DEPARTMENT OF HUMANITIES & SCIENCES

ACADEMIC REGULATIONS & SYLLABI (R-22)

B. Tech I Year

(Electrical & Electronics Engineering)

w.e.f. the Academic Year 2025-2026

Vidya Jyothi Institute of Technology

(An Autonomous Institution)

(Accredited by NAAC A+ Approved by AICTE New Delhi & Permanently Affiliated to JNTUH)

Aziz Nagar Gate, C.B. Post, Hyderabad-500 075

DEPARTMENT OF HUMANITIES & SCIENCES

B. TECH I YEAR COURSE STRUCTURE 2025-26

(Electrical & Electronics Engineering)

Semester – I

S. No	Course Code	Course Title	L	T	P	Credits
1	A251002	Mathematics-I(Matrices & Calculus)	3	1	0	4.0
2	A251003	Advanced Engineering Physics	3	0	0	3.0
3	A251503	Programming for Problem Solving	3	0	0	3.0
4	A251302	Engineering Drawing and computer aided drafting	2	0	2	3.0
5	A251202	Electrical Circuits - I	2	0	0	2.0
6	A251001	English for Skill Enhancement	3	0	0	3.0
7	A251082	Advanced Engineering Physics Lab	0	0	2	1.0
8	A251583	Programming for Problem Solving Lab	0	0	2	1.0
9	A251081	English Language & Communication Skills Lab	0	0	2	1.0
10		Induction Program				
Total			**16**	**01**	**08**	**21**

Semester – II

S. No	Course Code	Course Title	L	T	P	Credits
1	A252002	Mathematics – II (Ordinary Differential Equations & Vector Calculus)	3	0	0	3.0
2	A252004	Engineering Chemistry	3	0	0	3.0
3	A252502	Data Structures Essentials	3	0	0	3.0
4	A252503	Python Programming	3	0	0	3.0
5	A252202	Electrical Circuits – II	3	0	0	3.0
6	A252381	Engineering Workshop	0	0	2	1.0
7	A252083	Engineering Chemistry Lab	0	0	2	1.0
8	A252582	Data Structures Essentials Lab	0	0	2	1.0
9	A252583	Python Programming Lab	0	0	2	1.0
10	A252282	Electrical Circuits Lab	0	0	2	1.0
Total			**15**	**0**	**10**	**20**

MATHEMATICS-I (MATRICES AND CALCULUS)

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251002	L	T	P	C	CIE	SEE	Total
	3	1	0	4	40	60	100

Objectives: To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form
3. Geometrical approach to the mean value theorems and their application to the mathematical problems and also to discuss the curve tracing process.
4. Finding maxima and minima of functions of two and three variables.
5. Evaluation of multiple integrals and their applications.

Course outcomes: After learning the contents of this paper, the student must be able to

1. Formulate the matrix representation of a given set of linear equations and analyze the solution of the system using appropriate methods.
2. Compute the eigenvalues and determine the corresponding eigenvectors of a given matrix. Transform a quadratic form into its canonical form using orthogonal transformations.
3. Apply the mean value theorems to solve real-world and mathematical problems also to discuss the curve tracing process.
4. Determine the extreme values of functions of two variables with and without constraints.
5. Evaluate multiple integrals and apply them to calculate areas and volumes.

UNIT-I: Matrices 8 L

Rank of a matrix by Echelon form and Normal form — Inverse of Non-singular matrices by Gauss-Jordan method. System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations.

UNIT-II: Eigen values and Eigen vectors 10 L

Linear Transformation and Orthogonal Transformation: Eigen values — Eigen vectors and their properties – Diagonalization of a matrix – Cayley-Hamilton Theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms – Reduction of Quadratic form to canonical form by Orthogonal Transformation.

UNIT-III: Single Variable Calculus 10 L

Limit and Continuous of functions and its properties. Mean value theorems: Rolle's theorem — Lagrange's Mean value theorem with their Geometrical Interpretation and applications – Cauchy's Mean value Theorem — Taylor's Series (All the theorems without proof).
Curve Tracing: Curve tracing in Cartesian coordinates.

