu.ac.in/econtent/courses/video/CSE/15CS42.html
5. https://nptel.ac.in/courses/128/106/128106012/ (DevOps)

SCHEME FOR EXAMINATIONS:

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
CO3		3	3		3							3			3
CO4															3
CO5				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-2025 -2026

Course Title	**COMPUTER NETWORKS**						
Course Code	**22 ISU502**						
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. Tounderstandbasicconcepts, topologiesandOSI/TCPlayers
2. Understandthe workingof differentprotocols.
3. Tounderstandthe workingofvarious NetworklayerRouting algorithms& Transport layer services
4. TounderstandusageofapplicationlayerlikeDNS,Remote login, E-mail, FTP etc.

UNIT I 12 hours

Data Communications :Introduction to Data Communications; Network Models;; Layered tasks; The OSI Model and the layers in the OSI model; TCP / IP Protocol Suite.
Digital & Analog Transmission: Data signals; Digital Transmission; Analog Transmission
Textbook 1: Ch 1, Ch 2, Ch 3
Laboratory Components*:* The following experiments shall be conducted using either NS2/OPNET/NCTUNS or any other suitable simulator.
1.Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2.Simulate a four node point-to-point network with the links connected as follows:
n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.

UNIT II **10 hours**

Data Link Layer
Error detection and correction : Introduction to error detection / correction; Block coding; Linear block codes; Cyclic codes, Checksum.
Data Link control: Framing; Flow and Error control; Protocols; Noiseless channels; Noisy channels; HDLC; Point-to-point Protocol - framing, transition phases.
Multiple Access Random Access; Controlled Access; Channelization
Textbook 1: Ch 10, Ch 11,Ch 12

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

UNIT III 10 hours

Network layer
Logical addressing ipv4 addresses, ipv6 addresses, internet protocol, delivery, forwarding and routing, security

TextBook 1: Ch 19, Ch 20,Ch 22,Ch 30

Laboratory Components:

1. Write a programming java for distance vector algorithm to find suitable path for transmission

2. Implement Diffie -Hellman Key exchange algorithm in java.

3. Write a program in java for simple RSA algorithm to encrypt and decrypt the data.

UNIT IV **10 hours**

Transport Layer

Process to process Delivery: UDP, TCP, SCTP, Congestion control and Quality of Service

Textbook 1: Ch 23, Ch 24

Laboratory Components:

1. Write a program in Java for congestion control using leaky bucket algorithm.

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

1.Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

UNIT V **10 hours**

Application Layer Network Management

Domain Name System (DNS): Name Space, Domain name space, Distribution of name space , DNS in internet, Resolution, DNS messages, Types of record. Remote Login, E-mail: Architecture, user agent, Message Transfer Agent(SMTP),Message Access Agent: POP and IMAP. FTP

World Wide Web and HTTP: Architecture, web documents, HTTP: HTTP transaction,Network Management: SNMP.

TextBook 1: Ch 25, Ch 26, Ch 27, Ch 28

Laboratory Components:

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

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

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

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

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

CO1: Analyze and formulate components of computer networks.

CO2: Designanddevelopprotocolsfortransmissionatlowerlayers

CO3: Identify anddevelop routing algorithmsfornetworklayer.

CO4: Recognizeandapplytechnologyfortransportlayerservices.

CO5: DemonstratetheknowledgeofComputernetworksfordifferentapplications

TEXT BOOKS:

1. Behrouz A. Forouzan: Data Communications and Networking, 6th Edition, McGraw-Hill, 2022

REFERENCE BOOKS:

1. WilliamStallings:DataandComputerCommunication,8th Edition,PearsonEducation,2007.

2.LarryL.PetersonandBruceS.David:ComputerNetworks–ASystemsApproach,4th Edition,Elsevier, 2007.

3.WayneTomasi:IntroductiontoDataCommunicationsandNetworking,PearsonEducation,2005

EBOOKS/ONLINE RESOURCES

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

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	PS03
CO1	2	3			2							2	2		3
CO2	2	2	3	2					2			3			
CO3			3		3										
CO4			3		3								2		
CO5			3		2	3			3			3			3
Strength of correlation: Low-1, Medium- 2, High-3															

Course Title	**THEORY OF COMPUTATION AND COMPILER DESIGN**						
Course Code	**22IST503**						
Category	Professional Core Course (PCC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	04	**00**	**00**	**00**	**04**	**52**	**04**
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 **10 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: Regular expressions;; Minimization of automata

T1: Ch 1-Ch 4

UNIT II **10 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 10 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 **10 hours**

Introduction, Lexical analysis: Language processors; The structure of a Compiler.**Lexicalanalysis:** The Role of Lexical Analyzer.**Syntax Analysis – 1:** Introduction; Top-down Parsing: Predictive parser.

T2: Ch 1, T2: Ch 3, Ch 4: 4.1, 4.3-4.4

UNIT V **12 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, vid

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 (Reprint), Pearson Education, 2021.

