



B. Tech

CSE - Artificial Intelligence & Data Science

Curriculum and Syllabus - AR26

GMARIT Deemed to be University
Rajam, Andhra Pradesh



Institute Vision and Mission

Vision

To be a preferred multidisciplinary university that advances knowledge, innovation, Sustainability, and societal transformation through excellence in education, research, and industry integrated learning

Mission

- ❖ To provide flexible and multidisciplinary education that nurtures academic excellence, critical thinking, creativity and holistic development.
- ❖ To foster a vibrant ecosystem of research, innovation, entrepreneurship, intellectual property creation, and emerging technologies that address industry and societal challenges.
- ❖ To strengthen industry partnerships and global collaborations that enhance experiential learning, professional competence, employability, innovation, and international exposure
- ❖ To develop ethically responsible, socially conscious, and future ready graduates committed to sustainability, inclusiveness, leadership, and nation building

School Vision and Mission

Vision

To be a preferred centre of excellence in advanced computing that advances knowledge, innovation, sustainability, and societal transformation through excellence in education, research, and industry-integrated learning.

Mission

- ❖ To deliver excellence in education in advanced computing, fostering knowledge, critical thinking, creativity, and holistic development.
- ❖ To promote research, innovation, and emerging technologies addressing industry needs and sustainable societal challenges.
- ❖ To strengthen industry-integrated learning through collaborations, enhancing competence, employability, and global exposure.
- ❖ To develop ethically responsible, socially conscious, and future-ready computing professionals committed to inclusiveness, leadership, and nation-building.

Department Vision and Mission

Vision

To be a premier department in Artificial Intelligence and Data Science, fostering excellence in education, research, and innovation to develop intelligent, data-driven solutions for global challenges and sustainable development.

Mission

- ❖ To provide quality education in Artificial Intelligence and Data Science, fostering strong technical foundations, critical thinking, creativity, and lifelong learning.
- ❖ To promote research, innovation, and interdisciplinary learning in AI, Machine Learning, and Data Science to address industry and societal challenges.
- ❖ To strengthen industry-integrated learning through collaborations and experiential opportunities, enhancing competence, employability, entrepreneurship, and global readiness.
- ❖ To nurture ethical, socially responsible, and future-ready professionals who develop intelligent, data-driven solutions for sustainable development and nation-building.

Program Educational Objectives

- PE01:** Employ logical and analytical skills in solving complex real-world engineering problems in the areas of computer Science and allied fields.
- PE02:** Adaptable to emerging technologies with enhanced professional skills and ability towards continuous learning, facilitating higher studies and research.
- PE03:** Demonstrate professional ethics, leadership qualities and promote inclusive and collaborative growth with human values towards societal interest.

Program Outcomes

Engineering graduate will be able to

- PO1:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals to develop to the solution of complex engineering problems. ***(Engineering Knowledge)***
- PO2:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. ***(Problem Analysis)***
- PO3:** 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. ***(Design/Development of Solutions)***
- PO4:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. ***(Conduct Investigations of Complex Problems)***
- PO5:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. ***(Engineering Tool Usage)***
- PO6:** 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. ***(The Engineer and the World)***
- PO7:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. ***(Ethics)***
- PO8:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams. ***(Individual and Collaborative Team)***
- PO9:** 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 ***(Communication)***
- PO10:** 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. ***(Project Management and Finance)***

- P011:** 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. *(Life-long learning)*
- PS01:** Apply Artificial Intelligence, Machine Learning, Data Science, and advanced computing techniques to analyze data, develop predictive and intelligent models, and solve real-world problems.*(Program Specific)*
- PS02:** Design and implement innovative and ethical AI-driven solutions using emerging technologies to address industry and societal challenges while promoting sustainability, entrepreneurship, and responsible technology adoption. *(Program Specific)*

Department of CSE-Artificial Intelligence & Data Science

Minimum Credits to be earned: 160 (for Regular Students) 120 (for Lateral Entry Students)

S. No	Course Code	Course Name	L	T	P	Credits
Semester I						
1	26EN101T	Communicative English	3	0	0	3
2	26MA101T	Linear Algebra & Calculus	3	0	0	3
3	26PH101T	Wave Optics and Quantum Physics	3	0	0	3
4	26CS101T	Programming for Problem Solving	3	0	0	3
5	26EE101T	Basics of Engineering	3	0	0	3
6	26EN101L	Communicative English Lab	0	0	2	1
7	26PH101L	Wave Optics and Quantum Physics Lab	0	0	2	1
8	26CS101L	Programming for Problem Solving Lab	0	0	2	1
9	26ME102L	Engineering Workshop Lab	0	0	2	1
10	26HS101V	Sports, Yoga, NCC and NSS	0	0	2	1
						20
S. No	Course Code	Course Name	L	T	P	Credits
Semester 2						
1	26EN102T	Advanced Communicative English	3	0	0	3
2	26MA103T	Differential Equations & Discrete Mathematics	3	0	0	3
3	26CH102T	Applied Chemistry for Computing	3	0	0	3
4	26CS102T	Python Programming	2	0	0	2
5	26CS103T	Data Structures	3	0	0	3
6	26EN102L	Advanced Communicative English Lab	0	0	2	1
7	26CH102L	Applied Chemistry for Computing Lab	0	0	2	1
8	26CS102L	Python Programming Lab	0	0	2	1
9	26CS103L	Data Structures lab	0	0	2	1
10	26ME101L	Engineering Graphics Lab	0	1	2	2
						20
S. No	Course Code	Course Name	L	T	P	Credits
Semester 3						
1	26DS201T	Artificial Intelligence and Data Science	3	0	0	3
2	26CS201T	Web Technologies	3	0	0	3
3	26CS203T	Object Oriented Programming through JAVA	3	0	0	3
4	26CS204T	Digital Logic and Computer Organization	3	0	0	3
5	26EC241T	Introduction to Internet of Things	3	0	0	3
6	26MA201T	Probability and Statistics	3	0	0	3
7	26DS201L	Artificial Intelligence and Data Science Lab	0	0	2	1
8	26CS201L	Web Technologies Lab	0	0	2	1
9	26CS203L	Object Oriented Programming through JAVA Lab	0	0	2	1
10	26EC241L	Introduction to Internet of Things Lab	0	0	2	1
11	26HS201V	Value Added Course (Environmental Science)	2	0	0	1
						23

S. No	Course Code	Course Name	L	T	P	Credits
Semester 4						
1	26CS205T	Design and Analysis of Algorithms	3	0	0	3
2	26CS206T	Operating Systems	3	0	0	3
3	26CS202T	Database Management Systems	3	0	0	3
4		Core Elective-1/Career Path Elective -1	3	0	0	3
5		Open Elective -1 /Sequential Open Elective –1	2	0	0	2
6	26SC201Q	Quantitative Aptitude -1	2	0	0	1
7	26SC201E	Soft skills -1	0	0	2	1
8	26CS205L	Design and Analysis of Algorithms Lab	0	0	2	1
9	26CS202L	Database Management Systems Lab	0	0	2	1
10		Core Elective Lab-1/Career Path Elective Lab-1	0	0	2	1
11		Open Elective Lab-1 /Sequential Open Elective Lab–1	0	0	2	1
12	26HS202V	Value Added Course (Professional Ethics and Human Values)	2	0	0	1
						21
S. No	Course Code	Course Name	L	T	P	Credits
Semester 5						
1	26DS301T	Knowledge Discovery and Machine Learning	2	0	0	2
2	26DS302T	Big Data Analytics and Visualization Techniques	3	0	0	3
3	26DS303T	Computer Networks &Cloud Infrastructure	3	0	0	3
4	26ML303T	Software Engineering Principles	2	0	0	2
5		Core Elective-2/Career Path Elective -2	3	0	0	3
6		Open Elective -2 /Sequential Open Elective –2	2	0	0	2
7	26SC301S	Summer Internship- I	-	-	-	2
8	26SC301Q	Quantitative Aptitude -2	2	0	0	1
9	26SC301E	Soft skills -2	0	0	2	1
10	26DS301L	Knowledge Discovery and Machine Learning Lab	0	0	2	1
11	26DS302L	Big Data Analytics and Visualization Techniques Lab	0	0	2	1
12		Core Elective Lab-2/Career Path Elective Lab-2	0	0	2	1
13		Open Elective Lab-2 /Sequential Open Elective Lab–2	0	0	2	1
						23
S. No	Course Code	Course Name	L	T	P	Credits
Semester 6						
1	26ML305T	Automata Theory and Language Processing	3	0	0	3
2	26DS304T	Data Engineering	3	0	0	3
3	26DS305T	Neural Networks and Deep Learning	3	0	0	3
4		Core Elective-3/Career Path Elective -3	2	0	0	2
5		Open Elective -3 /Sequential Open Elective –3	2	0	0	2
6	26SC302Q	Quantitative Aptitude-3	2	0	0	1
7	26SC302E	Soft skills -3	0	0	2	1
8	26SC301P	Mini Project	0	0	4	2
9	26DS305L	Neural Networks and Deep Learning Lab	0	0	2	1
10		Core Elective Lab-3/Career Path Elective Lab-3	0	0	2	1
11		Open Elective Lab-3 /Sequential Open Elective Lab–3	0	0	2	
						20

S. No	Course Code	Course Name	L	T	P	Credits
Semester 7						
1	26DS401T	MLOPS and AI System Deployment	3	0	0	3
2		Core Elective 4	3	0	0	3
3	26DS402T	Software Project Management	3	0	0	3
4	26SC401P / 26SC401F	Project-1/ FSI-1	0	0	16	8
5	26SC401S	Summer Internship II	-	-	-	2
						19
S. No	Course Code	Course Name	L	T	P	Credits
Semester 8						
1	26DS403T	Generative and Responsible AI	3	0	0	3
2		Core Elective- 5	3	0	0	3
3	26SC402P / 26SC402F	Project- 2/ FSI -2	0	0	16	8
						14

26EN101T - Communicative English
(Common to all branches of Engineering)

3 - 0 - 0 - 3

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

1. Demonstrate effective listening skills.
2. Communicate confidently in English.
3. Apply reading strategies to comprehend texts.
4. Produce coherent written communication.
5. Apply grammar to write accurate sentences.
6. Develop vocabulary for effective communication in academic contexts.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1		1				1		1	3		2		
2		1				1		1	3		2		
3		1				1		1	3		2		
4		1				1		1	3		2		
5		1				1		1	3		2		
6		1				1		1	3		2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1:**8 Hours**

Listening: Fundamentals of Listening; Hearing vs Listening

Speaking: Self Introduction

Reading: Skimming; Text: My Visions for India (A.P.J. Abdul Kalam) & Self-Reliance: Ralph Waldo Emerson (self-study)

Writing: Guided Paragraph Writing

Grammar: Parts of Speech

Vocabulary: Word Formation; Roots, Prefixes, Suffixes

Unit 2:**8 Hours**

Listening: Types of Listening

Speaking: Role Play / Interview using WH-Questions

Reading: Scanning; Text: The Fun They Had (Isaac Asimov) & India's Chandrayan Mission (self-study)

Writing: Sequel Writing

Grammar: Types of Sentences; Sentence Structure

Vocabulary: Synonyms; Antonyms

Unit 3:**8 Hours**

Listening: Barriers to Listening

Speaking: Describing Places, Objects and Processes

Reading: Vocabulary through Context; Text: *Kabuliwala* -Rabindranath Tagore & *The Selfish Giant*-Oscar Wilde(self-study)

Writing: Description Writing

Grammar: Tenses

Vocabulary: Compound Words; Collocations.

