AR25
PROGRAM STRUCTURE
AND
FIRST YEAR SYLLABUS

DEPARTMENT OF

COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

For CBCS BASED B. TECH – FOUR YEAR PROGRAM
(Applicable for the batches admitted from AY 2025-26)

Geethanjali College of Engineering and Technology
(Autonomous)
(Approved by AICTE, Permanently Affiliated to JNTUH, Accredited by NAAC with A+ Grade)
Sy. No: 33 & 34, Cheeryal (V), Keesara (M), Medchal District, Telangana – 501301

GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY
(UGC Autonomous)
Cheeryal (V), Keesara (M), Medchal Dist., - 501 301
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (AIML)

VISION OF THE INSTITUTE

To be an epicenter, promoting scholarly activities, fostering innovation, research, and entrepreneurship, leading sustainable societal development

MISSION OF THE INSTITUTE

1. To solve complex societal problems, inculcating critical thinking and problem-solving skills.
2. To inculcate creativity and innovation, developing a culture of research and entrepreneurship.
3. To preserve and promote cultural heritage, humanistic and spiritual values, promoting peace and harmony in society.

VISION OF THE DEPARTMENT

To be a leading center for education, research, innovation and entrepreneurship in Artificial Intelligence and Machine Learning, addressing real-world challenges and contributing to societal well-being.

MISSION OF THE DEPARTMENT

1. Provide opportunities to delve deep into concepts, tools, and applications, through high quality learning experiences, with comprehensive and advanced curricula in Artificial Intelligence and Machine Learning.
2. Involve faculty and students in research, explore emerging trends, and contribute to the advanced knowledge in AI and ML, promoting a stronger understanding of ethical implications, societal impact, and responsible development of Artificial Intelligence and Machine Learning Systems.
3. Promote critical thinking, involving in complex problem-solving, encouraging lifelong learning and adaptation to the rapidly evolving field of Artificial Intelligence and Machine Learning, collaborating with stakeholders for societal development.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

Program Educational Objectives (PEOs) are broad statements that describe what graduates are expected to attain within a few years of graduation. The PEOs for Computer Science and Engineering (Artificial Intelligence and Machine Learning) graduates are:

PEO :1 Students will possess a strong foundation in mathematics, basic sciences, and engineering fundamentals, facilitating them towards gainful employment, or pursue higher studies, or entrepreneurship with penchant for life-long learning

PEO :2 Develop critical and independent thinking to analyze, design, develop, and implement Artificial Intelligence and Machine Learning solutions, solving complex societal problems in multidisciplinary areas.

PEO :3 Impart knowledge and skills to solve real-world problems, demonstrating innovation and adaptability to emerging technologies, exhibit professional and

ethical conduct, contributing to the advancement of knowledge in Artificial Intelligence and Machine Learning and related areas.

PROGRAM OUTCOMES (POs):

Program Outcomes (POs) describe what students are expected to know and be able to do by the time of graduation to accomplish Program Educational Objectives (PEOs). The Program Outcomes for Computer Science and Engineering (Artificial Intelligence and Machine Learning) graduates are:

Engineering Graduates would be able to:

PO 1 Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO 2 Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO 3 Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO 4 Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO 5 Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modeling recognizing their limitations to solve complex engineering problems. (WK2 and WK6).

PO 6 The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).

PO 7 Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO 8 Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO 9 Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO 10 Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one’s own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO 11 Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8).

WK 1 A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

WK 2 Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modeling applicable to the discipline.

WK 3 A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

WK 4 Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

WK 5 Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

WK 6 Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

WK 7 Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

WK 8 Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

WK 9 Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO 1 Demonstrate competency in Programming and problem-solving skills and apply those skills in solving computing problems

PSO 2 Select appropriate programming languages, Data structures and algorithms in combination with modern technologies and apply them in developing innovative solutions

PSO 3 Demonstrate adequate knowledge in the concepts and techniques of artificial intelligence and machine learning, apply them in developing intelligent systems to solve real world problems

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Department of CSE (AI&ML)
Applicable from AY 2025-2026 Batch
AR25 STRUCTURE

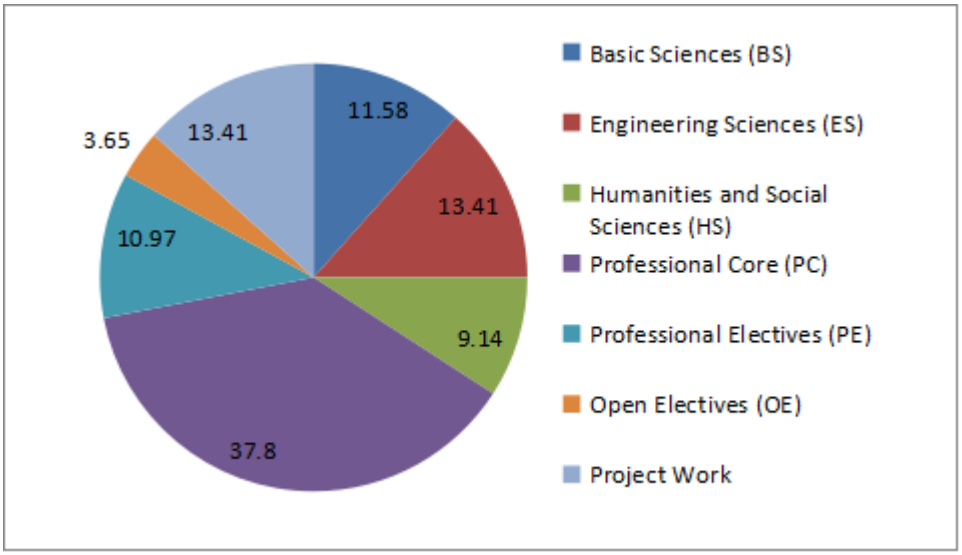
S.No.	Category	Credits as per GCET AR25	Credits as per AICTE Model Curriculum (2022)
1	**Humanities and Social Sciences including Management Courses**	**15**	**16**
2	**Basic Sciences Courses**	**19**	**23**
3	**Engineering Sciences Courses** including workshop, drawing, basics of electrical/ mechanical/ computer etc.	**19**	**29**
4	**Program Core Courses**	**65**	**59**
5	**Program Elective Courses**: Subjects relevant to chosen specialization/branch	**18**	**12**
6	**Open Elective Courses**: Electives from other technical and/or emerging subjects	**06**	**09**
7	**Project work, Seminar and Internship** in industry or else where	**14**	**15**
8	**Industry raining/ Internship/ Industry Oriented Mini- project/Skill Development Courses (Industry Training/ Internship/ Industry Oriented Mini- Project/Skill Development Courses)**	**8**	-
Total		**164**	**163**

COURSE CODE AND DEFINITION

S.No.	Category Abbreviation	Description
1	HSMC	Humanities and Social Sciences including Management Course
2	BSC	Basic Science Course
3	ESC	Engineering Science Course
4	PCC	Program Core Course
5	PEC	Professional Elective Course
6	OEC	Open Elective Course
7	PROJ	Project, Industry Oriented Mini Project, Seminar and Internship
8	VAC	Value Added Course (Environmental Science, Indian Knowledge Systems, Gender Sensitization / Human Values and Professional Ethics)
9	SDC	Skill Development Course

DEFINITION OF CREDIT

S.No.	Abbreviation	Credits	Description
1	L	1	1 Hour Lecture (L) per week
2	T	1	1 Hour Tutorial (T) per week
3	P/D	0.5 1	1 Hour Practical (P)/ Drawing (D) per week 2 Hours Practical (P)/ Drawing (D) per week



B. TECH COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

Academic Regulations: AR25 **Academic Year 2025-26**

PROGRAMME STRUCTURE

FIRST YEAR I – SEMESTER

S.No.	Course Code	Course	Category	Number of hours Per week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	C
1.	25MA11001	Matrices and Calculus	BSC	3	1	0	40	60	100	4
2.	25PH11001	Advanced Engineering Physics	BSC	3	0	0	40	60	100	3
3.	25CS11001	Programming for Problem Solving	ESC	2	0	0	40	60	100	2
4.	25EE11001	Basic Electrical Engineering	ESC	3	0	0	40	60	100	3
5.	25ME11001	Engineering Drawing and Computer Aided Drafting	ESC	2	0	2	40	60	100	3
6.	25PH11L01	Advanced Engineering Physics Lab	BSC	0	0	2	40	60	100	1
7.	25CS11L01	Programming for Problem Solving Lab	ESC	0	0	2	40	60	100	1
8.	25EE11L01	Basic Electrical Engineering Lab	ESC	0	0	2	40	60	100	1
9.	-	Induction Program	-	-	-	-	-	-	-	-
			Total	**13**	**1**	**08**	**320**	**480**	**800**	**18**
			Total Hours per Week	**22**						