2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman: Compilers - Principles, Techniques and Tools, 2nd Edition (Reprint), Pearson, 2022.

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 PCC shall be evaluated both by CIE and SEE.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	2		2		2								2		
CO2		2	2	2	2								2		
CO3			2	2	2								2		
CO4			2	2	2								2		
CO5		2	2		2								2		
Strength of correlation: Low-1, Medium- 2, High-3															

Course Title	**Mobile Application Development Lab**						
Course Code	**22ISL504**						
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:

This course will enable students to:

1. Learn and acquire the art of Android Programming.
2. Configure Android studio to run the applications.
3. Understand and implement Android's User interface functions.
4. Create, modify and query on SQlite database.
5. Inspect different methods of sharing data using services.

LIST OF PROGRAMS

1. Create an application to design a Visiting Card. The Visiting card should have a company logo at the top right corner. The company name should be displayed in capital letters, aligned to the center. Information like the name of the employee, job title, phone number, address, email, fax and the website address is to be displayed.

2. Develop an Android application using controls like Button, Text View, Edit Text for designing a calculator having basic functionality like Addition, Subtraction, Multiplication, and Division.

3. Create a SIGN UP activity with Username and Password. Validation of password should happen based on the following rules:
   - Password should contain uppercase and lowercase letters.
   - Password should contain letters and numbers.
   - Password should contain special characters.
   - Minimum length of the password (the default value is 8).

   On successful SIGN UP proceed to the next Login activity. Here the user should SIGN IN using the Username and Password created during signup activity. If the Username and Password are matched then navigate to the next activity which displays a message saying "Successful Login" or else display a toast message saying "Login Failed". The user is given only two attempts and after that display a toast message saying "Failed Login Attempts" and disable the SIGN IN button.

4. Develop an application to set an image as wallpaper. On click of a button, the wallpaper image should start to change randomly every 20 seconds.

5. Write a program to create an activity with two buttons START and STOP. On pressing the START button, the activity must start the counter by displaying the numbers from One and the counter must keep on counting until the STOP button is pressed. Display the counter value in a Text View.

6. Create two files of XML and JSON type with values for CityName, Latitude, Longitude, Temperature and Humidity. Develop an application to create an activity with two buttons to parse the XML and JSON files which when clicked should display the data in their respective layouts side by side.

7. Develop a simple application with one Edit Text so that the user can write some text in it. Create a button called "Convert Text to Speech" that converts the user input text into voice.

8. Create an activity like a phone dialer with CALL and SAVE buttons. On pressing the CALL button, it must call the phone number and on pressing the SAVE button it must save the number to the phone contacts.

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

CO1: Build an application using Android development environment.
CO2: Experiment with the method of storing, sharing and retrieving the data in Android Applications.
CO3: Examine responsive user interface across wide range of devices.
CO4: Demonstrate methods in storing, sharing and retrieving data in Android Applications.
CO5: Create a mobile Application by using various components like activity, views, services, content providers and receivers.

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

Professional Elective Course

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025 -2026

Course Title	**PYTHON PROGRAMMING**						
Course Code	**22IST505A**						
Category	**ProfessionalElectiveCourse** (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 OBJECTIVE:

1. Learn Syntax, Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.
5. Build Threaded applications and Database Programming 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 Own Modules in Python,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: Explain syntax and semantics of different statements and functions in Python.
CO2: Demonstrate the use of strings, files, lists, dictionaries, and tuples in simple applications.
CO3: Write simple applications using regular expressions, multiple threads.
CO4: Build simple database applications with GUI.
CO5: Analyze the given problem and select appropriate data types and modules to develop the solution

Textbooks:

1. Dr. R. NageswawaRao,CorePython Programming, Dreamtech press, 2nd Edition 2018 (ChapterNumbers: 3,4,5,6,7, 8,9,10,11,16,17,18,22).

ReferenceBooks:

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

SCHEME FOR EXAMINATIONS:

The PEC 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	2	2		1								2		
CO2	2	3	3		1								3	1	1
CO3	3	3	3		1								3	1	1
CO4	3	3	3		1								3	1	1
CO5	2	3	1		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-2025 -2026

Course Title	**Artificial Intelligence**						
Course Code	**22IST505B**						
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

UNITI : **07 hours**

What is AI? Intelligent Agents: Agents and environment; Rationality; the nature of environment; the structure of agents. Problem-solving agents, Example problems.