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

Definitions of Limit and continuity – Partial Differentiation: Total derivative – Jacobian — Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration) 10 L

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

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

ADVANCED ENGINEERING PHYSICS

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251003	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

Course Objectives:

1. To study crystal structures and material characterization techniques like XRD.
2. To learn the various wave optics techniques, phenomena and applications.
3. To understand fundamental concepts of quantum mechanics and their applications in solids.
4. To introduce quantum computing principles, quantum gates, and basic quantum measurements.
5. To explore the working and applications of lasers and fibre optics in modern technology.

Course Outcomes:

1. Analyze crystal structures and apply XRD technique or material characterization.
2. Classify various wave optics techniques and explain their phenomena and applications.
3. Apply quantum mechanical principles to explain particle behaviour and discrete energy levels in materials.
4. Understand quantum computing concepts, use quantum gates, and explain basic quantum measurements.
5. Explain the principles of lasers and fibre optics and their applications in various communications.

UNIT-I: Crystallography & Materials Characterization [09Hrs]

Introduction: Unit cell, Space lattice, Basis, Lattice parameters; Crystal structures, Bravais lattices, Atomic radius, Number of atoms per unit cell, Coordination number, Distance of nearest neighbourhood, packing factor of Simple cubic (SC), Body Centered Cubic (BCC), Face Centered Cubic (FCC) structure; Miller indices, Inter-planar distance. Concept of Nanomaterials: Surface area to Volume ratio, X -ray diffraction: Bragg's law, Powder method, Calculation of average crystallite size using Debye Scherrer formula.

UNIT-II: Wave Optics [09 Hrs]

Principle of superposition, Coherence, Interference - Interference in thin films by reflection, Newton's rings. Diffraction – Fresnel and Fraunhofer diffraction, Fraunhofer diffraction due to single slit, Plane diffraction grating, Resolving power of grating (qualitative treatment), Polarization – Polarization of light waves, Plane of vibration, Plane of polarization, Double refraction, Nicol's Prism, Applications of polarization.

UNIT-III: Quantum Mechanics [09Hrs]

Introduction: de-Broglie hypothesis, Heisenberg uncertainty principle, Postulates of quantum mechanics: Operators in quantum mechanics, Eigen values and Eigen functions, Expectation value, Physical significance of wave function, Schrödinger's time independent wave equation, Application of Schrödinger's time independent wave equation for a particle in a1-D box: Expression for solution of wave function and derivation for Eigen energy states, Band Theory of solids, Classification of solids based on Band theory.

UNIT-IV: Quantum Computing [09Hrs]

Introduction to Quantum Computing, Mathematical Tools: Linear Algebra Basics, Tensor Product, Dirac Notation (Bra-Ket) and Properties, Hilbert Space, Bloch Sphere, Superposition, Classical Bits vs Quantum Bits (Qubits), Multiple Qubit Systems and Entanglement, Quantum Evolution and Measurements. Quantum Gates: Hadamard Gate, CNOT, Pauli-X gate, Swap Gate and Quantum Circuits. Future of Quantum Computing.

UNIT-V: Laser and Fiber Optics [09Hrs]

Introduction to interaction of radiation with matter: Absorption, Spontaneous emission and Stimulated emission, Einstein coefficients and their relations, Characteristics of a laser, Population inversion, Components of a laser: active medium, pumping source, optical resonator, Construction and working of Ruby laser, He-Ne laser, Applications of lasers.

Introduction to Optical Fibers: Total internal reflection, Construction of optical fiber, Acceptance angle and Numerical aperture, Classification of optical fibers (step and graded index fibers), Block diagram of optical fiber communication system, Applications of optical fibers.

TEXT BOOKS:

1. Engineering Physics, Rajendran; McGraw Hill Education.
2. Engineering Physics by B K Pandey and S Chaturvedi; CENGAGE Learning.
3. Introduction to Classical and Quantum Computing, by Thomas G. Wong; Rooted Grove.

REFERENCE BOOKS:

1. Quantum computing: A Gentle Introduction by Rieffel and Polak; The MIT Press.
2. Introduction to Solid State Physics, Charles Kittel, John Wiley & Sons, Inc.
3. Optics, Ajoy K. Ghatak, McGraw Hill Education India.