FIRST YEAR II-SEMESTER

S.No.	Course Code	Course Title	Category	Number of hours Per week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1.	25MA12001	Ordinary Differential Equations and Vector Calculus	BSC	3	0	0	40	60	100	3
2.	25CH12001	Engineering Chemistry	BSC	3	0	0	40	60	100	3
3.	25CS12001	Data Structures	ESC	3	0	0	40	60	100	3
4.	25PH12002	Semiconductor Devices and Circuits	ESC	3	0	0	40	60	100	3
5.	25EN12001	English for Skill Enhancement	HSMC	3	0	0	40	60	100	3
6.	25CS12003	Discrete Mathematics	PCC	3	0	0	40	60	100	3
7.	25CH12L01	Engineering Chemistry Lab	BSC	0	0	2	40	60	100	1
8.	25CS12L01	Data Structures Lab	PCC	0	0	2	40	60	100	1
9.	25EN12L01	English Language and Communication Skills Lab	HSMC	0	0	2	40	60	100	1
10	25ME12L01	Engineering Workshop	ESC	0	0	2	40	60	100	1
Total				**18**	**0**	**08**	**400**	**600**	**1000**	**22**
Total hours per Week				**26**						

SECOND YEAR I-SEMESTER

S. No	Course Code	Course Title	Category	Number of hours Per week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1	25EC21002	Digital Logic Design	ESC	3	0	0	40	60	100	3
2	25MS21001	Innovation and Entrepreneurship	HSMC	0	0	2	40	60	100	2
3	25MS21002	Business Economics and Financial Analysis	HSMC	3	0	0	40	60	100	3
4	25CS21001	Advanced data Structures	PCC	3	0	0	40	60	100	3
5	25CS21002	Object Oriented Programming through Java	PCC	3	0	0	40	60	100	3
6	25CS21003	Database management System	PCC	3	0	0	40	60	100	3
7	25CS21L01	Advanced data Structures Lab	PCC	0	0	2	40	60	100	1
8	25CS21L02	Object Oriented Programming through Java Lab	PCC	0	0	2	40	60	100	1
9	25CS21L03	Database management Systems Lab	PCC	0	0	2	40	60	100	1
10	25AI21SD1	Skill Development Course – 1 (Node Js/React JS/Django)	SDC	0	0	2	40	60	100	1
Total				**15**	**0**	**10**	**400**	**600**	**1000**	**21**
Total Hours per Week				**25**						

SECOND YEAR II- SEMESTER

S. No.	Course Code	Course Title	Category	Number of hours Per week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P / D	CIE	SEE	Total	
1	25MA22001	Statistics for Machine Learning	BSC	3	0	0	40	60	100	3
2	25CS22001	Algorithms Design and Analysis	PCC	3	0	0	40	60	100	3
3	25CS22002	Computer Organization and Assembly Language Programming	PCC	3	0	0	40	60	100	3
4	25CS22003	Operating Systems	PCC	3	0	0	40	60	100	3
5	25CS22006	Computer Networks	PCC	3	0	0	40	60	100	3
6	25CS22L04	Algorithms Design and Analysis Lab	PCC	0	0	2	40	60	100	1
7	25CS22L05	Computer Networks and Operating Systems Lab	PCC	0	0	2	40	60	100	1
8	25MA22L01	Statistics for Machine Learning Lab	BSC	0	0	2	40	60	100	1
9	25AI22VA1	Environmental Science	ESC	1	0	0	40	60	100	1
10	25AI22SD2	Skill Development Course – 1 (Data Visualization – R/WT/Power BI)	SDC	0	0	2	40	60	100	1
			Total	**16**	**0**	**08**	**400**	**600**	**1000**	**20**
			Total Hours per Week	**24**						

***Note:** Students who wish to exit after II Year II Semester has to register for this optional course and acquire the credits allotted by doing 6 weeks Work-based Vocational Course/ Internship or Apprenticeship.

THIRD YEAR I-SEMESTER

S. No.	Course Code	Course Title	Category	Number of hours Per week			Scheme of Examination with Maximum Marks			Number of Credits
				L	T	P/D	CIE	SEE	Total	
1	25AI31001	Data Analytics and Visualization	PCC	3	0	0	40	60	100	3
2	25AI31002	Software Engineering	PCC	3	0	0	40	60	100	3
3	25CS31001	Artificial Intelligence	PCC	3	0	0	40	60	100	3
4	Professional Elective-I		PEC	3	0	0	40	60	100	3
	25AI31004	Automata Theory and Compiler Design								
	25AI31005	Introduction to Data Science								
	25AI31006	Software Testing Methodologies								
	25AI31007	Data Mining								
	25AI31008	Web Programming								
	25AI31009	Distributed Systems								
5	Open Elective-I		OEC	2	0	0	40	60	100	2
	25CE31101	Building Science and Technology								
	25CS31103	Principles of Programming Languages								
	25CY31106	Cyber Security								
	25CY31107	Ethical Hacking Fundamentals								
	25DS31108	R- Programming								
	25DS31109	Data Engineering								
	25EE31110	Fundamentals of Electric Vehicles								
	25EC31111	Principles of Communication								
	25ME31112	Industrial Robotics								
	25MS31113	Intellectual Property Rights								
	25MA31114	Logical reasoning-I								
6	25AI31L01	Data Analytics and Visualization Lab	PCC	0	0	2	40	60	100	1
7	25AI31L02	Software Engineering Lab	PCC	0	0	2	40	60	100	1
8	25CS31L01	Artificial Intelligence with Python Lab	PCC	0	0	2	40	60	100	1
9	25AI31003	Field Based Research Project/Internship	PROJ	0	0	4	-	100	100	2
10	25EN31L01	English for Employability Skills Lab	HSMC	0	0	2	40	60	100	1
11	25AI31SD3	Skill Development Course – 3 (UI Design –Flutter/ Android Studio)	SDC	0	0	2	40	60	100	1
12	25AI31VA2	Gender Sensitization / Human Values and Professional Ethics*	HSMC	1	0	0	40	60	100	0.5+0.5
			Total	**1**	**0**	**14**	**440**	**760**	**1200**	**22**

	5						
Total Hours per Week	**29**						

***Note: For the courses Gender Sensitization and Human Values and Professional Ethics -** one hour of instruction will be conducted on alternate weeks. For example, if a one-hour class for Gender Sensitization is conducted this week, then a one-hour class for Human Values and Professional Ethics will be conducted in the following week.

THIRD YEAR II-SEMESTER

S. No.	**Course Code**	**Course Title**	**Category**	**Number of hours Per week**			**Scheme of Examination with Maximum Marks**			**Number of Credits**
				L	**T**	**P/D**	**CIE**	**SEE**	**Total**	
1	25AI32001	Natural Language Processing	PCC	3	0	0	40	60	100	3
2	25AI32002	Machine Learning	PCC	3	0	0	40	60	100	3
3	Professional Elective-II		PEC	3	0	0	40	60	100	3
	25AI32003	Image Processing								
	25AI32004	Blockchain Technology								
	25AI32005	Software Project Management								
	25AI32006	Mining Massive Datasets								
	25AI32007	Full Stack Development								
	25AI32008	Devops								
4	Professional Elective-III		PEC	3	0	0	40	60	100	3
	25AI32009	Computer Vision								
	25AI32010	Cryptography and Network Security								
	25AI32011	Penetration Testing and Incident Response								
	25AI32012	Data Stream Mining								
	25AI32013	Cloud								

		Computing								
	25AI32014	Information Retrieval Systems								
5	Open Elective-II		OEC	2	0	0	40	60	100	2
	25CE32201	Building Services								
	25CS32203	Modern Databases								
	25CY32206	Social Media Security								
	25CY32207	Information System Audit and Assurance								
	25DS32208	MERN Stack Development								
	25DS32209	Web Social Media Analytics								
	25EE32210	Digital Energy								
	25EC32211	Electronics for Healthcare								
	25ME32212	Non-Conventional Sources of Energy								
	25MS32213	Supply Chain management								
	25MA32214	Logical Reasoning-II								
6	25AI32L01	Natural Language Processing Lab	PCC	0	0	2	40	60	100	1
7	25AI32L02	Machine Learning Lab	PCC	0	0	2	40	60	100	1
8	25AI32L03	Chatbots Lab	PCC	0	0	2	40	60	100	1
9	25AI32VA3	Indian Knowledge System	HSMC	1	0	0	40	60	100	1
10	25AI32SD4	Skill Development Course – 4 Prompt Engineering	SDC	0	0	2	40	60	100	1
			Total	**15**	**0**	**08**	**400**	**600**	**1000**	**19**
			Total Hours per Week	**23**						

FOURTH YEAR I- SEMESTER

S. No.	Course Code	Course Title	Category	Number of hours Per week			Scheme of Examination with Maximum Marks			Credits
				L	T	P/D	CIE	SEE	Total	
1	25AI41001	Reinforcement Leaning	PCC	3	0	0	40	60	100	3
2	25AI41002	Generative AI	PCC	3	0	0	40	60	100	3
3	25CS41002	Deep Learning	PCC	3	0	0	40	60	100	3
4	Professional Elective I V		PEC	3	0	0	40	60	100	3
	25AI41003	Augmented Reality & Virtual Reality								
	25AI41004	Agile Methodology								
	25AI41005	Big Data Technologies								
	25AI41006	Quantum Computing								
	25AI41007	Robotic Process Automation`								
	25AI41008	Cyber Forensics								
5	Open Elective-III		OEC	3	0	0	40	60	100	2
	25CE41301	Disaster management								
	25CS41302	Fundamentals of Cyber Security								
	25CS41303	Soft Computing								
	25CY41306	Data Privacy								
	25CY41307	Security Incident and Response Management								
	25DS41308	Android Application Development								
	25DS41309	Data Stream Processing using Spark								
	25EE41310	Sustainable Energy								
	25EC41311	Introduction to Sensors and Instrumentation								
	25ME41312	Digital manufacturing								
	25MS41313	Project management and finance								
	25MA41314	Mathematics in India from Vedic Period to Modern Times								
6	25AI41L01	Reinforcement Leaning Lab	PCC	0	0	2	40	60	100	1
7	25AI41L02	Generative AI Lab	PCC	0	0	2	40	60	100	1
8	25CS41L02	Deep Learning Lab	PCC	0	0	2	40	60	100	1
9	25AI41003	Industry Oriented Mini Project/ Internship	PROJ	0	0	4	-	100	100	2
Total				**15**	**0**	**10**	**320**	**580**	**900**	**19**
Total Hours per Week				**25**						