Unit 4:**8 Hours**

Listening: Listening for Specific Information

Speaking: Picture Description

Reading: Literary Interpretation; Text: The Last Leaf (O. Henry) & The Eyes Are Not Here- Ruskin Bond (self-study)

Writing: Summarizing and Paraphrasing
 Grammar: Articles
 Vocabulary: Homonyms, Homophones, Homographs

Unit 5:**8 Hours**

Listening: Critical and Evaluative Listening
 Speaking: Expressing Opinions and Justifying Choices
 Reading: Analytical Reading; Text: The Road Not Taken (Robert Frost) & My grand Mother's House- Kamala Das (self-study)
 Writing: Descriptive and Narrative Essays
 Grammar: Prepositions
 Vocabulary: Commonly Misspelt Words

Unit 6:**8 Hours**

Listening: Note-taking
 Speaking: Presenting Arguments
 Reading: Editorials and Opinion Texts; text: *The Spoken and Broken English*- G.B. Shaw & Education and National development-Dr. S. Radhakrishnan (self-study)
 Writing: Analytical and Argumentative Essays
 Grammar: Reported Speech
 Vocabulary: Words Often Confused

Total 48 Hours**Textbooks:**

1. Sanjay Kumar & Pushpa Lata. *Communication Skills*. Oxford University Press.2013
2. Stephen Bailey. *Academic Writing: A Handbook for International Students*. Routledge.2010

Reference Books:

1. Dubey, Sham Ji & Co. *English for Engineers*, Visas Publishers. 2020
2. Murphy, Raymond. *English Grammar in Use*, Cambridge University Press.2013
3. Lewis, Norman. *Word Power Made. Easy*. Goyal Publishers. 2020

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26MA101T - Linear Algebra & Calculus
(Common to all branches of Engineering)

3 - 0 - 0 - 3

Course Outcomes:

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

1. Apply the concepts of matrices, rank, echelon and normal forms to solve systems of homogeneous and non-homogeneous linear equations.
2. Determine eigenvalues and eigenvectors, characteristics of quadratic forms and use the Cayley–Hamilton theorem to find the inverse and powers of a matrix.
3. Apply mean value theorems and differential calculus techniques to analyze functions and construct Taylor and Maclaurin series expansions for functions of two variables.
4. Apply Jacobians, multivariable optimization methods, and multiple integration techniques to solve problems involving functions of several variables.
5. Apply vector differential operators to determine gradient, divergence, and curl of scalar and vector point functions.
6. Apply line, surface, and volume integrals to evaluate circulation, work done, and flux, and apply vector integral theorems to solve related problems.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	3	2	2							1		
2	3	3	2	2							1		
3	3	3	2	2							1		
4	3	3	2	2							1		
5	3	3	2	2							1		
6	3	3	2	2							1		

3 - Strongly Linked | 2 - Moderately Linked | 1 - Weakly Linked

Unit 1: Matrices

8 Hours

Rank of a matrix by Echelon form and normal form, Solving system of Homogeneous and Non-Homogeneous linear equations by Gauss elimination method.

Unit 2: Eigenvalues and Eigenvectors

8 Hours

Eigenvalues, Eigenvectors and their properties (without proof), Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms – Rank, Index, Signature and Nature.

Unit 3: Calculus-1

8 Hours

Rolle's Theorem, Lagrange's mean value theorem with geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin's Theorem (without proofs), Partial derivatives, total derivative, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables.

Unit 4: Calculus-2

8 Hours

Jacobian of functions, maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers, Double integrals and Triple integrals.

Unit 5: Vector differentiation

8 Hours

Scalar and vector point functions, vector differential operator, Gradient, directional derivatives, Divergence and Curl- problems.

Unit 6: Linear Integral**8 Hours**

Line integral- circulation- work done, surface integral-flux, Volume integral, Green's theorem in the plane (with proof), Stoke's theorem and Divergence theorem (without proofs)- problems.

Total 48 Hours**Textbooks:**

1. B. S. Grewal, *Higher Engineering Mathematics*, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, 10/e, John Wiley & Sons, 2018.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, 5/e, Alpha Science International Ltd., 2021 (9th reprint).
2. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus*, 14/e, Pearson Publishers, 2018.
3. Glyn James, *Advanced Modern Engineering Mathematics*, 5/e, Pearson publishers, 2018.
4. Michael Greenberg, *Advanced Engineering Mathematics*, 9th edition, Pearson Education
5. H. K Das, Er. Rajnish Verma, *Higher Engineering Mathematics*, S. Chand, 2021

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26PH101T – Wave Optics and Quantum Physics
(Common to CSE, CSE-AIDS, CSE-AIML and CSE-Cyber Security)

3 - 0 - 0 - 3

Course Outcomes:

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

1. Demonstrate the principles of interference in thin films and their applications.
2. Apply the concepts of diffraction and polarization to design optical devices.
3. Explain the principles of laser operation and optical fiber communication.
4. Describe semiconductor fundamentals and carrier transport mechanisms
5. Apply basic concepts of quantum mechanics to physical systems.
6. Illustrate the basic principles of quantum computing and quantum gates.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	3	2	1	1						1		
2	3	3	2	1	1						1		
3	3	3	2	1	3						1		
4	3	3	2	1	1						1		
5	3	3	2	1	2						1		
6	3	3	2	1	3						1		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1: Interference

8 Hours

Interference: Introduction - Principle of superposition and superposition of waves with constant phase difference -Interference of light - Interference in thin films (by Reflection of light) - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index - Applications

Unit 2: Diffraction and Polarization

8 Hours

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, Diffraction Grating - Grating spectrum - Applications

Polarization: Introduction -Types of polarization - Double refraction - Nicol's Prism -Half wave and Quarter wave plates - Applications.

Unit 3: Laser and Optical fibers

8 Hours

Lasers: Characteristics of a laser - Spontaneous emission - Stimulated emission – population inversion - Components of laser system - Ruby laser - Laser applications.

Optical fibers: Structure of optical fiber – principle of optical fiber - Acceptance angle and Numerical Aperture (NA) - Types of optical fibers - Advantages of optical fibers - Applications of optical fibers.

Unit 4: Semiconductors

8 Hours

Semiconductors: Formation of energy bands - Classification of solids – Semiconductors - Intrinsic semiconductors - Extrinsic semiconductors (p-type and n-type) - Fermi level - dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

Unit 5: Quantum Mechanics

8 Hours

Quantum Mechanics: Introduction to quantum mechanics - Wave Particle duality - De Broglie waves - Heisenberg's Uncertainty Principle - Significance and properties of wave function - Schrodinger's time independent and dependent wave equations - Particle in a one-dimensional infinite potential box - Quantum tunnelling.

Unit 6: Quantum Computing**8 Hours**

Quantum Computing: Classical bits vs qubits - Dirac's bra and ket notation and its properties - Bloch sphere - Entanglement - Quantum measurement - No cloning theorem - Basics of quantum gates - Single qubit gates - Pauli gates (X, Y, Z) - Hadamard gate - Phase gate.

Total 48 Hours**Textbooks:**

1. *Concepts of Modern physics*, Arthur Beiser, McGraw Hill, 2020.
2. *Physics, Vol-2*, David Halliday, Robert Resnick, Kenneth S. Krane, Willey, 2020.
3. *Introductory quantum computing: A practical approach using Python*, Nikhil Ranjan Roy and Kuntal Mukherjee, S. Chand Publications, 11th Edition 2024.
4. *Engineering Physics, Vol-2*, Dr K Vijaykumar, S Chand Publication, 2011.
5. *A Textbook of Engineering Physics* - M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.

Reference Books:

1. *Engineering Physics* - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. *Engineering Physics* - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26CS101T - Programming for Problem Solving (Common to all branches of Engineering)

3 - 0 - 0 - 3

Course Outcomes:

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

1. Apply algorithmic and flowchart-based approaches to formulate solutions for computational problems
2. Construct simple C programs using data types, operators, and expressions
3. Implement decision-making and iterative logic using branching and loop constructs
4. Make use of arrays and strings to organize and process homogeneous data
5. Apply functions and pointers for modular programming and dynamic memory utilization
6. Build programs using structures, unions, and files for data storage and processing.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	3	2	1	2								
2	3	3	2	1	2								
3	3	3	2	2	2								
4	3	2	2	1	2								
5	3	3	3	1	2								
6	3	3	2	2	2								

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1: Introduction to Problem Solving

8 Hours

Computer hardware and software; Evolution of Programming Languages and translators. Programs and algorithms; phases of problem solving; Algorithms: definition, characteristics, representation; pseudocode. Flowcharts: symbols, rules, and examples (sequence, decision, iteration). Desk-checking; converting algorithms /flowcharts into programs; program verification, testing, and debugging.

Unit 2: C Language Fundamentals

8 Hours

Introduction to C; Structure of a C Program; Comments, Keywords, Identifiers; Data Types, Variables, Constants; Input/Output Statements; Types of Operators: arithmetic, relational, logical, bitwise, conditional; precedence and associativity; type conversion; expression evaluation.

Unit 3: Control Flow & Iteration

8 Hours

Conditional branching: if, if-else, if-else-if, nested if, switch; Loop structures: while, do-while, for; break and continue.