Textbook 1:Chapter1-1.1,1.2, 1.3Chapter2- 2.1,2.2, 2.3,2.4

UNIT II **08 hours**

Searching for Solutions Uninformed Search Strategies: Breadth First search, Depth First Search, Iterative deepening depth first search;

Knowledge representation issues: Representations and mappings approaches to knowledge representation, Issues in knowledge representation.**Textbook1**:Chapter3-3.1,3.2,3.3,3.4

UNIT III **08 hours**

Informed Search Strategies: Heuristic functions, Greedy best first search, A*search. Heuristic Functions

Logical Agents: Knowledge based agents, The Wumpus world, Logic Propositional logic Reasoning patterns in Propositional logic.**Textbook1**:Chapter3-3.5,3.6

UNIT IV **08 hours**

FirstOrderLogic:RepresentationRevisited,SyntaxandSemanticsofFirstOrderlogic,UsingFirstOrder logic.**Inference in First Order Logic** :Propositional Versus First Order Inference, Unification, Forward Chaining, Backward Chaining

Textbook1:Chapter8-8.1,8.2,8.3Chapter9-9.1,9.2,9.3,9.4,9.5

UNITV **08 hours**

Statistical learning, Maximum likelihood parameter learning, Bayesian parameter learning.

ExpertSystems: Representingandusingdomainknowledge,ESshells.Explanation,knowledgeacquisition

TextBook2:Chapter 20

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

Course outcomes:

On successful completion of the course, the student will be able to

CO1:Applyknowledgeofagentarchitecture,searchingandreasoningtechniquesfordifferent applications.
CO2.ComparevariousSearchingandInferencingTechniques.
CO3.Describe the concepts of knowledge based agents
CO 4. Developknowledgebasesentencesusingpropositionallogicandfirstorderlogic
CO5:UsetheconceptsofExpertSystemstobuildapplications..

TEXT BOOK:

1. Stuart J. Russell and Peter Norvig: Artificial Intelligence: A Modern Approach, 4th Edition, Pearson, 2021
2. Elaine Rich and Kevin Knight: Artificial Intelligence, 4th Edition, McGraw-Hill, 2020

REFERENCE BOOKS

1. GeorgeFLugar,ArtificialIntelligenceStructureandstrategiesforcomplex,PearsonEducation,5th Edition,2011
2. NilsJ.Nilsson,PrinciplesofArtificialIntelligence,Elsevier,1980
3.SarojKaushik,ArtificialIntelligence,Cengagelearning,2014

EBOOKS/ONLINE RESOURCES

1. https://www.kdnuggets.com/2019/11/10-free-must-read-books-ai.html
2. https://www.udacity.com/course/knowledge-based-ai-cognitive-systems--ud409
3.https://nptel.ac.in/courses/106/105/106105077/

SCHEME FOR EXAMINATIONS:

The PEC 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		
CO2	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		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-2025 -2026

Course Title	**NETWORK AND CYBER SECURITY**
Course	**22IST503C**

Code							
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:Ch2:1,2Ch9:1,2

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.T1:Ch19:1,2,3

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

T1:Ch20:1,3

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

T1:Ch20:1,3

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

T1:Ch17:1,2

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:Ch1,Ch2

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, 8th Edition, Pearson, 2023.
2. Sunit Belapure and Nina Godbole: Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, 2nd Edition, Wiley India, 2021.

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	PO	PO	PO4	PO5	PO6	PO	PO	PO9	PO10	PO1	PO1	PSO	PSO	PSO
CO	2	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	2	
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-2025 -2026

Course Title	**UNIX System Programming**
Course Code	**22IST505D**

Category	Professional Elective Course (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. Know the operating system standards like POSIX standards and ANSI Standards.
2. Design & develop UNIX commands and applications using UNIX system API's.
3. Understand the UNIX process control mechanism.
4. Analyze the problem & apply the relevant IPC techniques in UNIX system programming.
5. Adopting signals as IPC for efficient application development on Unix Systems.

UNIT I : **07 hours**

Introduction: UNIX and ANSI Standards:The ANSI C Standard, The ANSI/ISOC++ Standards, Difference between ANSI C and C++, The POSIX Standards, The POSIX.1 FIPS Standard, The X/Open Standards.
UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics. ---
T1.CH1,CH2,CH3

UNIT II **08 hours**

UNIX Files: File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links.
UNIX File APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.RulesT2-CH4,CH5,CH6

UNIT III **08 hours**

UNIX Processes: The Environment of a UNIX Process:Introduction, main function, Process Termination, Com Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes.
T1&T2-CH7,CH8

UNIT IV **08 hours**

Process Control: Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times, I/O Redirection.
Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Gro
T2-12&15

UNIT V **08 hours**

Signals and Daemon Processes: Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers.Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.

Interprocess Communication – 1: Overview of IPC Methods, Pipes, popen, pclose Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores.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: UnderstandANSIC,C++standards,POSIXstandards,UNIX&POSIX API'sforUNIXOperatingsystem.
CO2: Analyze theUNIXFile,FileSystem,UNIXKernelsupportforfilesand differenttypesof APIs.
CO3: Demonstrate advanced UNIX features such as signals, Job Control, daemon processes and IPC.
CO4 : Develop UNIX commands, utilities and applications utilizing UNIX System calls.
CO5 : Analyze process control, Deamon characteristics, coding rules and error logging and IPC facilities

TEXT BOOKS:

1. Terrence Chan: UNIX System Programming Using C++, 2022 Reprint, Pearson India.
2. W. Richard Stevens: Advanced Programming in the UNIX Environment, 3rd Edition, Pearson Education, 2021 Reprint.