FOURTH YEAR II- SEMESTER

S. No.	Course Code	Course Title	Category	Number of hours Per week			Scheme of Examination with Maximum Marks			Credits
				L	T	P/D	CIE	SEE	Total	
1	25AI42001	Project Work	PROJ	0	0	28	40	60	100	14
2	25MS42003	Fundamentals of Management for Engineers	HSMC	3	0	0	40	60	100	3
3	Professional Elective-V		PEC	3	0	0	40	60	100	3
	25AI42002	Social Media Mining								
	25AI42003	Nature Inspired Computing								
	25AI42004	Internet of Things								
	25AI42005	Game Theory								
	25AI42006	Mobile Application Development								
	25AI42007	Human Computer Interaction								
4	Professional Elective – VI		PEC	3	0	0	40	60	100	3
	25AI42008	High Performance Computing								
	25AI42009	Edge Computing								
	25AI42010	Graph Theory								
	25AI42011	Adhoc and Sensor Networks								
	25AI42012	Sustainable Engineering								
	25AI42013	Distributed Databases								
Total				**9**	**0**	**28**	**160**	**240**	**400**	**23**
Total Hours per Week				**37**						

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25MA11001 – Matrices and Calculus
Common to All Branches

B. Tech. – I Year, I Sem.

Prerequisite(s): None

L	T	P/D	C
3	1	-/-	4

Course Objectives:

Develop ability to

1. Understand various types of matrices, properties and rank of the matrix to find the solution for system of equations, if it exists.
2. Apply the knowledge of eigenvalues and eigenvectors of a matrix from quadratic form into a canonical form through linear and orthogonal transformations.
3. Familiarize students with the statements, geometrical interpretations, and applications of Mean Value Theorems such as Rolle's theorem, Lagrange's Mean Value Theorem, and Cauchy's Mean Value Theorem.
4. Compute partial derivatives, composite functions of several variables and apply the methods of differential calculus to optimize multivariable functions
5. Evaluate definite integrals to calculate surface and volume of revolutions of curves, multiple integrals and apply the same to solve engineering problems.

Course outcomes (COs)

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

CO1: Apply elementary transformations to solve a system of linear equations and reduce the quadratic form to the canonical form using linear and / or orthogonal transformation.

CO2: Apply Mean Value Theorems to analyze the behaviour of functions, interpret their geometrical meaning, and solve related problems in mathematical and engineering contexts.

CO3: Apply the concept of partial differentiation to solve constrained optimization problems without graphical representation

CO4: Apply the definite / multiple integrals to compute areas and volumes of any region/solids

CO	**Related POs and PSOs**	**Related Units**	**BTL**	**Related SDGs**
CO1	PO1, PO2, PO3, PSO1	I & II	1,2,3,4	SDG4, SDG9
CO2	PO1, PO2, PO3, PSO1	III	1,2,3,4	SDG4, SDG9
CO3	PO1, PO2, PO3, PSO1	IV	1,2,3,4	SDG4, SDG9
CO4	PO1, PO2, PO3, PSO1	V	1,2,3,4	SDG4, SDG9

UNIT-I: Matrices **8 L**

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method.

System of linear equations: Solving System of Homogeneous and Non-Homogeneous equations**,** Gauss Seidel Iteration Method.

UNIT-II: Eigenvalues and Eigenvectors 10 L

Linear Transformation and Orthogonal Transformation: Eigenvalues and eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic forms, Reduction of Quadratic form to canonical form by Orthogonal Transformation.

UNIT III: Single Variable Calculus: 10 L

Limits and Continuity of Functions and their properties, Mean Value Theorems – Rolle's Theorem, Lagrange's Mean Value Theorem with their geometrical interpretation and applications, Cauchy's mean Value Theorem, Taylor's Series (All the theorems without proof)

UNIT IV: Multivariable Calculus (Partial Differentiation and applications) 10 L

Definitions of Limit and Continuity, Partial Differentiation, Euler's Theorem, Total derivative, Jacobian, Functional dependence and independence.

Applications: Maxima and Minima of functions of two variables and three variables using method of Lagrange multiplier.

Improper Integrals: Beta and Gamma Functions and their applications without proofs.

UNIT V: Multivariable Calculus (Integration) 10 L

Evaluation of Double Integrals (Cartesian and polar coordinates), Change of order of integration (only Cartesian form), Change of variables for double integrals (Cartesian to polar), Evaluation of Triple Integrals: Change of Variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates).

Applications: Areas by double integrals and volumes by double integrals and triple integrals.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2011.
2. G.B. Thomos and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2002,
3. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Edition, 2015.
4. H.K. Das and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Ltd, New Delhi.

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25PH11001- ADVANCED ENGINEERING PHYSICS
Common to all Engineering branches

L	T	P	C
3	-	-	3

B.Tech. I Year, I Sem.
Prerequisite(s): None

Course Objectives:
Develop ability to

1. Understand the fundamental concepts of quantum behavior of matter in its micro state and experimental evidence to dual nature of matter, and physical significance and application of wave function.
2. Understand the characteristics of intrinsic and extrinsic semiconductors, and applications of Hall effect.
3. Understand the concepts of quantum computing principles, quantum gates, and basic quantum algorithms.
4. Understand the properties and applications of magnetic and dielectric materials.
5. Understand the working and applications of lasers and fibre optics in modern technology.

Course Outcomes:

CO 1 Apply quantum mechanical principles to explain particle behavior and energy band formation in solids.
CO 2 Classify semiconductors, interpret Fermi level variations, and apply Hall effect concept to determine the type of semiconductor.
CO 3 Explain quantum computing concepts, quantum gates, and describe basic quantum algorithms.
CO 4 Classify magnetic and dielectric materials, assess their characteristics, and apply them in technological applications.
CO 5 Explain principles of lasers and optical fibres, their operation and application in communication and sensing technologies.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1, PO2	I	1,2,3	SDG4
CO2	PO1, PO2	II	1,2,3	
CO3	PO1, PO2	III	1,2,3	
CO4	PO1, PO2	IV	1,2,3	
CO5	PO1, PO2	V	1,2,3	

UNIT - I: Quantum Mechanics

Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, effective mass of electron, formation of energy bands, origin of bandgap, classification of solids, concept of discrete energy levels and quantum confinement in nanomaterials.

UNIT - II: Semiconductors

Classification of semiconductors: n-type, p-type, carrier concentration in intrinsic and extrinsic semiconductors, Fermi level in intrinsic and extrinsic semiconductors, variation of Fermi level with temperature and concentration of dopants in extrinsic semiconductors, direct and indirect band gap semiconductors, Hall effect and its applications.

UNIT - III: Quantum Computing

Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, quantum computing system for information processing, evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, Introduction to quantum algorithms: Deutsch-Jozsa, Shor, Grover (Qualitative).

UNIT - IV: Magnetic and Dielectric Materials

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using sol-gel method, applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.

Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT - V: Laser and Fibre Optics

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO_2 laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle.

Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.

TEXT BOOKS:

1. Walter Borchardt-Ott, Crystallography: An Introduction, Springer.
2. Charles Kittel, Introduction to Solid State Physics, John Wiley & Sons, Inc.
3. Thomas G. Wong, Introduction to Classical and Quantum Computing, Rooted Grove
4. Physics, Halliday, Resnick and Krane, Wiley Publishers, 5^{th} edition, 2018.
5. Engineering Physics, B.K. Pandey, S. Chaturvedi, Cengage Learing.2012.

REFERENCE BOOKS:

1. Jozef Gruska, Quantum Computing, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
3. John M. Senior, Optical Fiber Communications Principles and Practice, Pearson Education Limited.
4. A Textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar, S. Chand, Revised edition, 2018.

Useful Links

https://shijuinpallotti.wordpress.com/wpcontent/uploads/2019/07/opt ical-fiber-communications-principles-and-pr.pdf

https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf

https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State PhysicsCharles-Kittel.pdf

https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf

https://www.fi.muni.cz/usr/gruska/qbook1.pdf

https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf

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25CS11001: PROGRAMMING FOR PROBLEM SOLVING

B. Tech CSE(AIML) – I Year, I Sem.

Prerequisite(s): None

L	T	P/D	C
2	-	-/-	2

Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems.

Course Outcomes: The student will learn

CO 1 Develop algorithms and flowcharts to solve problems and implement them using C programs.

CO 2 Apply control structures and iterative statements to solve real-world problems using C.

CO 3 Design modular programs using functions, recursion, and pre-processor directives.

CO 4 Implement and analyze searching and sorting algorithms using arrays in C.