Unit 4: Arrays & Strings

8 Hours

Array operations; two-dimensional and multidimensional arrays; String fundamentals; string processing with and without library functions; array of strings.

Unit 5: Functions & Pointers

8 Hours

Introduction to Functions, categories of Functions; Types of storage classes, parameter passing, recursion. Pointer concept, address arithmetic, null and generic pointers, pointers and arrays, pointer to pointer, dynamic memory allocation.

Unit 6: Structures, Unions & Files

8 Hours

Structures, arrays of structures, structures and functions, self-referential structures, unions, enumerated types, typedef, bit fields; File operations: opening, closing, file modes, text and binary file I/O, random file access.

Total 48 Hours

Textbooks:

1. Yashavant Kanetkar, *Let Us C*, 21st ed., BPB Publications, 2025. ISBN 9789365899689.
2. Thareja R., "Computer Programming," 3rd Edition, Oxford University Press, 2023.
3. Forouzan B.A., Gilberg R.F., "Computer Science: A Structured Programming Approach Using C," 3rd Edition, Cengage India Private Limited, 2007.
4. Mittal A., "Programming in C: A Practical Approach," 1st Edition, Pearson Education, 2010.

Reference Books:

1. Balagurusamy E., "Programming in ANSI C," 9th Edition, McGraw-Hill Education, 2023.
2. Kamthane A.N., "Programming in C," 2nd Edition, Pearson Education, 2011.
3. Gottfried B.S., "Programming with C," 3rd Edition (Schaum's Outline Series), McGraw-Hill Education, 2018.
4. Kernighan B.W., Ritchie D.M., "The C Programming Language," 2nd Edition, Pearson Education, 1988.
5. Dromey R.G., "How to Solve It by Computer," Pearson Education, 1982.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26EE101T - Basic of Engineering
(Common to all branches of Engineering)

3 - 0 - 0 - 3

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

1. Summarize the concepts of DC circuits, electric shock and earthing.
2. Illustrate the functioning of basic electronic devices and digital logic gates.
3. Outline the concepts of Internet of Things (IoT).
4. Outline the characteristics of engineering and construction materials.
5. Outline the principles of surveying, transportation systems and dams.
6. Summarize the concepts of energy sources and smart production technologies

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	2	2	2			2					2		
2	2	2	2			2					2		
3	2	2	2			2					2		
4	2	2	2			2					2		
5	2	2	2			2					2		
6	2	2	2			2					2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1: Electrical Circuits and Safety**8 Hours**

DC Circuits: Difference between Network and Circuit; Classification of network elements-Active & passive, Linear and Non-linear, Unilateral & Bilateral, Lumped & Distributed; Ohm's Law; KCL & KVL; Types of circuits - series, parallel, series-parallel circuits;

Safety: Electric Shock-Effects on human body, Prevention measures; Earthing-Pipe and plate earthing.

Unit 2: Basic Electronics devices and Digital Logic**8 Hours**

Semiconductor Devices: Diode-PN, Zener, Schottky, Tunnel; LED-Single colour, RGB, Infrared, High-power; Photodiode-PN, PIN, Avalanche; BJT-NPN, PNP; FET-JFET, MOSFET.

Electronic Building Blocks: Operational Amplifier, Integrated Circuits-Analog, Digital.

Power & Interface Devices: SCR, TRIAC, DIAC; Electromechanical relay,

Display Devices: LCD, LED, OLED. (Definition, Symbol & applications only)

Logic gates: Truth Tables and Functionality of NOT, OR, AND, NOR, NAND, XOR and XNOR gates.

Unit 3: Internet of Things and Embedded Systems**8 Hours**

Introduction to Embedded Systems and Internet of Things (IoT) - relationship between IoT and Embedded Systems - features and basic architecture of IoT - Components of IoT: Sensors: resistive, inductive, capacitive, optical, electromagnetic and thermal sensors. Actuators, Microprocessors/Microcontrollers, Connectivity Modules, Cloud/Server Platforms, User Interfaces - applications of IoT in various domains.

Unit 4: Engineering Materials and components**8 Hours**

Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel, types of foundations, stone and brick masonry, plastering

Mechanical Engineering Materials – Classification of Materials: Metals, Polymers, Ceramics, Composites and Smart Materials – Properties and Engineering Applications. Energy transmission and Conversion devices: Belts, Ropes gears, Pumps, Compressors and Turbines (Working Principles)

Unit 5: Surveying and Transportation Engineering**8 Hours**

Surveying - Surveying principles -Horizontal Measurements- Angular Measurements- Introduction to Bearings, Levelling, Contour Mapping. Importance of Transportation in Nation's economic development. Types of Highway Pavements-Flexible Pavements and Rigid Pavements. Basics of Harbour, Tunnel, Airport, and Railway Engineering. Introduction to Dams and its types.

Unit 6: Energy, Production and Smart Technologies

8 Hours

Energy Sources – Conventional and Renewable Energy Sources – Introduction to Power Plants – Working Principles of Thermal, Hydroelectric, Nuclear, Solar and Wind Power Plant.

Production and Smart Technologies – Basic Manufacturing Processes: Casting, Forming, Machining and Joining and Additive Manufacturing (Principles and applications). Introduction to Automation – Industrial Robots (basic anatomy and applications) - Industry 4.0 Concepts, Digital Twin Technology, and introduction to Smart Factories.

Total 48 Hours

Textbooks:

1. Ramana Pilla, N.V.Lalitha & G.Suresh, "Basic Electrical and Electronics Engineering", Schand and Company Ltd., 1st Edition, 2024.
2. O. Srikanth and M. Sreenivasa Reddy, "Basics of Civil and Mechanical Engineering", S. Chand and company, 1st Edition, 2024.

Reference Books:

1. R. L. Boylestad & Louis Nashlesky, "Electronic Devices & Circuit Theory," Pearson Education, 2nd Edition 2021.
2. R. P. Jain, "Modern Digital Electronics" Tata Mc Graw Hill, 4th Edition, 2009.
3. M. S. Palanisamy, "Basic Civil Engineering" , Tata Mc Graw Hill publications (India) Pvt. Ltd, 4th Edition, 2022.
4. L. Jyothish Kumar, Pulak M Pandey, "3D printing & Additive Manufacturing Technology", Springer, 2019.
5. Mahesh M Rathore, "Thermal Engineering" , Tata Mcgraw Hill publications (India) Pvt. Ltd, 1st Edition 2022.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26EN101L - Communicative English Lab (Common to all branches of Engineering)

0 - 0 - 2 - 1

Course Outcomes:

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

1. Apply appropriate pronunciation and functional communication skills.
2. Demonstrate fluency and confidence in individual speaking tasks.
3. Deliver effective oral presentations.
4. Participate actively in group discussions.
5. Analyse and summarize spoken texts.
6. Produce and analyse digital media content

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1		1				1		1	3		2		
2		1				1		1	3		2		
3		1				1		1	3		2		
4		1				1		1	3		2		
5		1				1		1	3		2		
6		1				1		1	3		2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

1. Letters and Sounds: English alphabet, sounds (vowels and consonants) and practice correct pronunciation. (CO-1)
2. Rules of Pronunciation: Practice pronunciation rules, including silent letters, and sound patterns. (CO-1)
3. JAM (Just A Minute): Speak spontaneously on a given topic for one minute to develop fluency, confidence, and coherence. (CO-2)
4. Functional Communication-I: Practice everyday communication skills such as greetings, taking leave, self-introduction, introducing others. (CO-1)
5. Functional Communication-II: Develop communication skills for real-life situations such as making requests, giving directions, seeking permission, (CO-1)
6. Dynamics of Group Discussions: Learn the principles, roles, etiquette, and strategies required and plan for effective participation in group discussions. (CO-4)
7. Group Discussions: Participate in structured discussions on current or academic topics to improve teamwork and communication skills. (CO-4)
8. Story Telling: Narrate stories creatively using appropriate voice modulation, sequencing, and expressive language. (CO-3)
9. Picture Description – Preparing Interpretation: Observe a picture carefully and organize ideas to prepare a logical and meaningful interpretation for presentation. (CO-3)
10. Picture Description – Presentation: Present a clear and coherent oral description of a

picture using appropriate vocabulary and expressions. (CO-3)

11. Summarizing TED Talks: Listen to a TED Talk and summarize its key ideas accurately and concisely. (CO-5)

12. Presentation on TED Talks: Deliver a structured presentation highlighting the main message, insights, and personal reflections from a TED Talk. (CO-5)

13. Individual Oral Presentations: Prepare and deliver an individual presentation on an assigned topic using effective presentation techniques. (CO-2)

14. Short-Video Production: Create a short educational or informative video by planning, scripting, recording, and editing the content. (CO-6)

15. Short-Video Presentation: Present the produced video to the class and explain its objective, content, and learning outcomes. (CO-6)

16. Media Literacy: Develop the ability to critically evaluate, interpret, and responsibly use information from digital and social media sources. (CO-6)

Total 32 Hours

Textbooks/ Dictionaries:

1. *Cambridge Advanced Learners' Dictionary (CALD)*
2. *English Pronunciation Dictionary (EPD)*

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press. 2018.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
4. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English, (2nd Ed)*, Kindle, 2013
5. K. Nirupa Rani, Jayashree Mohan Raj, B. Indira, (Ed) *Speak Well (C.D)* Orient Black Swan Pvt Ltd, Hyderabad, 2012

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment <i>(Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)</i>	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) <i>(Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)</i>	60	60 Marks
Total	105	100 Marks

26PH101L - Wave Optics and Quantum Physics Lab
(Common to CSE, CSE-AIDS,CSE-AIML,CSE-Cyber security)

0 - 0 - 2 - 1

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

1. Infer knowledge from scientific methods and learn the process of measuring different physical parameters.
2. Develop the laboratory skills in handling electrical and optical instruments.
3. Demonstrate the spectral patterns produced by different light sources.
4. Inspect and experience physical principles of laser and optical fibre communications.
5. Apply the principles of physics and measure the solid-state properties of materials.
6. Demonstrate basic quantum phenomena through photoelectric effect and Planck's constant.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1				3	2			2		2	1		
2				3	2			2		2	1		
3				3	2			2		2	1		
4				3	2			2		2	1		
5				3	2			2		2	1		
6				3	2			2		2	1		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

1. Photocell–Characteristics and determination of Planck's constant.
2. Verification of Malu's law.
3. Determination of Hall Coefficient and charge carrier density of a semiconductor.
4. Determination of Band gap of a semiconductor.
5. Determination of wavelength of Laser by diffraction grating.
6. Determination of thickness of a thin paper piece -Air wedge experiment.
7. Solar cell characteristics -V-I characteristics.
8. Determination of wavelengths of spectral line of mercury spectrum using diffraction grating.
9. Determination of radius of curvature of convex lens by forming Newton's rings.
10. Calculation of Numerical Aperture (NA) and bending losses of a given fiber.
11. Determination of temperature coefficients of a thermistor.
12. Tunnel diode characteristics - V-I characteristics
13. Dispersive power of prism.
14. Characteristics of a laser beam- beam width and Divergence angle.
15. Determination of particle size -Lycopodium powder
16. Double refraction in calcite crystal.