REFERENCE BOOKS / WEBLINKS:

1. Maurice JBach :Advanced UNIX Programming, 2nd Edition, Pearson Education, 2015.
2. UNIX kernel Internals –UreshVahlia PHI 2010.
3. www.tutorialspoint.com/unix/unix-basic-operators.html
4. https://www.youtube.com/watch?v=DpcCtaaGxyQ&list=PLd3UqWTnYXOmKXhD-PVqMN1XhNQV-s4lj

EBOOKS/ONLINE RESOURCES

1. https://www.youtube.com/watch?v=gTU1IP8JSxc&list=PLOZyfu4IYm88aq4qTqqzKfwgrHhl-hcTJ
2.https://www.youtube.com/watch?v=JkN6GMkSgXw&list=PLawoGO2yQK2Y6sRsFLHuJhAjcR-a0JYsd

SCHEME FOR EXAMINATIONS:

The PEC 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		
CO2	2	1										2	2		
CO3	2	1										2	2		
CO4	2	1										2	2		
CO5	2	1										2	2		
Strength of correlation: Low-1, Medium- 2, High-3															

Detailed Scheme and Syllabus

ACADEMIC YEAR 2025-2026

III - IV (2024-2028 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

PEOs:

PEO 1:

Graduates will acquire strong technical knowledge and problem-solving skills in Information Science and Engineering to develop innovative solutions for engineering challenges in diverse global environments.

PEO 2:

Graduates will pursue continuous professional development through higher education, research activities, and adaptation to emerging technologies to enhance their expertise and contribute to advancements in Information Technology.

PEO 3:

Graduates will demonstrate ethical leadership, effective communication, and teamwork skills while applying their Information Science expertise to address societal and sustainable needs with professional integrity and social commitment.

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 2025-26

IIISEMESTER

Sl. No	Course	CourseCode	Course Title	TeachingDepartment (TD)and QuestionPaper SettingBoard(PSB)	TeachingHours/Week				Examination				Credits
					TheoryLecture	Tutorial	Practical/ Drawing	Self study	Duration inhours	CIEMarks	SEEMarks	TotalMarks	
					L	T	P	S					
1	BSC	MAT301IS	Mathematics for Computer Science	Maths	3	2	0		03	50	50	100	4
2	IPCC	ISU302	Digital Design and Computer Organization	ISE	3	0	2		03	50	50	100	4
3	IPCC	ISU303	Operating Systems	ISE	3	0	2		03	50	50	100	4
4	PCC	IST304	Data Structures using C/C++	ISE	3	0	0		03	50	50	100	3
5	PCCL	ISL305	DataStructures Lab	ISE	0	0	2		03	50	50	100	1
6	ESC	IST306x	ESC/ETC/PLC	ISE	3	0	0		03	50	50	100	3
7	UHV	HSL307	SocialConnectandResponsibility	AnyDepartment	0	0	2		01	100	---	100	1
8	AEC/SEC	IST308x or ISL308x	Ability Enhancement Course/Skill EnhancementCourse– III		Ifthecourseisa Theory: 1	0	0		01	50	50	100	1
					Ifacourseisalaboratory: 0	0	2		02				
9	HS	CDN309	Aptitude and Verbal Ability Skill-I	Placement Cell	2	0	0		--	50	--	50	PP/NP
10	MC	NSN310	NationalServiceScheme(NSS)	NSScoordinator	0	0	2		--	100	---	100	PP/NP
		PEN310	PhysicalEducation(PE)(Sportsand Athletics)	Physical EducationDirector									
		YON310	Yoga	YogaTeacher									
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**: AbilityEnhancement Course, **SEC**:Skill Enhancement Course, **L:** Lecture, **T**: Tutorial, **P**: Practical,S= Self-Study, **CIE**: Continuous Internal Evaluation, **SEE**:SemesterEndEvaluation.K: Thisletterinthe coursecode indicates commontoallthe streamsofEngineering.ESC:EngineeringScienceCourse,ETC:EmergingTechnologyCourse,PLC:ProgrammingLanguage Course

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EngineeringScienceCourse(ESC/ETC/PLC) 22XXT306x			
IST306A	OOPs with Java	IST306C	
IST306B	OOPs with C++	IST306D	
AbilityEnhancementCourse–III22XXT308x **OR**2XXL308x			
ISL308A	Data analytics with excel	IST308C	Version Controlling with GIT
ISL308B	R Programming	IST308D	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 beevaluatedbyonlyCIE(noSEE).However,questionsfromthepracticalpartofIPCCshallbeincludedintheSEEquestionpaper.

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), andYoga(YOG) with the concerned coordinator of the course during the first Week of III semesters.Activities shall be carried out betweenIII 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.