PROGRAMMING FOR PROBLEM SOLVING

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251503	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

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

1. Write algorithms, draw flowcharts and convert them into modular C programs using variables, control structures, and loops.
2. Apply arrays and functions to design structured and reusable programs.
3. Use pointers and string manipulation techniques to develop modular C programs
4. Implement recursive solutions and create programs using structures, unions, and enumerated types.
5. Perform file handling operations and implement basic searching and sorting algorithms.

UNIT-I

Overview of C: C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Arithmetic Expressions, Formatting Numbers in Program Output.
Selection Structures: Control Structures, Conditions, if Statement, if Statements with Compound Statements, Decision Steps in Algorithms.
Loop Statements: Repetition in Programs, Counting Loops and the while Statement, Computing a Sum or Product in a Loop, for Statement, Conditional Loops, Loop Design, Nested Loops, do-while Statement.

UNIT-II

Arrays: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Multi-dimensional Arrays.
Top-Down Design with Functions: Building Programs from Existing Information, Library Functions, Top-Down Design and Structure Charts, Functions without Arguments, Functions with Arguments, Using Array Elements as Function Arguments.

UNIT-III

Pointers and Modular Programming: Pointers and the Indirection Operator, Functions with Output Parameters, Multiple Calls to a Function with Input/ Output Parameters,
Scope of Names, Formal Output Parameters as Actual Arguments.
Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings-Concatenation and Whole-Line Input, String Comparison.

UNIT-IV

Recursion: The Nature of Recursion, Tracing a Recursive Function,
Structure and Union Types: User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Union Types, Enumerated Types.

UNIT-V

Text and Binary File Pointers: Input/ Output Files, Binary Files.
Sorting and Searching: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble and Insertion algorithms).

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251302	L	T	P	C	CIE	SEE	Total
	2	0	2	3	40	60	100

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

1. Understand and apply the fundamental principles of engineering graphics.
2. Apply orthographic projections to points, lines, and planes using conventional and computer-aided methods.
3. Analyzeprojectionsandsectionalviewsofregularsolidsusingconventionaland computer-aided methods.
4. Develop surfaces of basic solids like prism, cylinder, pyramid, and cone.
5. Create isometric projections and convert between isometric and orthographic views.

UNIT–I: Introduction to Engineering Graphics (Conventional)

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

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

Principles of Orthographic Projections, Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures. Auxiliary Planes. Computer aided orthographic projections, points, lines and planes. Introduction to Computer aided drafting, views, commands and conics.

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

Auxiliary Views, Sections or Sectional views of Right Regular Solids, Prism, Cylinder, Pyramid, Cone, Auxiliary views, Computer aided projections of solids, sectional views.

UNIT–IV: Development of Surfaces (Conventional)

Prism, Cylinder, Pyramid and Cone.

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

Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple and Compound Solids, Isometric Projection of objects having non, isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice- versa, Conventions. Conversion of orthographic projection into isometric view.

TEXTBOOKS:

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

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill,3rd Edition,2019.

ELECTRICAL CIRCUITS – I

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251202	L	T	P	C	CIE	SEE	Total
	2	0	0	2	40	60	100

Course Objectives:

1. To gain knowledge in circuits and to understand the fundamentals of derived circuit laws.
2. To learn steady state analysis of single-phase and three-phase circuits.
3. To understand Theorems and concepts of magnetic coupled circuits.

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

1. Explain the fundamental network elements, laws, and basic circuit analysis methods.
2. Apply phasor representation and steady-state AC analysis techniques to solve single-phase electrical circuits.
3. Analyze balanced and unbalanced three-phase circuits, including star and delta configurations, three-phase power measurements.
4. Evaluate electrical circuits using various network theorems for both AC and DC cases to simplify complex networks and verify circuit behavior.
5. Design and model circuits involving self and mutual inductance using dot convention and coefficient of coupling for specific electrical applications.

UNIT-I:

Network Elements & Laws: Active elements- Independent and dependent sources, Passive elements- R, L and C, Energy stored in Inductance and Capacitance, Kirchhoff's laws, Source transformation, Star-Delta transformation, Node voltage method, and Mesh current method.