Total 32 Hours**Textbooks:**

1. *Physics Lab manual–Department of Physics, BS & H, GMRIT, Rajam, 2019.*
2. *S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.*

Reference Books:

1. *Y. Aparna and K. Venkateswara Rao, Engineering Physics–I and II, VGS Techno series, 2010.*
2. *S. Panigrahi and B. Mallick, Engineering Practical Physics, Cengage learning, Delhi, 2015.*

Evaluation Pattern: 40:60		
Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment <i>(Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)</i>	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) <i>(Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)</i>	60	60 Marks
Total	105	100 Marks

26CS101L - Programming for Problem Solving Lab (Common to all branches of Engineering)

0 - 0 - 2 - 1

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

1. Read, trace, and write basic programs using arithmetic expressions.
2. Select the proper control structure for solving a problem.
3. Construct programs using homogeneous data types (arrays, strings).
4. Develop modular programs using functions and recursion
5. Make use of pointers and structures for memory utilization.
6. Develop programs using files.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	3	2	1	3				1				
2	3	3	3	1	3				1				
3	3	3	3	1	3				1				
4	3	3	3	2	3				1				
5	3	3	3	2	3				1				
6	3	3	3	2	3				1				

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

1. Algorithms and Flowcharts to C Conversion (CO1)
Sample Programs: Sum & average of 3 numbers; Fahrenheit ↔ Celsius; simple interest.
2. Familiarization with the Programming Environment (CO1)
Editors (VS Code / Code::Blocks / Dev-C++); simple programs using printf() and scanf().
3. Arithmetic Expressions and Type Conversion (CO1)
Sample Programs: Square root; compound interest; area of triangle (Heron's); distance traveled; total & average of marks.
4. Operators, Precedence, and Associativity (CO2)
Sample Programs: Evaluate expressions; max of three (conditional operator); precedence/associativity demos.
5. Decision-Making using Branching Statements (CO2)
Sample Programs: Max/min of four numbers; electricity bill; quadratic roots; calculator (switch); leap year.
6. Iterative Problems using Loops (CO2)
Sample Programs: Factorial; prime check; sine/cosine series; palindrome; pyramid of numbers.
7. One-Dimensional Arrays and Linear Search (CO3)
Sample Programs: Min/max; linear search; reverse; 2's complement; eliminate duplicates.
8. Two-Dimensional Arrays and Bubble Sort (CO3)
Sample Programs: Matrix addition & multiplication; transpose; bubble sort; diagonal sum.
9. String Operations with and without Library Functions (CO3)
Sample Programs: Length; concatenate; reverse; compare; count vowels/consonants/digits.
10. Functions using Call by Value (CO4)
Sample Programs: nCr; string length; matrix transpose; Euler's method; GCD.
11. Recursive Functions (CO4)
Sample Programs: Fibonacci; LCM; factorial; Ackermann; sum of series.
12. Functions using Call by Reference (CO4)

Sample Programs: Swap two numbers; copy string; count character types; array sum/average.

13. Pointers and Dynamic Memory Allocation (CO5)

Sample Programs: malloc()/calloc()/realloc(); student records; command-line arguments; pointer arithmetic.

14. Structures, Unions, and Bit Fields (CO5)

Sample Programs: Date using bit fields; singly linked list; structures vs unions; bit shift/rotate; structure copy.

15. Text and Binary File Operations (CO6)

Sample Programs: Read/write text file; binary file (fread/fwrite); copy file; append; read line by line.

16. File Processing Applications (CO6)

Sample Programs: Merge files (command line); count lines/words/characters; word search; character count.

Total 32 Hours

Textbooks:

1. Thareja R., "Computer Fundamentals and Programming in C," 3rd Edition, Oxford University Press, 2023.
2. Forouzan B.A. and Gilberg R.F., "Computer Science: A Structured Programming Approach Using C," 4th Edition, Cengage Learning, 2023.
3. Dey P. and Ghosh M., "Programming in C," 2nd Edition, Oxford University Press, 2013.

Reference Books:

1. Mittal A., "Programming in C: A Practical Approach," 1st Edition, Pearson Education, 2010.
2. Gottfried B.S., "Programming with C," 3rd Edition (Schaum's Outline Series), McGraw-Hill Education, 2018.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) (Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)	60	60 Marks
Total	105	100 Marks

**26ME102L – Engineering Workshop Lab
(Common to all branches of Engineering)**

0 - 0 - 2 - 1

Course Outcomes:

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

1. Apply basic computer skills for hardware operation, internet usage, and document creation.
2. Use spreadsheet, presentation, and LMS tools for data management and related tasks.
3. Generate content, designs, and programming solutions using Generative AI tools.
4. Construct basic wooden joints and concrete moulds using standard workshop practices.
5. Implement and test simple electrical wiring circuits.
6. Fabricate engineering components using fitting, sheet metal, soldering, and welding techniques.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	2	2		3				2		2		
2	3	2	2		3				2		2		
3	3	2	2		3				2		2		
4	3	2	2		3				2		2		
5	3	2	3		3				2		2		
6	3	2	3		3				2		2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

Part-A

1. Computer Hardware and Operating Systems(CO1)

Students should identify computer hardware components and peripherals, assemble and disassemble a Personal Computer (PC), install and configure operating systems, and perform basic system maintenance tasks.

Features to be covered: Computer hardware components, input and output devices, storage devices, PC assembly and disassembly, operating system installation, file and folder management, and basic system configuration.

Tools: Windows, Linux

2. Internet Tools, Email Services and Cyber Hygiene(CO1)

Students should use internet services effectively for communication and information access, configure email services, and follow safe cyber practices.

Features to be covered: Internet Browsing, Search Techniques, Email Creation and Management, Cloud Storage, Online Communication Tools, Cyber Hygiene Practices, Password Management, and Safe Internet Usage.

Tools: Google Chrome, Mozilla Firefox, Gmail, Google Drive and any similar emerging tools.

3. Document Preparation using MS Word and LaTeX(CO1)

Students should create professional documents such as certificates, abstracts, newsletters and reports.

Features to be covered: Document Creation, Document Formatting, Tables and Figures, References and Hyperlinks, Mail Merge, and Report Preparation.

Tools: MS Word, LaTeX (Overleaf)

4. Spreadsheet and Presentation Applications(CO2)

Students should create spreadsheets for data analysis and design professional presentations using multimedia tools.

Features to be covered: Spreadsheet Creation, Formulas and Functions, Charts and Graphs, Data Analysis, Data Visualization, Slide Design in PowerPoint, Multimedia Integration and Animation effects.

Tools: MS Excel, MS PowerPoint

5. Learning Management Systems (LMS)(CO2)

Students should use Learning Management Systems for online learning and academic activities.

Features to be covered: Course Enrollment, Assignment Submission, Online Quizzes, Discussion Forums, Progress Tracking

Tools: Moodle, Google Classroom and similar LMS platforms.

6. Generative AI for Content Creation and Productivity(CO3)

Students should use Generative AI tools for content generation and professional communication.

Features to be covered: Introduction to Generative AI-Prompt Engineering, Content Generation, Summarization, Translation, Email and Report Writing

Tools: ChatGPT, Gemini, Claude and other emerging AI tools.

7. Generative AI for Visual Design and Presentations(CO3)

Students should create images, posters, info graphics, and presentations using AI-powered tools.

Features to be covered: Image Generation, Poster Design, Infographics, Presentation Design and Visual Content Enhancement

Tools: Canva AI, Adobe Firefly, Gamma AI and other emerging Generative AI platforms.

8. Generative AI for Programming(CO3)

Students should use AI tools for AI assisted programming

Features to be covered: AI Assisted Programming- Code Generation, Debugging

Tools: GitHub Copilot, ChatGPT, Gemini, Perplexity AI and other emerging AI tools.

Part-B

1. Fabrication of a Cross-Lap Joint using wooden members.(CO4)
2. Fabrication of a T-Lap Joint for simple structural models using wood.(CO4)
3. Fabrication of a Mini Concrete Cube Mould and determination of the compressive strength of concrete.(CO4)
4. Implementation of Series and Parallel Lamp Connections.(CO5)
5. Implementation of Staircase Wiring using two-way switches.(CO5)
6. Fabrication of a V-Fit using standard fitting tools and practices.(CO6)
7. Fabrication of a Square Box without Lid using GI Sheet and soldering techniques.(CO6)
8. Fabrication of a Lap Joint using Arc Welding.(CO6)

Total 32 Hours

Textbooks:

1. *Engineering workshop Lab manual.*

Reference Books:

1. *S.k. hajra choudhury & nirjhar roy, Elements of workshop technology (vol - 1, manufacturing processes] revised and enlarged 7th edition, media promoters & publishers pvt. Ltd.2023*
2. *Phoenix J., Taylor M., "Prompt Engineering for Generative AI: Future-Proof Inputs for Reliable AI Outputs," O'Reilly Media, 2024.*
3. *Taulli T., "AI-Assisted Programming," O'Reilly Media, 2024.*
4. *Foreman S.D., "The LMS Guidebook: Learning Management Systems Demystified," ATD Press, 2017.*

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment <i>(Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)</i>	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) <i>(Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)</i>	60	60 Marks
Total	105	100 Marks

26HS101V – Sports, Yoga, NCC and NSS
(Common for all Branches)

0 – 0 – 2 – 1

Course Outcomes:

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

1. Demonstrate basic skills and rules of selected sports for physical fitness and active participation.
2. Develop teamwork, sportsmanship, discipline, and leadership through sports activities.
3. Demonstrate basic yoga asanas, Surya Namaskar, pranayama, and meditation for physical and mental well-being.
4. Apply yoga practices for stress management, flexibility, relaxation, and healthy living.
5. Demonstrate basic NCC knowledge, discipline, map-reading skills, and awareness of safety practices.
6. Participate in community service activities and demonstrate social responsibility, leadership, and teamwork.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1					2				2				
2								3	3	2			
3		2		2									
4					2		3						
5					2			2					
6						3		3	3	2			

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Activities:

Sports:

1. **Physical Fitness** - Meaning and importance of physical fitness, Components of physical fitness, Benefits of regular exercise, Sportsmanship and ethics in sports
2. **Volleyball** - History and introduction, Court dimensions and equipment, Basic rules, Serving, passing, setting and spiking
3. **Basketball** - History and rules Court dimensions, Dribbling, passing, shooting, Basic game strategies
4. **Kho-Kho** - History and rules, Court dimensions, Basic skills and techniques,
5. **Kabaddi** – History, Rules and regulations, Raiding and defensive skills
6. **Cricket** – Introduction, Rules and formats, Batting, bowling and fielding fundamentals

Yoga:

7. **Introduction to Yoga** - Meaning and philosophy of yoga, Importance of yoga, Concept of wellness, Benefits of yoga in daily life
8. **Surya Namaskar** - Twelve postures, Breathing techniques, Health benefits
9. **Standing Asanas** – Tadasana, Vrikshasana, Trikonasana, Veerabhadrasana
10. **Sitting Asanas** – Padmasana, Vajrasana, Paschimottanasana, Ardha Matsyendrasana
11. **Pranayama & Meditation** - Anulom-Vilom, Bhramari, Kapalabhati, Meditation techniques, Stress management

National Cadet Corps (NCC):

12. **Origin of NCC** - Aim and objectives, Motto and Flag, Introduction to weapon safety, Parts of a rifle, Safety precautions, Aiming and firing principles
13. **Map Reading** - Introduction to maps, Conventional signs, Grid references, Direction and bearing, Practical map reading exercises

National Service Scheme (NSS):

14. **Introduction to NSS** - History and Objectives of NSS, NSS Motto, Symbol, Badge and Philosophy, Importance of Community Service, Role and Responsibilities of NSS Volunteers.

Activity: Orientation and Group Discussion on "**Why should every student participate in NSS?**"

15. **Environment and Social Responsibility** - Swachh Bharat and Cleanliness, Waste Management (Reduce, Reuse and Recycle), Tree Plantation and Water Conservation, Green Campus Initiatives

Activity: **Campus Cleanliness Drive or Tree Plantation Programme**

16. **Community Service and Leadership** - Community Service and Rural Development, Health and Hygiene Awareness, Leadership and Teamwork, Volunteerism and Nation Building.

Activity: **Community Awareness Programme** on any one topic such as Cleanliness, Plastic-Free Campus, Road Safety, Water Conservation, or Health and Hygiene, followed by submission of a brief reflection report.

Total 32 Hours

Reference Books:

1. *Health and Physical Education* – NCERT
2. *Yoga for Health and Wellness* – NCERT / Ministry of AYUSH resources
3. *NCC Cadet Handbook – Common Subjects – National Cadet Corps, Government of India*
4. *National Service Scheme Manual – Ministry of Youth Affairs & Sports, Government of India*

Evaluation Pattern: 100

Assessment Component	Maximum Marks	Final Weightage
End Semester Assessment (ESA) (Six Activities (6 × 15 Marks) - 90, Viva-Voce – 10)	100	100 Marks
Total	100	100 Marks

**26EN102T – Advanced Communicative English
(Common to all branches of Engineering)**

3 - 0 - 0 - 3

Course Outcomes:

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

1. Comprehend professional communication through listening.
2. Participate effectively in workplace interactions.
3. Analyse academic and technical texts critically.
4. Produce professional documents and correspondence.
5. Apply appropriate grammar to write effective sentences.
6. Use workplace vocabulary for effective communication.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1		1				1		1	3		2		
2		1				1		1	3		2		
3		1				1		1	3		2		
4		1				1		1	3		2		
5		1				1		1	3		2		
6		1				1		1	3		2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1:

8 Hours

Listening: Active Listening Techniques

Speaking: Short Talks

Reading: Research-based Texts. Text: Grit: The Power of Passion and Perseverance (Angela Duckworth) & ISRO: India's Journey to Space (self-study)

Writing: Note Making

Grammar: Active and Passive Voice

Vocabulary: One-word Substitutions

Unit 2:

8 Hours

Listening: Listening for Main Ideas and Supporting Details

Speaking: Explaining a concept/ Giving information

Reading: Expository Texts. Text: Knowledge and Wisdom (Bertrand Russell) & Three days to see -Helen Keller (self-study)

Writing: Data Interpretation

Grammar: Conditionals

Vocabulary: Indianisms

Unit 3:

8 Hours

Listening: Listening for Gist

Speaking: News Analysis

Reading: Notices. Text: Satya Nadella's Email to his to his employees on his first day as CEO of Microsoft & Abraham Lincoln's Letter to His Son's Teacher (self-study)

Writing: Email Writing

Grammar: Question Tags

Vocabulary: Acronyms and Abbreviations

Unit 4:

8 Hours

Listening: Listening in Professional Contexts

Speaking: Advertising a Product

Reading: Career-oriented Texts – Text: The Future of Jobs (World Economic Forum) & Message

to Young people – Nikola Tesla (self-study)
 Writing: Formal Letter Writing
 Grammar: Cohesive Devices, Linkers and Connectors
 Vocabulary: Idioms and Phrases

Unit 5:**8 Hours**

Listening: Listening for Details and Inference
 Speaking: Mock Interview
 Reading: Analysis of Tone, Purpose and Bias. Text: The Horse and Two Goats (R.K. Narayan) & The Open Window –Saki (self-study)
 Writing: Resume Writing and Cover Letter
 Grammar: Subject-Verb Agreement
 Vocabulary: Technical Vocabulary

Unit 6:**8 Hours**

Listening: Critical Listening and Retention
 Speaking: Giving Feedback
 Reading: Multi-genre and Technical Texts . Text: Transforming Our World (United Nations) & Digital Infrastructure in India (self-study)
 Writing: Official Correspondence: Notice, Agenda and Minutes
 Grammar: Correcting Common Errors
 Vocabulary: Workplace Vocabulary

Total 48 Hours**Textbooks:**

1. Sanjay Kumar & Pushpa Lata. *Communication Skills*. Oxford University Press.2013
2. Stephen Bailey. *Academic Writing: A Handbook for International Students*. Routledge.2010

Reference Books:

1. Dubey, Sham Ji & Co. *English for Engineers*, Visas Publishers. 2020
2. Murphy, Raymond. *English Grammar in Use*, Cambridge University Press.2013
3. Lewis, Norman. *Word Power Made. Easy*. Goyal Publishers. 2020

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26MA103T - Differential Equations & Discrete Mathematics
(Common to CSE allied branches)

3 - 0 - 0 - 3

Course Outcomes:

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

1. Solve first-order differential equations using standard analytical methods and apply them to real-world models such as growth, decay, and cooling processes.
2. Analyze and solve higher-order linear differential equations using complementary functions, particular integrals, and variation of parameters.
3. Formulate partial differential equations and solve Lagrange's linear partial differential equations.
4. Represent logical expressions with truth tables and also identify tautologies, equivalences, implications, and normal forms.
5. Apply rules of inference to propositional and predicate logic and use quantifiers appropriately.
6. Analyze and represent binary relations using relation matrices and relational graphs, and also apply Hasse diagrams and lattices to represent and study ordered structures.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	3	2	2							1		
2	3	3	2	2							1		
3	3	3	2	2							1		
4	3	3	2	2							1		
5	3	3	2	2							1		
6	3	3	2	2							1		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1: Differential equations of first order and first degree

8 Hours

Linear differential equations, Bernoulli's equations, Exact equations and equations reducible to exact form, Newton's Law of cooling, Law of natural growth and decay.

Unit 2: Linear differential equations of higher order

8 Hours

Introduction, homogenous and non-homogenous HDE, complimentary function, particular integral, Wronskian, Method of variation of parameters.

Unit 3: Partial Differential Equations

8 Hours

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order Lagrange's linear equations.

Unit 4: Statement Logic

8 Hours

Statements and Notations, Connectives, Well-formed Formulae, Truth Tables, Tautology, Equivalence Implication, Normal Forms.

Unit 5: Theory of Inference

8 Hours

Rules of Inference for Statement Logic, Predicate Logic, Quantifiers- Universal & Existential Quantifiers, Free & Bound Variables, Rules of Inference for Predicate Logic.

Unit 6: Binary Relations

8 Hours

Binary Relations-Properties and Operations, Relational Graphs, Relation Matrices, Equivalence Relations, Compatibility Relations, Partial Ordering Relations, Hasse Diagram, Lattices.

Total 48 Hours

Textbooks:

1. B. S. Grewal, *Higher Engineering Mathematics*, 44/e, Khanna Publishers, 2017.
2. Kenneth H. Rosen, *Discrete Mathematics and Applications*, 7th Edition, Tata McGraw Hill, 2011.
3. J. L. Mott, A. Kandel & T. P. Baker, *Discrete Mathematics for Computer Scientists & Mathematicians*, Prentice Hall India, 2nd Edition, 2009.