CO 5 Utilize pointers and strings for dynamic memory management and efficient program design.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1, PO2, PO3, PO4, PSO1, PSO2	Unit I	BTL 3	SDG4, SDG9
CO2	PO1, PO2, PO3, PO4, PO10, PSO1, PSO2	Unit II	BTL 3	SDG4, SDG8
CO3	PO1, PO2, PO3, PSO1, PSO2	Unit III	BTL 4	SDG9, SDG12
CO4	PO1, PO2, PO3, PO4, PSO1, PSO2	Unit IV	BTL 4	SDG4, SDG9
CO5	PO1, PO2, PO3, PO4, PSO1, PSO2	Unit V	BTL 4	SDG8, SDG9

UNIT - I: Logic Building:
Flow chart, Algorithm, Pseudo code. Introduction to Programming Computer Languages, Creating and running programs, Program Development. Introduction to the C Language Background, C Programs, Identifiers, Data Types, Variables, Constants, Input/output functions. Operators Arithmetic, relational, logical, bitwise, conditional, increment/decrement, assignment. Expressions, Precedence and Associativity, Expression Evaluation, Type conversions.

UNIT– II: **Control statements**:
Selection Statements (decision making) – if and switch statements. Repetition statements (loops) while, for, do-while statements. Break, continue, goto statements.

UNIT - III: Functions and Program structure:

User defined functions, inter function communication, Scope and Lifetime of variables, Storage classes-auto, register, static, extern, type qualifiers. The C preprocessor. Recursive functions.

UNIT - IV: **Array**s:

Declaring and Referencing Arrays, Array Subscripts, Using Array Elements as Function Arguments, Array Arguments, Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms two – dimensional arrays matrix addition and matrix multiplication, Declaration of Multidimensional arrays.

UNIT - V: Pointers and Strings

Pointers: Introduction, Pointers and addresses, Pointer types, Pointers and function arguments, Pointers and arrays, address arithmetic, Array of Pointers, Pointers to Pointers, Pointer to Function, pointers and multi-dimensional arrays. Dynamic Memory Allocation.

Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, character pointers and functions

TEXT BOOKS:

- Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
- B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.
3. Yashvant Kanetkar, Let Us C, 18th Edition, BPB.
4. R.G. Dromey, how to solve it by Computer, Pearson (16th Impression).
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
7. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill.

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25EE11001– BASIC ELECTRICAL ENGINEERING

B. Tech CSE(AIML) – I Year, I Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Outcomes (COs): On completion of the course, the student would be able to:

CO 1 Analyze DC and AC electrical circuits using basic laws, theorems, and phasor concepts.

CO 2 Explain the construction and operational principles of transformers and other electrical machines.

CO 3 Evaluate performance of various DC and AC machines.

CO 4 Apply principles of electrical installations, wiring systems, and safe practices in engineering applications.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO 1	PO1, PO2, PO3, PO4, PO5, PO11, PSO1	Unit I & II	BTL-4	SDG 7, SDG9
CO 2	PO1, PO2, PO3, PO5, PO11, PSO2	Unit III & IV	BTL-2	SDG 7, SDG9
CO 3	PO1, PO2, PO4, PO5, PO11, PSO2	Unit IV	BTL-5	SDG 7, SDG12
CO 4	PO1, PO2, PO3, PO5, PO11, PSO3	Unit V	BTL-3	SDG 3, SDG7, SDG11

UNIT-I: D.C. Circuit Analysis:

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Transient response of first-order RL and RC circuits (with DC excitation).

UNIT-II: A.C. Circuit Analysis:

Representation of sinusoidal waveforms; determination of average and RMS values; phasor representation. Computation of real, reactive, and apparent power; analysis of power factor. Analysis of single-phase AC circuits and Resonance in series R–L–C Circuit.

UNIT-III: Transformer:

Ideal and practical transformer, equivalent circuit, losses and efficiency in transformers. Auto-transformer and Fundamentals of three-phase transformer connections. Applications of transformers.

UNIT-IV: Electrical Machines:

DC machines – construction, working principle and Applications; Three-Phase Induction Motor – generation of rotating magnetic field, construction, operation and its applications. Single-Phase Induction Motor – construction and operation.

UNIT-V: Electrical Installations:

Components of LT switchgear – Types of Fuses, MCB, ELCB, MCCB; types of wires and cables; earthing methods. Batteries – types and key characteristics. Basic energy consumption calculations. Applications of installations.

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition,2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition,2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
4. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

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25ME11001: ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING

B. Tech CSE (AIML) – I Year, I Sem.
Prerequisite(s): None

L	T	P/D	C
2	0	2	3

Course Objectives:

1. To introduce the fundamentals of engineering drawing and projection systems.
2. To develop skills in constructing orthographic, isometric, and sectional views.
3. To train students in interpreting and creating technical drawings using CAD tools.
4. To familiarize students with dimensioning standards and drafting conventions.
5. To bridge manual drafting techniques with computer-aided drafting practices.

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

CO 1 Understand and apply the concepts of Auto-CAD commands to practice Engineering Drawing. **(U-I to V)**

CO 2 Construct scales, Geometric curves (Conic sections & Cylindrical curves)by using Auto- CAD. **(U – I)**

CO 3 Apply the principles of Orthographic projections to draw points , Straight lines , Planes and regular solids by using Auto-CAD. **(U- II, III)**

CO 4 Develop the sectional views and surfaces of a solid Geometries by using Auto-CAD. **(U- IV)**

CO 5 Demonstrate drafting skills for Isometric and Orthographic views. **(U- V)**

CO	Related POs and PSOs	Related Units	BTL
CO 1	POs: 1,3 and 9	1, 2, 3, 4, 5	2,3,4, 5
CO 2	POs: 1,3 and 9	1	2,3,4, 5
CO 3	POs: 1,3 and 9	2, 3	2,3,4, 5
CO 4	POs: 1,3 and 9	4	2,3,4, 5
CO 5	POs: 1,3 and 9	5	2,3,4, 5

UNIT – I: Introduction to Engineering Graphics (Conventional)

Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections including the Rectangular Hyperbola, General method only. Cycloid, Epicycloid and Hypocycloid.

UNIT - II: Orthographic Projections (Conventional and Computer Aided)

Introduction to Computer aided drafting, views, commands. Principles of Orthographic Projections, Conventions, Projections of Points and Lines (Lines Inclined to both the Planes).

UNIT – III: Projections of Regular Planes and Solids (Conventional and Computer Aided)

Projections of Plane regular geometric figures. Computer aided orthographic projections of planes (Planes inclined to both the planes). Right Regular Solids (Axis inclined to one plane)- Prism, Cylinder, Pyramid, Cone, Computer aided projections of planes & solids.

UNIT – IV: Sections of Solids and Development of Surfaces (Conventional)

Sectional views and development surfaces of Prism, Cylinder, Pyramid and Cone.

UNIT – V: Isometric Projections (Conventional and Computer Aided)

Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple and Compound Solids. Conversion of Isometric Views to Orthographic Views and Vice- versa.

Note:

1. The End Semester Examination will be in computer mode.
2. CIE – I will be in conventional / computer mode.
3. CIE – II will be in computer mode.

TEXT BOOKS:

1. Engineering Drawing, N. D. Bhatt, Charotar, 54th Edition, 2023.
2. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan and Vikas, S. Chand and company Ltd., 3rdEdition,2010.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill, 3rd Edition, 2019.
2. Engineering Graphics and Design, WILEY, John Wiley and Sons Inc, 3rdEdition, 2020.
3. Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2nd Edition, 2009.
4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1st Edition, 2015.
5. Computer Aided Engineering Drawing, K. Balaveera Reddy, CBS Publishers, 2nd Edition, 2015.

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25PH11L01- ADVANCED ENGINEERING PHYSICS LABORATORY
Common to all Engineering branches

L	T	P	C
0	-	2	1

B.Tech. I Year, I Sem.
Prerequisite(s): None

Course Objectives:

1. To provide practical exposure to advanced concepts in solid-state and modern physics.
2. To study the physical properties of materials like semiconductors, ferromagnetic, and ferroelectric substances.
3. To perform semiconductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

Course Outcomes:

CO 1 Analyze the characteristics of Solar cell and LED
CO 2 Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
CO 3 Characterize semiconductors using Hall effect and energy gap measurement techniques.
CO 4 Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
CO 5 Apply scientific methods for accurate data collection, analysis, and technical report writing.

CO	Related POs and PSOs	Related Experiments	BTL	Related SDGs
CO1	PO1, PO2	3,4	3, 4	SDG4
CO2	PO1, PO2	6,7,8,9		
CO3	PO1, PO2	1,2		
CO4	PO1, PO2	5,10		
CO5	PO1, PO2	All		

List of Experiments: (A minimum of Eight Experiments)

1. Determination of energy gap of a semiconductor.
2. Determination of Hall coefficient and carrier concentration of a given semiconductor.
3. Plot the V-I characteristics of a Solar cell.
4. Determination of Planck’s constant using the V-I characteristics of the LED.

5. a. Determination of wavelength of a laser using a diffraction grating.
   b. Study of V-I & L-I characteristics of a given laser diode.
6. Determination of the magnetic moment of a bar magnet and the horizontal Earth's magnetic field.
7. Study of the B-H curve of a ferromagnetic material.
8. Study of the P-E loop of a given ferroelectric crystal.
9. Determination of the dielectric constant of a given material.
10. a. Determination of the numerical aperture of a given optical fibre.
    b. Determination of bending losses of a given optical fibre.