TheeventsshallbeappropriatelyscheduledbythecollegesandthesameshallbereflectedinthecalendarpreparedfortheNSS,PE,andYogaactivities.Thesecoursesshallnotbeconsidered forvertical progressionas wellas for thecalculationofSGPAandCGPA,butcompletionof thecourseismandatoryfor theawardofDegree.

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 2025-26

IVSEMESTER

Sl. No	Course andCourseCode		CourseTitle	TeachingDepartment (TD)and QuestionPaper SettingBoard(PSB)	TeachingHours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self-Study	Duration inhours	CIEMarks	SEEMarks	TotalMarks	
					L	T	P	S					
1	PCC	IST401	Analysis & Design of Algorithms	ISE	3	0	0		03	50	50	100	3
2	IPCC	ISU402	Advanced Java	ISE	3	0	2		03	50	50	100	4
3	IPCC	ISU403	Data Base Management Systems	ISE	3	0	2		03	50	50	100	4
4	PCCL	ISL404	Analysis & Design of Algorithms Lab	ISE	0	0	2		03	50	50	100	1
5	ESC	IST405x	ESC/ETC/PLC	ISE	3	0	0		03	50	50	100	3
6	AEC/SEC	IST406x or ISL406x	Ability Enhancement Course/SkillEnhancementCourse- IV	TDandPSB:Concerneddepartment	Ifthe courseisTheory				01	50	50	100	1
					1	0	0						
					Ifthe course isalab				02				
					0	0	2						
7	BSC	BIT407	BiologyForEngineers	TD/PSB: BT, CHE,	2	0	0		03	50	50	100	2
8	UHV	HST408	Universalhumanvaluescourse	AnyDepartment	1	0	0		01	50	50	100	1
9	HS	CDN409	Aptitude and Verbal Ability Skill-II	Placement Cell	2	0	0		--	50	--	50	PP/ NP
10	MC	NSN410	NationalServiceScheme(NSS)	NSScoordinator	0	0	2			100	---	100	PP/ NP
		PEN410	PhysicalEducation(PE)(SportsandAthletics)	PhysicalEducation Director									
		YON410	Yoga	YogaTeacher									
									Total	500	400	900	19

PCC:ProfessionalCoreCourse,PCCL:ProfessionalCoreCourselaboratory,UHV:UniversalHumanValueCourse,MC:MandatoryCourse(Non-credit),AEC:AbilityEnhancementCourse,SEC:SkillEnhancementCourse,L:Lecture,T:Tutorial,P:Practical, S= Self-Study,CIE:ContinuousInternalEvaluation,SEE: SemesterEndEvaluation.K:Thisletter inthecoursecodeindicates commontoallthe streamofengineering.

EngineeringScienceCourse(ESC/ETC/PLC)22XXT405x OR 22XXL405x			
IST405A	Discrete Mathematical Structure	IST405E	Optimization Techniques
IST405B	Unix Shell Programming	IST405D	Graph Theory and Networks
AbilityEnhancementCourse/SkillEnhancementCourse –IV 22XXT405x OR 22XXL406x			
ISL406A	Green IT and Sustainability	ISL406C	TechnicalwritingusingLATEX
IST406B	UI/UX		

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Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025-26

III Semester

Course Title	**Mathematics-1II for Computer Science and Engineering stream/AIML Probability and Statistical Inference.**							
Course Code	**MAT301B**							
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, momentgenerating function, expectations. Discrete probability distributions-Binomial, Poisson and Geometricdistributions;Continuousprobabilitydistributions-Exponential, Normaland Weibull distributions. **Self-study*:***Gammadistributions. **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,conditionalprobabilityfunction. **Random Process:** Classification of random process, description of random process, stationary randomprocess – first order, second order and Strict-sense stationary processes, Autocorrelation and Cross-correlationfunctions. **Self-study**:Jointdensityfunction,marginaldensityfunction,conditionalprobabilitydensityfunction, 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.	04	04

	Application: Goodness of fitness (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 testingto 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.
Ptoblm

TEXTBOOKS

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 45th Ed., 2023.
2. Kishore S. Trivedi, Probability and Statistics with Reliability, Queuing and Computer Science Applications, Wiley, 3rd Ed., 2022
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, 12th Ed., 2023.
2. Srimanta Pal & Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, 4th Ed., 2022.
3. C. Ray Wylie, Louis C. Barrett, Advanced Engineering Mathematics, 7th Ed., McGraw Hill,

2021.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand, 4th Ed., 2022.

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-2025-26

Course Title	**DIGITAL DESIGN AND COMPUTER ORGANIZATION**						
Course Code	**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: RSFLIP-FLOPs,GatedFLIP-FLOPs ,Edge-triggered RS FLIP-FLOPs, Edge-triggered D FLIP-FLOPs,Edge-triggeredJKFLIP-FLOPs,JKMaster-slaveFLIP-FLOPs;JKMaster-slaveFLIP-FLOP,VariousRepresentationsofFLIP-FLOPs,ConversionofFLIP-FLOPs:A SynthesisExample, HDLImplementationofFlip-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. WriteVHDL code for switched tail counter. Simulateandverify it's working.