UNIT-II:

Single-Phase Circuits: RMS and average values of periodic sinusoidal waveforms, Phasor representation, j-Notation, Steady-state analysis of series, parallel circuits. Impedance, Admittance, Active and Reactive Powers, Complex Power.
Resonance: Series and parallel circuits, Bandwidth and Q-factor.

UNIT-III:

Three-phase Circuits: Analysis of balanced and unbalanced three-phase circuits, Star and delta connections, Measurement of three-phase power for balanced and unbalanced loads.

UNIT-IV:

Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorems, Maximum power transfer theorem, Tellegen's theorem, Compensation theorem, Millman's theorem and Reciprocity theorem. (AC & DC).

UNIT-V:

Magnetic Coupled circuits: Concept of self and mutual inductance, Dot convention, Coefficient of coupling, Analysis of circuits with mutual inductance.

TEXTBOOKS:

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGrawHill, 5th Edition, 2017.

Online Recourses:

1. https://nptel.ac.in/courses/108/104/108104139/
2. https://nptel.ac.in/courses/108/106/108106172/

ENGLISH FOR SKILL ENHANCEMENT

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251001	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

Course Objectives: This course will enable the students to:

1. Improve their vocabulary.
2. Use appropriate sentence structures in their oral and written communication.
3. Develop their reading and study skills.
4. Equip students to write paragraphs, essays, précis and draft letters.
5. Acquire skills for Technical report writing.

Course Outcomes:

Students will be able to:

1. Choose appropriate vocabulary in their oral and written communication.
2. Demonstrate their understanding of the rules of functional grammar and sentence structures.
3. Develop comprehension skills from known and unknown passages.
4. Write paragraphs, essays, précis and draft letters.
5. Write abstracts and reports in various contexts.

UNIT –I

Theme : Perspectives

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

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

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

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

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

UNIT–II

Theme : Digital Transformation

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

Vocabulary : Homophones, Homonyms and Homographs

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

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

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

UNIT–III

Theme : Attitude and Gratitude

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

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

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

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

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

UNIT–IV

Theme : Entrepreneurship

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

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

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

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

Writing : Writing Practices-Note Making-Précis Writing.

UNIT–V

Theme : Integrity and Professionalism

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

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

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

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

Writing : Report writing-Technical Reports-Introduction–Characteristics of Report –

Categories of Reports Formats- Structure of Reports (Manuscript Format)-

Types of Reports- Writing a Technical Report.

TEXTBOOKS:

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

REFERENCE BOOKS:

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

ADVANCED ENGINEERING PHYSICS LAB

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251082	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

Course Objectives:

1. To enable students to determine fundamental physical constants and material parameters using modern physics experiments.
2. To provide practical exposure to optical phenomena such as interference, diffraction, and dispersion using precision instruments.
3. To develop skills in the characterization of semiconductor devices including LEDs, photodiodes, and solar cells.
4. To impart knowledge and hands-on experience with laser-based measurements.
5. To familiarize students with optical fiber parameters and loss measurements, and strengthen skills in data analysis, interpretation, and reporting.

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

1. Determine fundamental constants such as Planck's constant and the energy gap of a semiconductor.
2. Analyze the optical phenomena including interference, diffraction, and dispersion through experimental study.
3. Evaluate the electrical and optical characteristics of semiconductor devices such as LEDs, photodiodes, and solar cells.
4. Demonstrate working knowledge of lasers through wavelength determination using single-slit and diffraction grating methods.
5. Determine the numerical aperture and bending losses of optical fibers, and apply scientific methods for accurate data collection and reporting.

List of Experiments:

1. Determination of work function and Planck's constant using the photoelectric effect.
2. Determination of the energy gap of a semiconductor.
3. Determination of the radius of curvature of a plano-convex lens by forming Newton's rings.
4. Determination of the wavelength of a given monochromatic light source using a plane diffraction grating.
5. Determination of the dispersive power of a given prism.
6. Determination of the operating point for maximum efficiency of a given LED.
7. Determination of the operating point of a photodiode under varying illumination levels
8. Determination of the optimum load for maximum power output of a given solar cell.
9. (a) Determination of the wavelength of a laser using a single slit.
   (b) Determination of the wavelength of a laser using a diffraction grating (N-slits).
10. (a) Determination of the numerical aperture of a given optical fiber.
    (b) Determination of the bending losses in a given optical fiber.