Note: Any 8 experiments are to be performed.

Equipment required:

1. Energy gap apparatus with thermometer.
2. Hall Effect Apparatus.
3. Solar cell arrangement with light source.
4. Characteristics of LED and LASER diode circuit board.
5. Bar magnet and other apparatus.
6. B-H Curve kit.
7. P-E loop kit.
8. RC circuit board and stop clock.
9. Optical fiber kit.

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25CS11L01: PROGRAMMING FOR PROBLEM SOLVING LAB

B.Tech. CSE(AIML) - I Year, I Sem.

Prerequisite(s): None.

L	T	P/D	C
-	-	2/-	1

[Note: The programs may be executed using any available Open Source/ Freely available IDE some of the Tools available are:
CodeLite: https://codelite.org/
Code Blocks:http://www.codeblocks.org/
DevCpp http://www.bloodshed.net/devcpp.html]

Course Objectives: The students will learn the following:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To write programs using the Dynamic Memory Allocation concept.

Course Outcomes: The candidate is expected to be able to:

CO 1 Formulate the algorithms for simple problems

CO 2 Translate given algorithms to a working and correct program

CO 3 Correct syntax errors as reported by the compilers.

CO 4 Identify and correct logical errors encountered during execution

CO 5 Represent and manipulate data with arrays, strings

CO 6 Use pointers of different types

CO 7 Modularize the code with functions so that they can be reused

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1, PO2, PO3, PO5, PSO1, PSO2	Unit I	BTL 3	SDG4, SDG9
CO2	PO1, PO2, PO3, PO5,PSO1, PSO2	Unit I	BTL 3	SDG4, SDG8
CO3	PO1, PO2, PO5, PSO1, PSO2	Unit I, II, III, IV, V	BTL 4	SDG4
CO4	PO1, PO2, PO3, PO5, PO10, PSO1, PSO2	Unit I, II, III, IV, V	BTL 3	SDG4, SDG9
CO5	PO1, PO2, PO5, PSO1, PSO2	Unit IV, V	BTL 3	SDG4, SDG9
CO6	PO1, PO2, PO3, PO5, PSO1, PSO2	Unit V	BTL 3	SDG4, SDG9
CO7	PO1, PO2, PO3, PO5, PSO1, PSO2	Unit III	BTL 4	SDG4, SDG9

PRACTICE SESSIONS:

Simple numeric problems:

a) Write a program for finding the max and min from the three numbers.

b) Write the program for the simple, compound interest.

c) Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:

5 x 1 = 5

5 x 2 = 10

5 x 3 = 15

d) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).

b) Write a program that finds if a given number is a prime number.

c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.

d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

Arrays, Pointers and Functions:

a) Write a C program to find the minimum, maximum and average in an array of integers.

b) Write a C program that uses functions to perform the following: I. Addition of Two Matrices II. Multiplication of Two Matrices

c) Write a program for reading elements using a pointer into an array and display the values using the array.
d) Write a program for display values reverse order from an array using a pointer.

Strings:
a) Write a C program that uses functions to perform the following operations: I. To insert a sub-string into a given main string from a given position. II. To delete n Characters from a given position in a given string
b) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
c) Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
d) Write a C program to count the lines, words and characters in a given text.

Sorting and Searching:
a) Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
b) Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
c) Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
d) Write a C program that sorts the given array of integers using selection sort in descending order
e) Write a C program that sorts the given array of integers using insertion sort in ascending order
f) Write a C program that sorts a given array of names.

TEXT BOOKS:

1. Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

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25EE11L01- BASIC ELECTRICAL ENGINEERING LAB

B. Tech. CSE(AIML) - I Year I Sem

Prerequisite(s): None.

L	T	P/D	C
-	-	2/-	1

Course Objectives: The students would develop ability to

1. Analyse a given network by applying various electrical laws and network theorems
2. To study the transient response of various R, L and C circuits using different excitations.
3. To determine the performance of different types of DC, AC machines and Transformers.

Course Outcomes: On completion of the course, the student would be able to

CO1. Get an exposure to basic electrical laws and theorems

CO2. Verify the basic Electrical circuits through different experiments.

CO3. Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.

CO4. Analyse the transient responses of R, L and C circuits for different input conditions.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1 PO2 PO4 PO5 PO11, PSO1	EXP1, EXP2, EXP3	BTL-4	SDG7, SDG9
CO2	PO1 PO2 PO3 PO5 PO11, PSO2	EXP1, EXP2, EXP3, EXP4, EXP5	BTL-2	SDG7, SDG9
CO3	PO1 PO2 PO4 PO5 PO11, PSO2	EXP7, EXP8, EXP9, EXP 10	BTL-5	SDG7, SDG12
CO4	PO1 PO2 PO3 PO5 PO11 & PSO3	EXP4, EXP6	BTL-3	SDG3, SDG7, SDG 11

List of Experiments:

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Verification of Superposition theorem
4. Transient response of series RL and RC circuits for DC excitation
5. Resonance in Series RLC circuit
6. Calculations and verification of Impedance and Current of RL and RC and RLC series circuits
7. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer

8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Performance Characteristics of a DC Shunt Motor
10. Torque-Speed Characteristics of a Three-phase Induction Motor.

Additional Experiments:

1. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
2. Measurement of Active and Reactive Power in a balanced Three-phase circuit

TEXT BOOKS:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker," Basic Electrical Engineering", S. Chand, 2 nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

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Sy. No: 33 & 34, Cheeryal (V), Keesara (M), Medchal District, Telangana – 501301

25MA12001 – ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Common to All Branches

B. Tech. – I Year, II Sem.

Prerequisite(s): 25MA11001- Matrices and Calculus

L	T	P/D	C
3	-	-/-	3

Course Objectives:

Develop ability to

1. Solve first and higher order differential equations of various types.
2. Analyze properties of Laplace Transform, and Inverse Laplace Transform.
3. Solve Ordinary Differential Equations using Laplace Transform techniques.
4. Explain properties of vector operators to determine solenoidal and irrotational vectors, directional derivatives of vectors.
5. Determine the length of a curve, area between the surfaces and volumes of solids using vector integration.

Course Outcomes (COs)

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

CO1: Form first order differential equations for Growth and Decay and apply appropriate methods for solving them

CO2: Form higher order differential equations for Electrical circuits and apply appropriate methods for solving them.

CO3. Apply Laplace transform techniques to evaluate integrals and solve ordinary differential equations with initial conditions.

CO4: Analyze and compute vector derivatives and relate vector integrals to physical and engineering applications.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO	PO1, PO2, PO3, PSO1	I	BTL-1, BTL-2, BTL-3, BTL-4	SDG4, SDG9
CO	PO1, PO2, PO3, PSO1	II	BTL-1, BTL-2, BTL-3, BTL-4	SDG4, SDG9
CO	PO1, PO2, PO3, PSO1	III	BTL-1, BTL-2, BTL-3, BTL-4	SDG4, SDG9
CO	PO1, PO2, PO3, PSO1	IV & V	BTL-1, BTL-2, BTL-3, BTL-4	SDG4, SDG9

UNIT-I: First Order Ordinary Differential Equations **8 L**

Exact Differential Equations, Equations reducible to Exact Differential Equations, Linear Differential Equations and Bernoulli's Equations orthogonal Trajectories (only in Cartesian Coordinates)

Applications: Newton's law of cooling, Law of Natural growth and decay

UNIT II: Ordinary Differential Equations of Higher Order 10 L

Higher Order Linear Differential Equations with Constant Coefficients: Non-homogeneous of the type e^{ax}, sin ax, cos ax, x^n, $e^{ax}V(x)$ and $xV(x)$**,** Method of variation of parameters.

Applications: Electrical Circuits.

UNIT III: Laplace Transforms 10 L

Definition of Laplace transform, Existence of Laplace transforms, Laplace transform of standard functions, first shifting theorem, Laplace transform of functions when they are multiplied and divided by "t", Laplace transforms of derivatives and integrals of functions, Laplace Transform of Periodic function, Inverse Laplace transform by different methods, Convolution theorem(without proof).

Applications: Evaluation of integrals using Laplace Transforms, Solving Initial Value Problems by using Laplace Transform method.

UNIT IV: Vector Differentiation 10 L

Vector point functions and Scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Vector Identities, Scalar potential function, Solenoidal and Irrotational vectors.

UNIT V: Vector Integration 10 L

Line, Surface and Volume Integrals. Theorems of Green's Gauss and Stokes (without proofs) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2011.
2. G.B. Thomos and R.L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Edition, 2015.
4. H.K. Das and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Ltd, New Delhi.

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25CH12001- ENGINEERING CHEMISTRY

L	T	*P*/D	C
3	-	-	3

B.Tech. I year II Sem

Prerequisite(s): None.

Course Objectives:

1. Acquire knowledge of various water treatment methods and their industrial significance in resolving the problem of water hardness.
2. Understand fundamental principles of electrochemistry and corrosion with a perspective of their industrial applications.
3. Impart fundamental knowledge of various energy sources and their practical applications in engineering.
4. Understand the various aspects of polymers, including conducting and biodegradable polymers, and their applications in diverse fields.
5. Acquire knowledge of materials such as cement, lubricants, and biosensors, as well as spectroscopic techniques applicable in engineering, industrial and biomedical fields.