Reference Books:

1. Ervin Kreyszig, *Advanced Engineering Mathematics*, 9th ed., Wiley India Pvt. Ltd., 2012.
2. Tremblay J.P. and P. Manohar, *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw Hill, 1997.
3. Seymour Lipschutz and Marc Lipson, *Discrete Mathematics*, Revised 3rd Edition, Schaum's Outline Series, Tata McGraw Hill, New Delhi, 2009.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26CH102T - Applied Chemistry for Computing (CSE, AI&DS, AIML and Cyber Security)

3 - 0 - 0 - 3

Course Outcomes:

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

1. Explain the role of advanced materials such as semiconductors, graphene, spintronic and quantum materials in modern computing devices.
2. Illustrate the synthesis, characterization and applications of nanomaterials for engineering, imaging and next-generation computing technologies.
3. Apply computational chemistry and molecular modelling techniques for understanding molecular structures, materials design and AI-assisted chemical research.
4. Analyze green computing principles, e-waste management strategies and sustainable manufacturing practices for environmentally responsible technology development.
5. Describe the construction, working and applications of energy storage systems, fuel cells, corrosion mechanisms and protective coating technologies.
6. Explain the chemistry of smart materials, sensors, nanoelectronics and IoT-enabled systems used in secure communication and future electronic technologies.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	2	3			1					1		
2	3	2	2			1					1		
3	3	3	2			1					2		
4	2	2	2			3					1		
5	3	2	2			2					1		
6	3	2	3			1					2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1: Advanced Materials for computing devices

8 Hours

Introduction to hardware materials-Semiconductor materials for processors and memory (Si, SiC, GaN, GaAs, Graphene) -Thermal management materials: graphene, diamond, and advanced Thermal Interface Materials (TIMs) - Optical and metallic interconnect materials - Spintronic, memristive and quantum computing materials - Magneto resistive Materials for MRAM, Resistive Switching Oxides for ReRAM -Two-dimensional materials.

Unit 2: Nano Materials

8 Hours

Introduction to nanomaterials, classification of nanomaterials based on dimensionality –Carbon based nanostructures - General approaches of preparation of nanomaterials - Chemical methods – sol-gel method, coprecipitation, hydrothermal method, Characterization of nanomaterials by powder XRD, Scanning Electron Microscopy (SEM), applications of nanomaterials in engineering and imaging, Nanomaterials for next-generation computing.

Unit 3: Computational Chemistry & Molecular Modelling

8 Hours

Introduction to Computational Chemistry - Basics of Molecular Structure and Modelling - Molecular Simulation Techniques - Introduction to Quantum Chemistry & Density Functional Theory (DFT) - Computational Materials Design - Artificial Intelligence in Chemistry - Molecular Visualization Softwares & Hands-on usage - Emerging trends and applications of computational chemistry, Organic Light-Emitting Diodes (OLEDs). Soft wares: Hg (Mercury) Software, CCDC (Cambridge Crystallographic Data Centre) Visualization Tools, Chemdraw Professional (Chem draw Pro).

Unit 4: Green computing

8 Hours

Principles of green chemistry - Green computing concepts - Environmental impact of electronic

devices - E-waste generation and management - Recycling and recovery of valuable materials - Sustainable manufacturing practices - Ethical and environmental responsibilities in technology.

Unit 5: Energy storage systems

8 Hours

Electrodes– electrochemical cells - Primary cells – Zinc-air battery, Secondary cells – construction and working of lithium-ion battery - Fuel cells - Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell, supercapacitors, Corrosion in electronic circuits and embedded systems - Protective coatings and anti-corrosion techniques.

Unit 6: Smart materials

8 Hours

Importance of material chemistry in electronic and secure communication device - Chemical and biosensors in smart systems - Sensor materials for environmental monitoring and biometric authentication - Role of sensors in secure IoT networks and smart surveillance systems, shape memory alloys, emerging technologies including nanoelectronics, IoT-enabled systems, and sustainable engineering solutions

Total 48 Hours

Textbooks:

1. Callister, W.D. and Rethwisch, D.G., *Materials Science and Engineering: An Introduction*, 10/e, Wiley, 2023.
2. Pradeep, T., *A Textbook of Nanoscience and Nanotechnology*, 3/e, McGraw-Hill Education, 2022.
3. Jensen, F., *Introduction to Computational Chemistry*, 4/e, Wiley, 2017.
4. Linden, D. and Reddy, T.B., *Handbook of Batteries*, 5/e, McGraw-Hill, 2019.
5. Raghavan, V., *Materials Science and Engineering: A First Course*, 6/e, PHI Learning, 2015.

Reference Books:

1. Poole, C.P. and Owens, F.J., *Introduction to Nanotechnology*, John Wiley & sons, 2003.
2. Leach, A.R., *Molecular Modelling: Principles and Applications*, 2/e, Pearson Education, 2009.
3. Syed Aftab Iqbal, *Textbook of Green Chemistry*, Discovery Publishing House PVT Limited, 2016.
4. Ozin, G.A. and Arsenault, A.C., *Nanochemistry: A Chemical Approach to Nanomaterials*, Royal Society of Chemistry, 2/e, RSC Publishing, 2009.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26CS102T - Python Programming
(Common to all branches of Engineering)

2 - 0 - 0 - 2

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

1. Demonstrate Python programming fundamentals including syntax, data types, operators, and expressions.
2. Implement decision-making and looping constructs to solve basic computational problems.
3. Develop structured programs using functions, recursion, and modular programming concepts.
4. Manipulate Python data structures such as strings, lists, tuples, sets, and dictionaries to solve problems.
5. Implement file handling and exception handling techniques in Python programs.
6. Develop Python applications using object-oriented programming concepts and libraries for basic data analysis and visualization.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	2			3						1		
2	3	3	1		3						1		
3	3	3	2		3				1		2		
4	3	3	2	2	3				1		2		
5	3	2	1	1	3				1		2		
6	3	3	2	2	3	1	1	1	2		3		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1: Python Fundamentals**5 Hours**

Introduction to Python, Features and applications, Python interpreter and IDE, Syntax and indentation, Variables and data types, Input and output statements, Operators and expressions.

Unit 2: Control Structures**5 Hours**

Conditional statements (if, if-else, elif), Nested conditions, looping statements (for, while), break, Continue, pass, Problem solving using control structures.

Unit 3: Functions and Modular Programming**6 Hours**

Functions and function definition, Function arguments and return values, Scope of variables, Recursion, Lambda functions, Map, Filter and Reduce, Modules and packages.

Unit 4: Strings and Data Structures**5 Hours**

String operations and methods, Lists, Tuples, Sets, Dictionaries, Basic data processing, Regular expressions.

Unit 5: File Handling and Exception Handling**5 Hours**

File operations (read, write, append), File modes, Text file processing, Exception handling (try-except-finally), User-defined exceptions.

Unit 6: OOP and Python Libraries**6 Hours**

Classes and objects, Constructors, Inheritance, Polymorphism, Introduction to NumPy, Introduction to Pandas, Data visualization basics (Matplotlib concepts).

Total 32 Hours

Textbooks:

1. Reema Thareja, *Python Programming Using Problem Solving Approach*, Oxford University Press, 3rd Edition, 2025.
2. Y. Daniel Liang, *Introduction to Python Programming and Data Structures*, Pearson Education, 3rd Edition, 2026.

Reference Books:

1. Eric Matthes, *Python Crash Course: A Hands-On, Project-Based Introduction to Programming*, No Starch Press, 3rd Edition, 2023.
2. Fabrizio Romano & Heinrich Kruger, *Learn Python Programming: The No-Nonsense, Beginner's Guide*, Packt Publishing, 4th Edition, 2024.
3. Paul Barry, *Head First Python*, O'Reilly Media, 3rd Edition, 2023.
4. Jake VanderPlas, *Python Data Science Handbook*, O'Reilly Media, Updated Edition, 2022.
5. David Beazley & Brian K. Jones, *Python Cookbook*, O'Reilly Media, 3rd Edition, 2019
6. Brett Slatkin, *Effective Python: 90 Specific Ways to Write Better Python*, Addison-Wesley, 2nd Edition, 2020.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

26CS103T - Data Structures
(Common for CSE, CSE-AIDS, CSE-AIML, CSE-CYS)

2 - 0 - 0 - 2

Course Outcomes:

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

1. Explain linear data structures and analyze searching and sorting techniques with their time and space complexities.
2. Describe the representation and operations of linked lists (singly, doubly, and circular).
3. Illustrate stacks and their applications such as expression evaluation and recursion.
4. Analyze queues, dequeues, and priority queues for scheduling and traversal problems.
5. Explain binary search tree construction, operations, and traversals.
6. Compare graph traversal strategies and hashing techniques for solving real-world problems.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	3	2	2							1		
2	3	3	2	1							1		
3	3	3	2	2							1		
4	3	3	3	2							1		
5	3	3	3	2							1		
6	3	3	3	3							2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

Unit 1: Introduction, Searching & Sorting

8 Hours

Introduction to linear data structures: definition and importance; Abstract Data Types (ADTs) and their implementation; time and space complexity analysis : Overview of asymptotic notations (Big-O, Omega, Theta). Searching Techniques: Linear Search, Binary Search. Sorting Techniques: Bubble Sort, Selection Sort, Insertion Sort.

Unit 2: Linked Lists

8 Hours

Singly linked lists: representation and operations; doubly linked lists; circular linked lists; comparison of arrays and linked lists; applications of linked lists (polynomial representation, sparse matrices)

Unit 3: Stacks

8 Hours

Introduction to stacks: properties and operations; implementing stacks using arrays and linked lists; applications of stacks: expression evaluation and conversions (infix, postfix, prefix), backtracking, recursion, reversing a list.

Unit 4: Queues, Deques & Priority Queues

8 Hours

Introduction to queues: properties and operations; implementing queues using arrays and linked lists; circular queues; dequeues (double-ended queues): operations and applications; priority queues; applications of queues: breadth-first search, scheduling.

Unit 5: Trees

8 Hours

Introduction to trees and terminology; binary trees and representations; tree traversals (in-order, pre-order, post-order, level-order); Binary Search Tree: insertion, deletion, and traversals; introduction to balanced trees –AVL trees, B Trees and heaps.

Unit 6: Graphs & Hashing

8 Hours

Graphs: introduction and terminology; graph representations (adjacency matrix and adjacency list); graph traversals: Breadth-First Search (BFS) and Depth-First Search (DFS); applications of

graphs. Hashing: hash functions; collision resolution techniques (chaining and open addressing); hash tables: implementation and operations; applications of hashing (unique identifier generation, caching).

Total 48 Hours

Textbooks:

1. Weiss M.A., "Data Structures and Algorithm Analysis in C," 2nd Edition, Pearson Education, 1996.
2. Horowitz E., Sahni S., Anderson-Freed S., "Fundamentals of Data Structures in C," 2nd Edition, Universities Press, 2008.
3. Cormen T.H., Leiserson C.E., Rivest R.L., Stein C., "Introduction to Algorithms," 4th Edition, MIT Press, 2022.