UNIT III08 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 usingdecade 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: ApplyK-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&GoutamSaha: DigitalPrinciples and Applications,7thEdition,Tata McGraw Hill, 2011
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization and Embedded Systems, 6th Ed., McGraw Hill, 2012

REFERENCE BOOKS:

1. StephenBrown,ZvonkoVranesic:FundamentalsofDigitalLogicDesignwithVHDL,2nd Edition, Tata McGraw Hill, 2005.
2. CharlesH.Roth:Fundamentals ofLogicDesign,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-2025-26

Course Title	**OPERATING SYSTEMS**						
Course Code	**ISU303**						
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 Demonstrate the need for OS and different types of OS
2. To discuss suitable techniques for management of different resources
3. To identify the various methods of causing deadlocks.
4. To describe the techniques for main memory management.
5. To analyze the file system interface, implementation and disk management.

UNIT I : **08 hours**

Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments.
Operating System Services: User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure.

Laboratory Component:

1. Develop a c program to implement the Process system calls (fork (), exec(), wait(), create process, terminate process)

Textbook 1: Chapter – 1 (1.1-1.12), 2 (2.2-2.11)

UNIT II **08 hours**

Process Management: Process concept; Process scheduling; Operations on processes; Inter process communication
Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues.
Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Thread scheduling; Multiple-processor scheduling,

Laboratory Component:

1. Implement CPU scheduling algorithms to find turnaround time and waiting time
FCFS and Priority.

Textbook 1: Chapter – 3 (3.1-3.4), 4 (4.1-4.4), 5 (5.1 -5.5)

UNIT III **07 hours**

Process Synchronization: Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization;
Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

Laboratory Component:

1. Develop a C program to simulate producer-consumer problem using semaphores.
2. Develop a C program which demonstrates interposes communication between a reader process and a writer process. Use mkfifo, open, read, write and close APIs in your program.
3. Develop a C program to simulate Bankers Algorithm for Deadlock Avoidance.

Textbook 1: Chapter – 6 (6.1-6.6), 7 (7.1 -7.7)

UNIT IV **08 hours**

Memory Management: Memory management strategies: Background; Swapping;
Contiguous memory allocation; Paging; Structure of page table; Segmentation.
Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement;
Allocation of frames; Thrashing.

Laboratory Component:

1. Develop a C program to simulate the following contiguous memory allocation Techniques: a) Worst fit b) Best First fit.
2. Develop a C program to simulate page replacement algorithms: FIFO

Textbook 1: Chapter -8 (8.1-8.6), 9 (9.1-9.6)

UNIT V **08 hours**

File System, Implementation of File System: File system: File concept; Access methods; Directory and Disk structure; File system mounting; File sharing;
Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.
Secondary Storage Structure, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix.

Laboratory Component:

1. Develop a program to implement File Organization Techniques
2. Develop a C program to simulate the Linked file allocation strategies.
3. Develop a C program to simulate SCAN disk scheduling algorithm.

Textbook 1: Chapter – 10 (10.1-10.5) ,11 (11.1-11.5),12 (12.1-12.5), 14 (14.1-14.4)

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 thefundamental principles and concepts of operating systems.

CO2: Apply appropriate CPU scheduling algorithms for the given problem.

CO3: Identify, analyze various synchronization technique, deadlocks.

CO4: Identify, analyze, apply the various algorithms for memory management.

CO5: Analyze Storage Structures and Implement Customized Case study.

CO5: Apply various protection and security techniques.

TEXT BOOK:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 10th Ed., Wiley, 2018.

2. **REFERENCE BOOKS:**

1. D.M Dhamdhere, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.

3. P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4th Edition, PHI (EEE), 2014.

4. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

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**
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-2025-26

Course Title	DATA STRUCTURES WITH C						
Course Code	**IST304**						
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 structureOperations, Review of Arrays, Structures, Self-ReferentialStructures, and Unions. Pointers and Dynamic Memory AllocationFunctions. Representation of Linear Arrays in Memory,Dynamicallyallocatedarrays.**Array Operations**: Traversing, inserting, deleting, searching, and sorting.MultidimensionalArrays**T 1:Ch 1:1.2,Ch2: 2.2-2.7T2:Ch1: 1.1-1.4,Ch3 : 3.1 -3.3,3.5, 3.7,Ch4:4.1-4.9,4.14**
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**
UNITIV **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: Classifycommondatastructuresandimplementthem.
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. Neetha Natesh,Data structure using C,1st Edition,2025
2. Ellis Horowitz and SartajSahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press,2014.
3. 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. ReemaThareja, 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 POsand 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-2025 -2026

Course Title	DATA STRUCTURES LAB						
Course Code	**ISL305**						
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,DevelopandImplementamenudrivenprograminCforthefollowingoperationsonSingly LinkedList (SLL)ofStudentData withthe fields:*USN,Name, Branch,Sem, PhNo*

i. Create a SLL ofN Students Data by using *front insertion*.i.
ii. DisplaythestatusofSLLandcountthenumberofnodesinit
iii. Perform Insertion at End of SLL
iv. PerformDeletion atEnd ofSLL
v. Exit

Theprogramshouldprintappropriatemessagesfordynamicstackoverflow,underflow andempty.