Course Outcomes: At the end of the course, student would be able to -

CO 1 Predict problems associated with hardness of water and identify appropriate method to treat hardness.

CO 2 Analyze different electrodes and corrosion control methods for interpreting their applications in various sectors.

CO 3 Comprehend the usage of batteries, fuel cells and various energy sources, enhancing their potential as future engineers and entrepreneurs.

CO 4 Categorize polymers and their applications in different fields.

CO 5 Apply knowledge of engineering materials and principles of spectroscopic techniques to support industrial and biomedical applications.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1, PO2	I	BTL-1, BTL-2, BTL-3	SDG3, SDG6, SDG7, SDG8, SDG 12
CO2	PO1, PO2	II	BTL-1, BTL-2, BTL-3, BTL-4	SDG3, SDG6, SDG7, SDG8, SDG 12
CO3	PO1, PO2	III	BTL-1, BTL-2, BTL-3	SDG3, SDG6, SDG7, SDG8, SDG 12
CO4	PO1, PO2	IV	BTL-1, BTL-2, BTL-3	SDG3, SDG6, SDG7, SDG8, SDG 12
CO5	PO1, PO2	V	BTL-1, BTL-2, BTL-3	SDG3, SDG6, SDG7, SDG8, SDG 12

UNIT-I: Water and its treatment: [8]

Introduction- Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and break-point chlorination. Defluoridation - Nalgonda technique.

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning and Phosphate conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis.

Unit-II: Electrochemistry and Corrosion: [8]

Introduction- Electrode potential, standard electrode potential, Nernst equation (no derivation), electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of reference electrodes – Quinhydrone and Calomel electrode. Construction, working and determination of pH of an unknown solution using Quinhydrone and Calomel electrode.

Corrosion: Introduction- Definition**,** causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Factors affecting rate of corrosion - Nature of the metal, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods. Metallic coatings-Methods of application - Galvanizing and Tinning.

UNIT–III Energy sources [8]

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Lead – acid storage battery and Lithium-ion battery. Fuel Cells – Differences between a battery and a fuel cell, Construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics of a good fuel, Calorific value – Units - HCV, LCV- Dulong's formula - Numerical problems.

Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil, LPG and CNG composition and uses.

Synthetic Fuels: Fischer-Tropsch process. Introduction and applications of Hythane and Green Hydrogen.

UNIT – IV Polymers [8]

Definition - Classification of polymers: Based on origin and tacticity with examples – Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization. Plastics, Elastomers and Fibers: Definition and applications (PVC, Teflon, Nylon-6,6). Differences between thermoplastics and thermo setting plastics.

Conducting polymers: Definition and Classification with examples - Mechanism of conduction in trans-poly-acetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid and its applications.

UNIT-V Engineering Materials and their applications [8]

Cement: Portland cement, its composition, setting and hardening.

Lubricants: Definition and characteristics of a good lubricant. Properties of lubricants - viscosity, cloud and pour point, flash and fire point.

Biosensor - Definition, Amperometric Glucose monitor sensor.

Spectroscopic techniques and applications: UV-Visible spectroscopy- Principle, Selection rules, Types of electronic transitions and applications (Analysis of pollutants in dye industry); IR spectroscopy-Principle- Mode of vibrations, Applications in night vision-security, Pollution under Control- CO sensor (Passive Infrared detection),

SUGGESTED TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Dr.P. Aparna and Rath, Cengage learning, 2025.

REFERENCE TEXT BOOKS:

1. Engineering Chemistry by Thirumala Chary, Laxminarayana & Shashikala, Pearson Publications (2020).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
5. Challenges and Opportunities in Green Hydrogen by **Editors:** Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. Raman Spectroscopy in Human Health and Biomedicine,
7. E-Content- https://doi.org/10.1142/13094 | October 2023
8. E-books:
   https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2up
   https://www.worldscientific.com/ doi/epdf/10.1142/13094

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25CS12001: DATA STRUCTURES

B. Tech.CSE(AIML) – I Year, II Sem.
Prerequisite(s): 25CS11001-Programming for Problem Solving

L	T	P/D	C
3	-	-/-	3

Course Objectives: Develop ability to

1. **Introduce students to advanced data representation techniques** in C using structures, unions, enumerations, and typedef to effectively organize and manipulate complex data types.
2. **Proficiency in file handling and data storage concepts**, including text and binary file operations, database searching, file positioning, and multifile program design.
3. **Build foundation in abstract data types and linear data structures**, enabling students to implement and manage linked lists, circular lists, and doubly linked lists for efficient data organization.
4. **Train students in the use of stacks and queues** for solving computational problems such as expression conversion, evaluation, and balancing of symbols through algorithmic thinking.
5. **Equip students with knowledge of hierarchical and network data structures**, including trees and graphs, and their associated algorithms for searching, traversal, and application in problem-solving.

Course outcomes (COs): At the end of the course, student would be able to

CO 1 Apply user-defined data types such as structures, unions, and enumerations to represent complex data.
CO 2 Implement file operations on text and binary files for data storage, retrieval, and maintenance.
CO 3 Develop and manipulate linear data structures including linked lists, stacks, and queues.
CO 4 Design and execute algorithms for trees and graphs including traversal, searching, and updating.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1, PO2, PSO1	Unit I	BTL 2,3	SDG4
CO2	PO1, PO2, PO3, PSO2	Unit II	BTL 3,4	SDG 9
CO3	PO1, PO3, PO4, PSO1	Unit III, IV	BTL3, 4	SDG 8
CO4	PO1, PO4, PO5, PSO2	Unit V	BTL 4,5	SDG 9

UNIT – I: Structure and Union Types
Introduction, User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Complex Structures, Self-Referential Structures, Bit Fields, Union Types, typedef, Enumeration.

UNIT – II: Text and Binary File Pointers

Files Introduction, Modes of File, Input/ Output Files - Review and Further Study, Binary Files, Searching a Database, File status functions, File positioning functions, Command Line Arguments, Multi file Programming.

UNIT–III: Introduction to Data Structures:

Abstract data types, selecting a Data Structure, Linear list ―Introduction, singly linked list, Circular Linked Lists, Doubly Linked List.

UNIT – IV: Stacks

Stack ADT, Stack applications -Infix Expression to Postfix Expression Conversion, Postfix Expression Evaluation, Balancing Symbols, Expression Tree, Queues- Queue ADT

UNIT – V: Trees and Graphs

Introduction, Types of Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree, Binary Search Trees (BST), BST Operations- Searching, Insertion and Deletion, BST ADT.

Introduction to types of Graphs, Representation of Graphs, Graph Traversal Algorithms – Depth First Search, Breadth First Search, Graph ADT, and Applications of Graphs.

TEXTBOOKS:

1. Data Structures: A Pseudo code Approach with C, 2nd Edition, R.F.GilbergandB. A.Forouzan, Cengage Learning.
2. Data Structure using C–ReemaThareja,3rd Edition, Oxford University Press.
3. C Programming and Data Structures, B.A. Forouzan and R.F. Gilberg, Cengage Learning, (3rd Edition).

REFERENCE:

1. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
2. The C Programming Language Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India.

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25PH12002 - SEMICONDUCTOR DEVICES AND CIRCUITS

B.Tech. I Year II Sem.
Prerequisite(s): None

L	T	P	C
3	-	-	3

Course Objectives: Develop the ability to

1. Understand the electrical characteristics, models of semiconductor diodes, applications of diodes as rectifiers and clipping circuits.
2. Understand the operation, configurations and characteristics of Bipolar Junction Transistor.
3. Understand the necessity of transistor biasing and types of biasing for faithful amplification.
4. Understand transistor amplifier circuits using h-parameter equivalent circuit.
5. Understand the working, characteristics and comparison of JFET, MOSFET, FinFET and CNTFET

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

CO 1 Analyze the electrical characteristics and models of semiconductor diodes and apply them in rectifier and clipping circuits.

CO 2 Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and analyze their input and output characteristics.

CO 3 Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications.

CO 4 Analyze transistor amplifier circuits using h-parameter models and assess performance for various configurations.

CO 5 Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare modern device technologies.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1, PO2, PO3, PO4, PO5, PO6	I	BTL-1, BTL-2, BTL-3	SDG4

CO2	PO1, PO2, PO3, PO4, PO5	II	BTL-1, BTL-2, BTL-3	SDG4
CO3	PO1, PO2, PO3, PO4, PO5	III	BTL-1, BTL-2, BTL-3	SDG4
CO4	PO1, PO2, PO3, PO4, PO5	IV	BTL-1, BTL-2, BTL-3	SDG4
CO5	PO1, PO2, PO3, PO4, PO5, PO6	V	BTL-1, BTL-2, BTL-3	SDG4

UNIT - I:

Diode Characteristics and Applications: PN junction diode – I-V characteristics, Diode resistance and capacitance, Diode models (Ideal, Simplified, Piecewise Linear), Rectifiers – Half-wave, Full-wave (Center-tap and bridge), Capacitor filter for rectifiers, Clippers and clampers, Zener diode – I-V characteristics and voltage regulation.

UNIT - II:

Bipolar Junction Transistor (BJT): Structure and working principle of BJT, Current components and transistor action, Configurations: Common Base (CB), Common Emitter (CE), Common Collector (CC), Input and output characteristics, Determination of h-parameters from transistor characteristics.