Reference Books:

1. Mehlhorn K., Sanders P., "Algorithms and Data Structures: The Basic Toolbox," Springer, 2008.
2. Aho A.V., Hopcroft J.E., Ullman J.D., "Data Structures and Algorithms," Addison-Wesley, 1983.
3. Miller B.N., Ranum D.L., "Problem Solving with Algorithms and Data Structures Using Python," 3rd Edition, Franklin, Beedle & Associates, 2013.
4. Karumanchi N., "Data Structures and Algorithms Made Easy: Data Structure and Algorithmic Puzzles," 5th Edition, CareerMonk Publications, 2017.
5. Sedgewick R., "Algorithms in C, Parts 1–5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms," Addison-Wesley, 2001.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (CA1-40, CA2-40, CA3-40)	40 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	25 Marks
Professional Competency Assessment (PCA) (PCA1-30, PCA2-30, PCA3-30)	30 (Computed as 40% of the first higher Assessment score + 40% of the second higher Assessment score + 20% of the lower Assessment score)	10 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA)	60	60 Marks
Total	135	100 Marks

**26EN102L – Advanced Communicative English Lab
(Common to all branches of Engineering)**

0 - 0 - 2 - 1

Course Outcomes:

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

1. Apply appropriate stress and intonation in spoken communication.
2. Demonstrate effective interpersonal and professional communication skills.
3. Design and deliver effective PowerPoint presentations.
4. Participate confidently in debates and panel discussions.
5. Prepare professional reports, resumes and perform effectively in interviews.
6. Demonstrate professional etiquette, and self-presentation.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1		1				1		1	3		2		
2		1				1		1	3		2		
3		1				1		1	3		2		
4		1				1		1	3		2		
5		1				1		1	3		2		
6		1				1		1	3		2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

1. Stress and Intonation: Practice the correct use of word stress, sentence stress, and intonation (CO-1)
2. Functional Communication–I: Making invitations, complaints, congratulating someone, showing sympathy (CO-2)
3. Functional Communication–II: Apologizing, advising, suggestions, expressing opinions, and telephone conversations (CO-2)
4. PPT Presentation Design: Design PowerPoint presentations using effective layout and content organization. (CO-3)
5. PPT Presentation Delivery: Delivering PowerPoint presentations with appropriate voice, body language, and audience engagement. (CO-3)
6. Preparation for Debates: Learn to research topics, organize arguments, gather evidence, and prepare rebuttals for effective debating. (CO-4)
7. Debates – Participation: Participation in debates by presenting logical arguments, responding to counterarguments, and demonstrating critical thinking. (CO-4)
8. Resume Writing: Preparation of a professional resume that effectively highlights educational qualifications, skills, projects, and achievements. (CO-5)
9. FAQs in Interviews: Practice answering commonly asked interview questions with confidence, clarity, and relevance. (CO-5)
10. Mock Interviews: Participation in simulated interview sessions to enhance

communication skills, confidence, and interview performance. (CO-5)

11. Report Writing: Develop the ability to write clear, organized, and professional reports following standard formats and conventions. (CO-5)

12. Panel Discussion – Planning & Moderation: Learn to organize, coordinate, and moderate panel discussions by ensuring effective participation and time management. (CO-4)

13. Panel Discussion – Participation: Participation in panel discussions by expressing ideas clearly, supporting opinions, and responding constructively to others. (CO-4)

14. Netiquette Training: Appropriate etiquette and ethical practices for effective communication in digital and online environments. (CO-6)

15. Video Resume Creation: Creating a concise and professional video resume that effectively showcases personal strengths, skills, and career objectives. (CO-6)

16. Video Resume Presentation: Presentation of a video resume demonstrating effective verbal communication, body language, and professional appearance. (CO-6)

Total 32 Hours

Textbooks/ Dictionaries:

1. *Cambridge Advanced Learners' Dictionary (CALD)*
2. *English pronunciation Dictionary (EPD)*

Reference Books:

1. *Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press. 2018.*
2. *Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016*
3. *Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.*
4. *J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed), Kindle, 2013*
5. *K. Nirupa Rani, Jayashree Mohan Raj, B. Indira, (Ed) Speak Well (C.D) Orient Black Swan Pvt Ltd, Hyderabad, 2012*

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) (Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)	60	60 Marks
Total	105	100 Marks

**26CH102L - Applied Chemistry for Computing Lab
(CSE, AI&DS, AIML and Cyber Security)**

0 - 0 - 2 - 1

Course Outcomes:

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

1. Prepare and characterize advanced materials such as nanoparticles, quantum dots, graphene, and magnetic materials using modern chemical techniques.
2. Employ computational and AI-based techniques for modelling and analysis of molecules and materials.
3. Evaluate electrochemical processes relevant to materials performance.
4. Evaluate environmental impacts and sustainable practices in computing technologies.
5. Develop and evaluate smart sensors and responsive materials for computing and environmental applications.
6. Characterization of material by XRD, SEM/TEM and established professional skills.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	2	1	3		1					1		
2	3	3	2	3							2		
3	3	2	2	3		1					1		
4	2	2	1	2		3					1		
5	3	2	3	2		1					2		
6	3	2	1	3		1					1		

3 - Strongly Linked | 2 - Moderately Linked | 1 - Weakly Linked

List of Experiments:

1. Preparation of TiO₂ nanoparticles by sol-gel method. (CO1)
2. Preparation and characterization ZnO nanoparticles by co-precipitation method (CO6)
3. Preparation of quantum dots and characterization by spectrophotometric method (CO1)
4. Determination of the Band Structure of Graphene Sheet Using UV-Visible Spectroscopy / Quantum ESPRESSO software (CO2)
5. Synthesis of Magneto resistive Material MnFe₂O₄ by Co-precipitation Method (CO1)
6. Estimation of copper in e-waste by spectrophotometric method (CO4)
7. Estimation of silica in e-waste by spectrophotometric method (CO4)
8. Construction and performance evaluation of a simple electrochemical cell. (CO3)
9. Measurement of corrosion rate of metals using weight-loss method (CO3).
10. Electrodeposition of Copper on base metal (CO3)
11. Study of shape memory alloy behavior through thermal activation (CO5).
12. Chemistry of Blue Printing Cyanotype Process (CO6)
13. Fabrication of simple humidity sensors using conductive paper (CO5)
14. Fabrication and testing of a simple chemical sensor for pH monitoring (CO5).
15. Molecular visualization of molecules using Avogadro/ChemDraw software. (CO2)
16. Determination of Molecular Energy Using Software Tools (DFT/ChemDraw Pro) (CO2)

Virtual/Simulation Experiments

Molecular docking and visualization using open-source platforms.
 Battery simulation and performance analysis.
 Computational modelling of nanomaterials.
 AI-assisted molecular property prediction.
 Smart sensor network simulation for IoT applications.

Total 32 Hours

Textbooks:

1. Pradeep, T., *A Textbook of Nanoscience and Nanotechnology*, 3/e, McGraw-Hill Education, 2022.
2. Jensen, F., *Introduction to Computational Chemistry*, 4/e, Wiley, 2017.
3. Bard, A.J. and Faulkner, L.R., *Electrochemical Methods: Fundamentals and Applications*, 2/e, Wiley, 2001.

Reference Books:

1. Leach, A.R., *Molecular Modelling: Principles and Applications*, Pearson College Div, 2001.
2. Ozin, G.A. and Arsenault, A.C., *Nanochemistry: A Chemical Approach to Nanomaterials*, Royal Society of Chemistry, 2/e, RSC Publishing, 2009.
3. Linden, D. and Reddy, T.B., *Handbook of Batteries*, McGraw-Hill, 2002.
4. Tiwari, A. and Valyukh, S., *Advanced Materials for Sensors and Smart Devices*, Wiley-Scrivener publishing,

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) (Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)	60	60 Marks
Total	105	100 Marks

26CS102L - Python Programming Lab
(Common to all branches of Engineering)

0 - 0 - 2 - 1

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

1. Demonstrate Python programming fundamentals using variables, data types, operators, and expressions.
2. Implement appropriate decision-making and looping constructs to solve computational problems.
3. Construct modular programs using functions, recursion, and modules.
4. Manipulate strings, lists, tuples, sets, and dictionaries for problem solving.
5. Implement file handling and exception handling techniques in Python programs.
6. Apply object-oriented programming concepts and Python libraries for basic data analysis and visualization.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	2			3						1		
2	3	3	1		3						1		
3	3	3	2		3				1		2		
4	3	3	2	2	3				1		2		
5	3	2	1	2	3		1		1		2		
6	3	3	2	2	3	1	1	1	2		3		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

1. Write programs demonstrating Python syntax, variables, input/output, data types and type conversion. (CO1)

Sample Programs:

- Display messages and formatted output
- Read and display student details
- Sum, difference, product and quotient of two numbers
- Calculate simple interest
- Calculate area and perimeter of basic shapes

2. Develop programs using arithmetic, relational, logical, assignment, membership and identity operators. (CO1)

Sample Programs:

- Calculate total and average of marks
- Convert temperature between Celsius and Fahrenheit
- Calculate simple and compound interest
- Calculate distance using speed and time
- Demonstrate type conversion and operator precedence

3. Solve problems using if, if-else, elif, and nested conditional statements. (CO2)

Sample Programs:

- Find largest/smallest of three numbers
- Determine whether a number is positive, negative or zero
- Check whether a year is a leap year
- Calculate student grade based on marks
- Determine eligibility based on age and other criteria

4. Develop programs using for, while, break, continue, and nested loops. (CO2)

Sample Programs:

- Generate multiplication tables
- Find factorial of a number

- Generate Fibonacci series
- Check whether a number is prime
- Find sum of digits and reverse of a number
- Generate suitable number and star patterns

5. Develop programs using user-defined functions with positional, keyword, default and variable-length arguments. (CO3)

Sample Programs:

- Functions for arithmetic operations
- Function to find factorial and Fibonacci series
- Function to determine prime numbers
- Function to find GCD and LCM
- Functions with default and keyword arguments

6. Implement recursive solutions for factorial, Fibonacci, GCD, binary search, etc. (CO3)

Sample Programs:

- Factorial using recursion
- Fibonacci series using recursion
- Sum of first n natural numbers using recursion
- GCD using recursion
- Recursive binary search

7. Create user-defined modules and packages and use them in Python applications. (CO3)

Sample Programs:

- Create a user-defined mathematical module
- Create and use a module for student result processing
- Develop a module for prime number and factorial operations
- Create a package containing related modules
- Develop a small application using user-defined modules