7. Design,DevelopandImplementamenudrivenprograminCforthefollowingoperationsonSinglyLinked List(SLL)ofStudent Datawiththefields:*USN,Name,Branch, Sem, PhNo*

i. Create a SLL ofN Students Data by using *front insertion*.
ii. DisplaythestatusofSLLandcountthenumberofnodesinit
iii.Perform Insertion at End of SLL
vi. PerformDeletion atfrontend ofSLL
v. Exit

Theprogramshouldprintappropriatemessagesfordynamicqueueoverflow,underflowandempty

8. Design,DevelopandImplementamenudrivenPrograminCforthefollowingoperationson Doubly Linked List (DLL) of Employee Data with the fields: *SSN, Name, Dept,Designation, Sal, PhNo*

i.Create a DLL ofN Employees Data by using *end insertion*.
ii.DisplaythestatusofDLLandcountthenumberofnodesinit.
iii.Perform Insertion and Deletion atEnd of DLL.
iv.Perform InsertionandDeletionatFrontofDLL.
v.Exit

9. Design,DevelopandImplementamenudrivenPrograminCforthefollowingoperationson BinarySearchTree (BST)of Integers.

i.CreateaBSTofN Integers: 6, 9, 5,2, 8, 15,24, 14, 7,8, 5, 2
ii.TraversetheBSTinInorder,Preorder andPostOrder
iii.SearchtheBSTfor agiven element(KEY)andreport theappropriatemessage
iv.Exit

10. Design, Develop and Implement a Program in C for the following operations on SinglyCircularLinked List (SCLL)with header nodes. RepresentandEvaluate aPolynomial:

$P(x,y,z) = 6 x^2 y^2 z - 4 y z^5 + 3 x^3 y z + 2 x y^5 z - 2 x y z^3$

Note:Programs2, 3, 6, 8, 9, 10to be conducted with support ofVirtual Lab .Weblink:

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

II. OPEN ENDED QUESTIONS

Design and implement a solution to the following in C.

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

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

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

NOTE:

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

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 POsand 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-2025 -2026

Course Title	**OOPs with Java**						
Course Code	**IST306A**						
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**

UNITIII: **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

UNITIV: 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, 12th Ed., McGraw Hill, 2024.

(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-2025 -2026

Course Title	**OOPs with C++**						
Course Code	IST306B						
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, Josée Lajoie, and Barbara E. Moo, C++ Primer, 5th Ed., Addison-Wesley, 2012.
2. Paul J. Deitel, Harvey M. Deitel, C++ for Programmers, 3rd Ed., Pearson, 2023.
3. K. R. Venugopal, Rajkumar Buyya, T. Ravi Shankar, Mastering C++, McGraw Hill, 2020.
4. Sourav Sahay, Object-Oriented Programming with C++, Oxford University Press, 2nd Ed., 2020.

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-2025 -2026

Course Title	**DATA ANALYTICS WITH EXCEL**						
Course Code	**IST308A**						
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: AboutExcel&Microsoft,UsesofExcel,Excelsoftware,Spreadsheetwindowpane,TitleBar, MenuBar,StandardToolbar,FormattingToolbar,theRibbon,FileTabandBackstageView, FormulaBar, WorkbookWindow, Status Bar, Task Pane, Workbook &sheets

Columns &Rows: SelectingColumns&Rows,ChangingColumnWidth&RowHeight,AutofittingColumns& Rows,Hiding/UnhidingColumns&Rows,Inserting&DeletingColumns&Rows,Cell,Address of acell, Components ofa cell– Format, value,formula, Useof paste and paste special

UNIT II **3 hours**

Functionality Using Ranges: UsingRanges, Selecting Ranges,Entering InformationInto a Range, UsingAutoFill **CreatingFormulas:** Using Formulas, Formula Functions– Sum, Average, if, Count, max, min,Proper, Upper, Lower, UsingAutoSum,

UNIT III **3 hours**

AdvanceFormulas : Concatenate, Vlookup, Hlookup, Match, Countif, Text, Trim
Spreadsheet Charts: CreatingCharts, Different types ofchart,FormattingChart Objects, Changingthe Chart Type, Showingand HidingtheLegend, Showingand Hidingthe Data Table

UNIT IV **3 hours**

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

PivotTables: CreatingPivotTables,ManipulatingaPivotTable,UsingthePivotTableToolbar,ChangingData Field,Properties,DisplayingaPivotChart,SettingPivotTableOptions,.AddingSubtotalsto PivotTables

UNIT V **3 hours**

Spreadsheet Tools: Moving between Spreadsheets, Selecting Multiple Spreadsheets, Inserting and Deleting SpreadsheetsRenamingSpreadsheets,SplittingtheScreen,FreezingPanes,CopyingandPasting Data between Spreadsheets, Hiding, Protectingworksheets