UNIT - III:

BJT Biasing: Need for biasing and stabilization, Load line and operating point, Biasing techniques: Fixed bias, Collector-to-base bias, Voltage divider bias, Stability factors and thermal runaway

UNIT - IV:

Transistor Amplifiers: Transistor as a small-signal amplifier, h-parameter equivalent circuit, CE, CB, CC amplifier analysis using h-parameters, Approximate CE model – with and without emitter bypass capacitor.

UNIT - V:

Special Purpose Diodes: Principle of Operation of – SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED and Schottky Diode

Field Effect Transistors and Advanced Devices: JFET: Structure, operation, and characteristics, MOSFET: Enhancement and Depletion modes – Structure, operation, and characteristics, Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET.

TEXT BOOKS:

1. Millman, Jacob, and Christos C. Halkias. *Electronic Devices and Circuits*. Tata McGraw-Hill, 1991.
2. Boylestad, Robert L., and Louis Nashelsky. *Electronic Devices and Circuit Theory*. Pearson, 11th ed., 2013.
3. Sedra, Adel S., and Kenneth C. Smith. *Microelectronic Circuits*. Oxford University Press, 7th ed., 2014.

REFERENCE BOOKS:

1. Bell, David A. Electronic Devices and Circuits. Oxford University Press, 5th ed., 2008.
2. Neamen, Donald A. Electronic Circuit Analysis and Design. McGraw-Hill, 2nd ed., 2001.
3. Salivahanan, S., and N. Suresh Kumar. Electronic Devices and Circuits. McGraw-Hill Education, 4th ed., 2017.
4. Razavi, Behzad. Fundamentals of Microelectronics. Wiley, 2nd ed., 2013.
5. Taur, Yuan, and Tak H. Ning. Fundamentals of Modern VLSI Devices. Cambridge University Press, 2nd ed., 2009.

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25EN12001- ENGLISH FOR SKILL ENHANCEMENT

L	T	P	C
3	0	0	3

B.Tech. CSE (AIML) I year, II Sem
Prerequisite(s): None
Course Objectives: Develop ability to

1. Improve vocabulary.
2. Use appropriate sentence structures in oral and written communication.
3. Strengthen reading comprehension and independent study skills.
4. Write paragraphs, essays, précis, and draft letters.
5. Write technical reports

Course Outcomes (COs) at the end of the course, student would be able to

CO 1: Infer and use appropriate vocabulary in oral and written communication.
CO 2: Apply the rules of functional grammar and sentence structures in communication.
CO 3: Comprehend any given text and respond precisely.
CO 4: Construct meaningful and explicit sentences in written form befitting the context.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO8, PO9	I, II, III, IV, V	BTL-2, BTL-3, BTL-4, BTL-5	SDG4
CO2	PO8, PO9	I, II, III, IV, V	BTL-2, BTL-3, BTL-4, BTL-5	SDG4
CO3	PO8, PO9	I, II, III, IV, V	BTL-2, BTL-3, BTL-4, BTL-5	SDG4
CO4	PO8, PO9	I, II, III, IV, V	BTL-2, BTL-3, BTL-4, BTL-5	SDG4

UNIT –I

Theme: Perspectives

Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Words Often Misspelt - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions — Degrees of Comparison

Reading: Reading and Its Importance- Sub Skills of Reading – Skimming and Scanning.

Writing: Sentence Structures and Types -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing Precisely –Nature

and Style of Formal Writing.

UNIT –II

Theme: Digital Transformation

Lesson on '*Emerging Technologies*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Reading Strategies-Guessing Meaning from Context – Identifying Main Ideas – Exercises for Practice

Writing: Paragraph Writing — Types, Structures and Features of a Paragraph - Creating Coherence — Linkers and Connectives - Organizing Principles in a Paragraph — Defining- Describing People, Objects, Places and Events — Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

UNIT –III

Theme: Attitude and Gratitude

Poems on '*Leisure*' by William Henry Davies and '*Be Thankful*' - Unknown Author from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading: Sub-Skills of Reading – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette.

UNIT –IV

Theme: Entrepreneurship

Lesson on '*Why a Start-Up Needs to Find its Customers First*' by Pranav Jain from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: Standard Abbreviations in English – Inferring Meanings of Words through Context – Phrasal Verbs — Idioms.

Grammar: Redundancies and Clichés in Written Communication – Converting Passive to Active Voice and Vice-Versa.

Reading: Prompt Engineering Techniques– Comprehending and Generating Appropriate Prompts - Exercises for Practice

Writing: Writing Practices- Note Making- Précis Writing.

UNIT –V

Theme: Integrity and Professionalism

Lesson on '*Professional Ethics*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan Pvt. Ltd.

Vocabulary: Technical Vocabulary and their Usage– One Word Substitutes – Collocations.

Grammar: Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice

Writing: ***Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.***

TEXT BOOK:

1. Board of Editors. 2025. English for the Young in the Digital World. Orient Black Swan Pvt. Ltd.

REFERENCE BOOK(S):

1. Swan, Michael. (2016). Practical English Usage. Oxford University Press. New Edition.
2. Karal, Rajeevan. 2023. English Grammar Just for You. Oxford University Press. New Delhi
3. 2024. Empowering with Language: Communicative English for Undergraduates. Cengage Learning India Pvt. Ltd. New Delhi
4. Sanjay Kumar & Pushp Lata. 2022. Communication Skills – A Workbook. Oxford University Press. New Delhi
5. Wood,F.T. (2007). Remedial English Grammar. Macmillan.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students.

   Mc Graw-Hill Education India Pvt. Ltd.

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25CS12003-DISCRETE MATHEMATICS

B.Tech. CSE - I Year, II Sem.

L	T	P/D	C
3	-	-/-	3

Prerequisite(s): None

Course Objectives

Enable student to

1. Understand concepts of Mathematical Logic, mechanisms of inference rules for propositional and predicate logic and their applications.
2. Understand the concepts of Sets, Relations, Functions and their applications.
3. Learn the concepts of Algebraic Structures, and Boolean algebra
4. Understand basics of counting, Principles of Inclusion-Exclusion.
5. Understand basic definitions and properties of graphs and their applications in computer science and engineering.

Course Outcomes (COs) after completion of the course, student would be able to

CO 1 Analyze and construct valid logical arguments using propositional and predicate calculus.

CO 2 Apply concepts of set theory, relations, and functions to represent and manipulate discrete structures.

CO 3 Analyze and apply algebraic structures to solve computational and logical problems

CO 4 Apply combinatorial methods to solve counting, permutation, and combination problems in discrete structures.

CO 5 Apply graph theory concepts to model and solve computing problems.

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
C01	PO1, PO2, PO3, PSO1	Unit I	BTL 4	SDG4, SDG9
CO2	PO1, PO2, PO3, PSO1	Unit II	BTL 3	SDG4, SDG9
CO3	PO1, PO2, PO3, PSO1	Unit III	BTL 4	SDG8, SDG9
CO4	PO1, PO2, PO3, PSO1	Unit IV	BTL 3	SDG4, SDG9
CO5	PO1, PO2, PO3, PSO1	Unit V	BTL 3	SDG9, SDG11

UNIT-I Mathematical Logic

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.

UNIT-II Set Theory
Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

UNIT-III Algebraic structures
Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean algebra.

UNIT-IV Recurrence Relations
Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Inclusion -Exclusion.

UNIT-V Graph Theory
Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

TEXT BOOK(S)

1. Discrete Mathematical Structures with Applications to Computer Science, J.P.Tremblay, R.Manohar, 1st Edition, Tata McGraw Hill, 2001. (Unit 1,Unit 2, Unit 3 - Algebraic structures)
2. Discrete Mathematics for Computer Scientists & Mathematicians, J.L. Mott, A. Kandel, T.P. Baker, 2nd Edition, PHI, 2009. (Unit 3-Elementary Combinatorics, Unit 4,Unit 5)

REFERENCE BOOK(S)

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition. TMH.
2. Discrete Mathematical structures Theory and application-Malik & Sen, Cengage.
3. Discrete Mathematics with Applications, Thomas Koshy, Elsevier.
4. Logic and Discrete Mathematics, Grass Man &Trembley, Pearson Education.

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25CH12L01- Engineering Chemistry Lab

B.Tech. I year II Sem
Prerequisite(s): None

L	T	P/D	C
	-	2	1

Course Description:

The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

Course Objectives

1. Estimate the hardness content in water and check its suitability for drinking purpose.
2. Acquire ability to perform acid-base titrations using instrumental methods such as conductometry, potentiometry, and pH metry.
3. Gain hands-on experience in synthesizing polymers like Bakelite and Nylon – 6, 6 in the laboratory.
4. Measure physical properties like acid value and viscosity.
5. Gain conceptual understanding of experiments involving core chemical principles through virtual platforms, with relevance to engineering applications.

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

CO 1 Estimate hardness in water to verify its suitability for drinking purpose.

CO 2 Apply instrumental techniques like conductometry, potentiometry, and pH metry to estimate concentrations or equivalence points in acid-base and redox titrations.

CO 3 Use fundamental preparatory techniques for the synthesis of polymers such as Bakelite and Nylon-6,6.

CO 4 Determine physical properties, namely acid value and viscosity of a given fluid.