8. Develop a menu-driven Python application integrating variables, operators, control structures, functions and modules. (CO1, CO2, CO3)

Sample Programs:

- Menu-driven mathematical calculator using functions
- Student result processing system
- Employee salary calculation system
- Electricity bill calculation system
- Number-analysis application integrating functions and control structures

9. Develop programs for string manipulation, searching, slicing, formatting and text processing. (CO4)

Sample Programs:

- Check whether a string is a palindrome
- Count vowels, consonants, digits and special characters
- Find frequency of characters in a string
- Search and replace substrings
- Perform string slicing and formatting
- Basic text analysis

10. Develop programs for searching, sorting, insertion, deletion, aggregation and nested data processing. (CO4)

Sample Programs:

- Find maximum, minimum and average of list elements
- Search and sort elements in a list
- Remove duplicate elements from a list
- Perform matrix operations using nested lists
- Student marks processing using lists and tuples

11. Solve problems involving duplicate removal, frequency counting, grouping and key-value data management. (CO4)

Sample Programs:

- Perform union, intersection and difference of sets
- Remove duplicate elements using sets
- Count word/character frequency using dictionaries
- Create a student database using dictionaries
- Group and summarize records using dictionaries

12. Create applications to read, write, append and process text and CSV files. (C05)

Sample Programs:

- Create, read, write and append text files
- Count lines, words and characters in a file
- Search for a word in a text file
- Copy contents from one file to another
- Read and process CSV files
- Store and retrieve student records using files

13. Develop reliable applications using try, except, else, finally, and user-defined exceptions. (C05)

Sample Programs:

- Handle division-by-zero errors
- Handle invalid input and type conversion errors
- Handle file-not-found errors
- Develop a calculator with exception handling
- Create and use user-defined exceptions
- Develop a robust student result processing application

14. Develop applications using classes, objects, constructors, methods, encapsulation and inheritance. (C06)

Sample Programs:

- Create a class for student details and marks
- Create a bank account class
- Demonstrate constructors and methods
- Implement inheritance using an employee hierarchy
- Demonstrate encapsulation and polymorphism

15. Use NumPy and Pandas to create, manipulate and analyze datasets. (C06)

Sample Programs:

- Create and manipulate NumPy arrays
- Perform statistical operations using NumPy
- Create DataFrames using Pandas
- Read and process CSV datasets
- Calculate summary statistics from a dataset
- Filter, sort and group data using Pandas

16. Analyze a dataset and create appropriate visualizations using Matplotlib. (C06)

Sample Programs:

- Plot student marks using a bar chart
- Plot monthly sales using a line graph
- Display category-wise data using a pie chart
- Generate histogram for numerical data
- Create scatter plots for two variables
- Perform basic data analysis and visualization on a real-world dataset

Total 32 Hours

Textbooks:

1. *Reema Thareja, Python Programming Using Problem Solving Approach, Oxford University Press, 3rd Edition, 2025.*
2. *Y. Daniel Liang, Introduction to Python Programming and Data Structures, Pearson Education, 3rd Edition, 2026.*

Reference Books:

1. Eric Matthes, *Python Crash Course: A Hands-On, Project-Based Introduction to Programming*, No Starch Press, 3rd Edition, 2023.
2. Fabrizio Romano & Heinrich Kruger, *Learn Python Programming: The No-Nonsense, Beginner's Guide*, Packt Publishing, 4th Edition, 2024.
3. Paul Barry, *Head First Python*, O'Reilly Media, 3rd Edition, 2023.
4. Jake VanderPlas, *Python Data Science Handbook*, O'Reilly Media, Updated Edition, 2022.
5. David Beazley & Brian K. Jones, *Python Cookbook*, O'Reilly Media, 3rd Edition, 2019
6. Brett Slatkin, *Effective Python: 90 Specific Ways to Write Better Python*, Addison-Wesley, 2nd Edition, 2020.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) (Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)	60	60 Marks
Total	105	100 Marks

26CS103L - Data Structures Lab
(Common for CSE, CSE-AIDS, CSE-AIML, CSE-CYS)

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Course Outcomes:

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

1. Implement searching and sorting techniques on linear data structures.
2. Develop programs using linked lists for dynamic data storage and manipulation.
3. Implement stack-based programs and their applications.
4. Implement queues, dequeues, and priority queues for scheduling and traversal problems.
5. Construct and implement binary search tree operations.
6. Implement graph traversals and hashing techniques to solve real-world problems.

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	2	3	3	2	3						1		
2	2	2	3	2	3						1		
3	2	2	3	2	2						1		
4	2	3	3	3	3						2		
5	2	2	3	2	3						1		
6	2	3	3	3	3						2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

1. Array Manipulation: reverse an array; basic array programs. (CO1)
2. Searching Techniques: linear search; binary search. (CO1)
3. Sorting Techniques: bubble sort; insertion sort. (CO1)
4. Linked List Implementation: singly linked list insertion/deletion; reverse iteratively and recursively. (CO2)
5. Linked List Application: detect and remove duplicates; polynomial representation and addition. (CO2)
6. Double and Circular Linked Lists: doubly linked list operations; circular linked list insertion, deletion, traversal. (CO2)
7. Stack Operations: implement a stack using arrays and using linked lists. (CO3)
8. Stack Applications: convert infix to postfix; evaluate a postfix expression. (CO3)
9. Queue Operations: implement a queue using arrays and using linked lists. (CO4)
10. Queue Types: implement a circular queue and a double-ended queue (deque). (CO4)
11. Queue Applications: simulate a printer queue system; use a stack/queue to check symmetry. (CO4)
12. Binary Search Tree: implement a BST using a linked list; perform insertion and deletion. (CO5)
13. BST Traversals and Applications: in-order, pre-order, post-order, and level-order traversals; find the kth smallest/largest element. (CO5)
14. Graph Traversal - BFS and DFS (CO6)
15. Closed Hashing: implement a hash table using open addressing. (CO6)
16. Open Hashing: implement a hash table using separate chaining. (CO6)

Total 32 Hours

Textbooks:

1. Weiss M.A., "Data Structures and Algorithm Analysis in C," 2nd Edition, Pearson Education, 1996.
2. Tenenbaum A.M., Langsam Y., Augenstein M.J., "Data Structures Using C," Pearson Education, 2019.

Reference Books:

1. Thareja R., "Data Structures Using C," 3rd Edition, Oxford University Press, 2023.
2. Horowitz E., Sahni S., Anderson-Freed S., "Fundamentals of Data Structures in C," 2nd Edition, Universities Press, 2008.
3. Karumanchi N., "Data Structures and Algorithms Made Easy: Data Structure and Algorithmic Puzzles," 5th Edition, CareerMonk Publications, 2017.

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment (Preparation, Observation & Results – 10, Record – 5, Viva-Voce – 10, Internal Test – 15)	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) (Procedure & Write-up – 10, Conduct of Experiment/Program – 15, Analysis & Results – 20, Record – 5, Viva-Voce – 10)	60	60 Marks
Total	105	100 Marks

26ME101L – Engineering Graphics Lab
(Common to all branches of Engineering)

0 - 0 - 2 - 1

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

1. Apply engineering drawing standards to create geometrical constructions and engineering curves.
2. Develop orthographic projections of points and straight lines.
3. Generate orthographic projections of plane surfaces.
4. Develop orthographic projections of solids using CAD
5. Prepare developments of surface of engineering solids using CAD.
6. Convert between orthographic and isometric views of engineering components using CAD..

COs- POs Mapping:

COs	PO ₁	PO ₂	PO ₃	PO ₄	PO ₅	PO ₆	PO ₇	PO ₈	PO ₉	PO ₁₀	PO ₁₁	PSO ₁	PSO ₂
1	3	2	2		3				2		2		
2	3	2	2		3				2		2		
3	3	2	2		3				2		2		
4	3	2	2		3				2		2		
5	3	2	3		3				2		2		
6	3	2	3		3				2		2		

3 - Strongly Linked | 2 – Moderately Linked | 1 – Weakly Linked

List of Experiments:

1. Lettering, Dimensioning, Bisecting a line, divide a line in to equal parts, Polygon.
2. Draw engineering curves such as ellipse, parabola, and hyperbola using the eccentricity method.
3. Draw engineering curves using special construction methods.
4. Draw orthographic projections of points, straight lines in simple positions and simple inclinations.
5. Draw orthographic projections of straight lines inclined to both the plane plane.
6. Draw orthographic projections of plane surfaces parallel to and perpendicular to reference planes.
7. Draw orthographic projections of plane surfaces inclined to one reference plane.
8. Draw orthographic projections of plane surfaces inclined to both reference planes.
9. Draw orthographic projections of solids (Prisms, Cylinders, Pyramids and Cones) in simple positions (Parallel to and perpendicular to reference planes) using CAD software.
10. Draw orthographic projections of solids inclined to one plane using CAD software.
11. Draw development of surfaces using CAD software.
12. Draw Sections of solids (cutting plane parallel to reference plane) using CAD software.
13. Draw isometric projections of simple solids such as prism and cylinder using CAD software.
14. Draw isometric projections of simple solids such as pyramid, and cone using CAD software.
15. Convert given orthographic views into isometric view using CAD software.
16. Convert given isometric view into orthographic views using CAD software.

Total 48 Hours

Textbooks:

1. *Engineering Drawing*, N. D. Bhatt and V. M. Panchal, Charotar Publishing House Pvt. Ltd., 56th Edition, 2026.
2. *Engineering Graphics with Auto CAD*, D. M. Kulkarni, A.P. Rastogi, Ashoke K. Sarkar, A

Trueman Publication, Revised Edition, 2017.

Reference Books:

1. *Engineering Drawing*, K. L. Narayana and P. Kannaiah, SciTech Publications, 3rd Edition, 2018.
2. *Engineering Drawing with AutoCAD*, B.V.R. Gupta, M. Raja Roy I K International Publishing House Pvt. Ltd., 3rd Edition 2016

Evaluation Pattern: 40:60

Assessment Component	Maximum Marks	Final Weightage
Continuous Assessment <i>(Day-to-Day Assessment (DDA) of Drawing Sheets – 20, Internal Test – 20)</i>	40	35 Marks
Attendance	5	5 Marks
End Semester Assessment (ESA) <i>(Manual Drawing Evaluation – 30 Marks, AutoCAD Drawing Evaluation – 30 Marks)</i>	60	60 Marks
Total	105	100 Marks