Making Macros: RecordingMacros, RunningMacros, DeletingMacros

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 LokeshLalwani 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-2025 -2026

Course Title	**RPROGRAMMING**						
Course Code	**IST308B**						
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. ExploreandunderstandhowRandRStudiointeractive environment.
2. TolearnandpracticeprogrammingtechniquesusingRprogramming.
3. ReadStructuredDataintoRfromvarioussources.
4. Understandthe differentdataStructures,data typesinR.
5. TodevelopsmallapplicationsusingRProgramming

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, animations, videos

COURSEOUTCOMES: On completionofthecourse,student should be able to:
CO1: Understand thefundamentalsyntaxofRthroughreadings,practiceexercises.
CO2: Demonstrate,andwriteRcode.
CO3: Applycriticalprogramminglanguageconceptssuchasdata types,iteration,
CO4: Explorecontrolstructures,functions,andBooleanoperatorsbywritingRrograms andthrough examples
CO5: Designand DevelopSolutionstoproblemsusingRprogramming

TEXTBOOKS

1. Jones,O.,Maillardet.R. andRobinson,A.(2014). IntroductiontoScientific Programmingand SimulationUsingR.Chapman&Hall/CRC,TheR Series.

REFERENCEBOOKS

1. MichaelJ.Crawley,"Statistics:An IntroductionusingR", Secondedition,Wiley,2015

ONLINERESOURCES

1. Wickham,H.&Grolemund,G.(2018).forDataScience.O'Reilly:NewYork.Available forfree at http://r4ds.had.co.nz

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPINGofCOswithPOs

	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

Strengthofcorrelation: Low-1, Medium-2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025 -2026

Course Title	Version Controlling with GIT						
Course Code	**IST308C**						
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. UnderstandtheuseofbasicGiT CommandsandFile systems
2. UseofCommits,Diffs,BranchesandAlteringcommands.
3. Useofcreate alocalrepository,create acommit,create aremote repository andpushcommitstoaremoterepository.
4. Understandtowrite effectivecommitmessages

UNIT I **3 hours**

Introduction: Basic GiT concepts: Basic Concepts, Repositories, Git Object Types ,Index ,ContentAddressable Names ,Git Tracks Content ,Pathname Versus Content Object Store Pictures , Git Concepts at WorkObject StorePictures, GitConcepts at Work:gitdirectory,Objects, Hashes,andFilesandTrees

UNIT II **3 hours**

File management and the Index: File Classifications in Git: Using git add, Using git rm ,Using git mv, ADetailedView of Git'sObjectModeland Files.**Commits:** Identifying Commits: Absolute Commit Names ,refs and symrefs ,Relative Commit Names, CommitHistory: Viewing Old Commits, Commit Graphs ,Commit Ranges, Finding Commits: Using git bisect , Using gitblame, Using Pickaxe

UNIT III **3 hours**

Branches: Branch Names, Using Branches, Creating Branches, Listing Branch Names ,Viewing Branches ,CheckingOutBranches,Deleting Branches.

Diffs: Formsofthegit diffCommand,examples,SimplegitdiffExample,gitdiffandCommit Ranges,gitdiffwithPath Limiting,Comparing HowSubversion andGitDerive diffs.

UNIT IV **3 hours**

Merges: MergeExamples,WorkingwithMergeConflicts,MergeStrategies.

AlteringCommits: CautionAbout AlteringHistory:Usinggitreset,Usinggit cherry-pick,Usinggit revert,reset,revert,andcheckout,Rebasing Commits :Usinggitrebase-i,rebase Versusmerge.

UNIT V **3 hours**

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

Patches: WhyUsePatches?,GeneratingPatches.,MailingPatches,ApplyingPatches,BadPatches,PatchingVersus Merging,

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

COURSEOUTCOMES: Attheendofthecoursethestudentwillbeableto:

CO1. Illustratehowto useGitforreal-worlddevelopment scenarios
CO2.Gain insightinto Git's common usecases, initial tasks,andbasicfunctions.
CO3.Applyhowtomanagemerges, conflicts,patches, anddiffs.
CO4: Gain insight into merging and commit altering
CO5:Manage Repository

TEXTBOOKS

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

REFERENCEBOOKS

1.VersionControlwithGit,2ndEditionbyJonLoeliger,MatthewMcCullough

ONLINERESOURCES

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/

SCHEME FOR EXAMINATIONS:

Ability Enhancement Course shall be evaluated both by CIE and SEE

MAPPINGofCOswithPOs

	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 ofcorrelation: Low-1, Medium-2, High-3															

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Information Science and Engineering
Scheme and Syllabus - CBCS-2025 -2026

Course Title	**DATA VISUALIZATION WITH PYTHON**						
Course Code	IST308D						
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 vectorizedconputation, 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 ,JeffreyElkner ,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 POsand 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