CO 5 Demonstrate the ability to analyze and interpret virtual experiments based on fundamental chemical principles applicable to engineering systems

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
C01	PO1, PO2, PO3, PSO1	Unit I	BTL 4	SDG4, SDG9
CO2	PO1, PO2, PO3, PSO1	Unit II	BTL 3	SDG4, SDG9
CO3	PO1, PO2, PO3, PSO1	Unit III	BTL 4	SDG8, SDG9
CO4	PO1, PO2, PO3, PSO1	Unit IV	BTL 3	SDG4, SDG9
CO5	PO1, PO2, PO3, PSO1	Unit V	BTL 3	SDG9, SDG11

List of Experiments:

I. Volumetric Analysis: Estimation of Hardness of water by EDTA

Complexometric method.

II. Conductometry:

1. Estimation of the concentration of strong acid by Conductometry.
2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

III. Potentiometry:

1. Estimation of concentration of Fe^{+2} ion by Potentiometry using $KMnO_4$.
2. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone.

IV. pH Metry: Determination of an acid concentration using pH meter.

V. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon – 6, 6.

VI. Corrosion: Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VII. Lubricants:

1. Estimation of acid value of given lubricant oil.
2. Estimation of viscosity of lubricant oil using Ostwald's Viscometer.

VIII. Virtual lab experiments

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

(*No laboratory equipment and computer lab are required for above experiments and they are conducted virtually.)

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

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25CS12L01: DATA STRUCTURES LAB

B. Tech.CSE(AIML) – I Year, II Sem.
Prerequisite(s): Programming for Problem Solving

L	T	P/D	C
-	-	2/-	1

Course Objectives: Develop ability to

1. Introduce students to advanced data representation techniques in C using structures, unions, enumerations, and typedef to effectively organize and manipulate complex data types.
2. Proficiency in file handling and data storage concepts**,** including text and binary file operations, database searching, file positioning, and multifile program design.
3. Build foundation in abstract data types and linear data structures, enabling students to implement and manage linked lists, circular lists, and doubly linked lists for efficient data organization.
4. Train students in the use of stacks and queues for solving computational problems such as expression conversion, evaluation, and balancing of symbols through algorithmic thinking.
5. Equip students with knowledge of hierarchical and network data structures**,** including trees and graphs, and their associated algorithms for searching, traversal, and application in problem-solving.

Course outcomes (COs): At the end of the course, student would be able to

CO 1 Develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.

CO 2 Implement the concepts of Trees and Graphs

CO	Related POs and PSOs	Related Units	BTL	Related SDGs
CO1	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	I, II, III, IV	BTL-3, BTL-4	SDG4, SDG8, SDG9
CO2	PO1, PO2, PO3, PO4, PO5, PSO1, PSO2	V	BTL-4	SDG4, SDG9

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal

2. Write a program that uses functions to perform the following operations on doubly linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) ADT
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) ADT
6. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
7. Write a program to implement Binary Search tree
8. Write a program to implement the Graph traversal methods.
   i) DFS ii) BFS

TEXT BOOKS:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

REFERENCE BOOK:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A.Forouzan, Cengage Learning.

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25EN12L01-ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

B.Tech. CSE (AIML) I year, II SEM
Prerequisite(s): None

L	T	P	C
0	**0**	2	1

Course Objectives: Develop an ability to

1. Enhance active listening skills
2. Listen and comprehend the speech of people from different linguistic backgrounds
3. Improve pronunciation and neutralize accent
4. Express ideas fluently and appropriately
5. Speak in social and professional contexts

Course outcomes: At the end of the course, the student would be able to

CO 1 Listen actively and identify important information in spoken texts.
CO 2 Use Phonetics to neutralize accent and speak intelligibly.
CO 3 Articulate ideas explicitly both verbally and non- verbally.

Course Outcomes (COs)

CO	Related POs and PSOs	Related Exercises	BTL	Related SDGs
CO1	PO8, PO9	I, II, III, IV, V	BTL-2, BTL-3, BTL-4, BTL-5	SDG4
CO2	PO8, PO9	I, II, III, IV, V	BTL-2, BTL-3, BTL-4, BTL-5	SDG4
CO3	PO8, PO9	I, II, III, IV, V	BTL-2, BTL-3, BTL-4, BTL-5	SDG4

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. **Computer Assisted Language Learning (CALL) Lab which focusses on listening skills**
b. **Interactive Communication Skills (ICS) Lab which focusses on speaking skills**

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise – I

CALL Lab:

Instruction: Speech Sounds-Listening Skill - Importance – Purpose - Types- Barriers- Active Listening

Practice: Listening to Distinguish Speech Sounds (Minimal Pairs) **-** *Testing Exercises*

ICS Lab:

- **Diagnostic Test – Activity titled '*Express Your View'***

Instruction: Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others

Practice: Any Ice-Breaking Activity

Exercise – II

CALL Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

Practice: Listening for General Information - Multiple Choice Questions - *Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)*

ICS Lab:

Instruction: Features of Good Conversation – Strategies for Effective Communication

Practice: Role Play Activity - Situational Dialogues –Expressions used in Various Situations –Making Requests and Seeking Permissions — Taking Leave - Telephone Etiquette

Exercise - III

CALL Lab:

Instruction: Errors in Pronunciation – Tips for Neutralizing Mother Tongue Influence (MTI)

Practice: Differences between British and American Pronunciation –*Listening Comprehension Exercises*

ICS Lab:

Instruction: How to make Formal Presentations, Describing Objects, Situations, Process, Places, People and Events

Practice: Picture Description Activity – Looking at a Picture and Describing Objects, Situations, Places, People and Events *(A wide range of Materials / Handouts are to be made available in the lab.)* Oral Presentations.

Exercise – IV
CALL Lab:
Instruction: Techniques for *Effective* Listening
Practice: Listening for Specific Details - Listening - Gap Fill Exercises - *Listening Comprehension Exercises*
(It is essential to identify a suitable passage with exercises for practice.)
ICS Lab:
Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity

Practice: Activity on Telling and Retelling Stories - Collage

Exercise – V
CALL Lab:
Instruction: Identifying the literal and implied meaning

Practice: Listening for Evaluation - Write the Summary – Listening Comprehension Exercises

(It is essential to identify a suitable passage with exercises for practice.)
ICS Lab:

Instruction: Understanding Non-Verbal Communication

Practice: Silent Speech - Dumb Charades Activity

- **Post-Assessment Test on 'Express Your View'**

REFERENCE BOOKS:

1. Shobha, KN & Rayen, J. Lourdes. (2019). *Communicative English – A workbook.* Cambridge University Press
2. Board of Editors. (2016). *ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.* Orient BlackSwan Pvt. Ltd.
3. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach.* Cambridge University Press
4. (2022). *English Language Communication Skills – Lab Manual cum Workbook.* Cengage Learning India Pvt. Ltd.
5. Ur, Penny and Wright, Andrew. 2022. *Five Minute Activities – A Resource Book for Language Teachers.* Cambridge University Press.

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25ME12L01-ENGINEERING WORKSHOP

L	T	P	C
0	0	2	1

B.Tech. I Year II Sem.

Prerequisites: Practical skill

Course Objectives:
1. To introduce students to basic manufacturing processes and workshop practices.
2. To provide hands-on training in carpentry, fitting, welding, sheet metal, and machining
3. To develop skills in using hand tools and measuring instruments.
4. To enhance safety awareness and proper handling of workshop equipment.
5. To build a foundational understanding of industrial production and fabrication.

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

CO 1 Understand the basic manufacturing processes and operations

CO 2 Use hand tools and equipment safely and efficiently.

CO 3 Perform basic operations in carpentry, fitting, welding, sheet metal work, and machining

CO 4 Read and interpret workshop drawings

CO 5 Develop teamwork, time management, and quality awareness in a workshop environment.

CO	Related POs and PSOs	Relate Trades	BTL
CO1	PO1, PO3, PO9, PSO3	1, 2, 3, 4, 5 and 7	BTL-2, BTL-4
CO2	PO1, PO3, PO9, PSO3	1, 2, 3, 4,5,6 and 7	BTL-2
CO3	PO1, PO3, PO9, PSO3	1, 2, 3, 4, 5 and 7	BTL-2
CO4	PO1, PO3, PO9, PSO3	1, 2, 3, 4, 5,6 and 7	BTL-2
CO5	PO1, PO3, PO9, PSO3	1, 2, 3, 4, 5,6 and 7	BTL-2

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. **Carpentry:** T- Lap Joint, Dovetail Joint, Mortise and Tenon Joint
2. **Fitting:** V- Fit, Dovetail Fit and Semi- circular fit
3. **Tin Smithy**: Square Tin, Rectangular Tray and Conical Funnel
4. **Foundry**: Preparation of Green Sand Mould using Single Piece and Split Pattern
5. **Welding Practice:** Arc Welding and Gas Welding
6. **House wiring**: Parallel and Series, Two-way Switch and Tube Light
7. **Black Smithy**: Round to Square, Fan Hook and S- Hook

2. TRADES FOR DEMONSTRATION AND EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools in construction and Wood Working

TEXT BOOKS:

1. Workshop Practice, B. L. Juneja, Cengage Learning India, 1st edition, 2015.
2. Workshop Practice Manual, K. Venkata Reddy, BS Publication,6th Edition, Rpt.2025.

REFERENCE BOOKS:

1. Workshop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012