Note: Any 8 experiments are to be performed.

TEXTBOOKS:

1. Laboratory Manual of Engineering Physics, Aparna and K. Venkateswara Rao, V.G.S. Publishers.

PROGRAMMING FOR PROBLEM SOLVING LAB

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251583	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

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

1. Apply algorithms, flowcharts, and control structures to solve numeric and expression-based problems in C.
2. Develop programs using arrays, pointers, and functions to perform computations and implement modular solutions.
3. Implement string manipulation operations and apply file handling techniques for data processing in C.
4. Design and test programs using user-defined functions and apply structured programming principles for problem solving.
5. Implement sorting & searching techniques and analyze their efficiency through programming.

PRACTICE SESSIONS:

Simple numeric problems:

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

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

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

5x1=5
5x2=10
5x3=15

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

Expression Evaluation:

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

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

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

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

Arrays, Pointers, and Functions:

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

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices ii) Multiplication of Two Matrices.

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

Files:

a) Write a C program that copies one file to another, replacing all lowercase characters with their uppercase equivalents.
b) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Strings:

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

Sorting and Searching:

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

TEXTBOOKS:

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

REFERENCE BOOKS:

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

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251081	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

Course Objectives:

Listening Skills:

1. To enable students, develop their active listening kills
2. To equip students with necessary training in listening, so that they can comprehend the speech of people from different linguistic backgrounds

Speaking Skills:

3. To improve their pronunciation and neutralize accent
4. To enable students express themselves fluently and appropriately
5. To practice speaking in social and professional contexts

Course Outcomes: Students will be able to:

1. Listen actively and identify important information in spoken texts
2. Interpret the speech and infer the intention of the speaker
3. Improve their accent for intelligibility
4. Speak fluently with clarity and confidence
5. Use the language in real life situations

Exercise-I

CALL Lab:

Instruction: Speech Sounds- Listening Skill-Importance – Purpose- Types-Barriers- Active Listening
Practice: Listening to Distinguish Speech Sounds (Minimal Pairs)-*Testing Exercises*

ICS Lab:

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

Instruction: Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others
Practice: Any Ice-Breaking Activity

Exercise–II

CALL Lab:

Instruction: Listening vs. Hearing-Barriers to Listening

Practice: Listening for General Information - Multiple Choice Questions - *Listening*

ICS Lab:

Instruction: Features of Good Conversation–Strategies for Effective Communication
Practice: Role Play Activity-Situational Dialogues –Expressions used in Various Situations – Making Requests and Seeking Permissions—Taking Leave- Telephone Etiquette

Exercise-III

CALL Lab:

Instruction: Errors in Pronunciation– Tips for Neutralizing Mother Tongue Influence(MTI)
Practice: Differences between British and American Pronunciation –*Listening Comprehension Exercises*

ICS Lab:

Instruction: Describing Objects, Situations, Places, People and Events
Practice: Picture Description Activity– Looking at a Picture and Describing Objects, Situations, Places, People and Events

Exercise–IV CALL Lab:

Instruction: Techniques for *Effective* Listening

Practice: Listening for Specific Details-Listening-Gap Fill Exercises-*Listening Comprehension Exercises*

ICS Lab:

Instruction: How to Tell a Good Story –Story Star-Sequencing-Creativity
Practice: Activity on Telling and Retelling Stories-Collage

Exercise–V

CALL Lab:

Instruction: Identifying the literal and implied meaning
Practice: Listening for Evaluation –Write the Summary–Listening Comprehension Exercises

ICS Lab:
Instruction: Understanding Non-Verbal Communication
Practice: Silent Speech-Dumb Charades Activity

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

Suggested Software:

- Cambridge Advanced Learners 'English Dictionary with CD.
- Grammar Made Easy by Darling Kindersley.
- Punctuation Made Easy by Darling Kindersley.
- Oxford Advanced Learner's Compass, 10th Edition.
- English in Mind (Series1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
- English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).

REFERENCE BOOKS:

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

MATHEMATICS II (ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS)

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252002	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

Course Objectives: To learn

1. Methods of solving the differential equations of first and higher order.
2. Concept, properties of Laplace transforms.
3. Solving ordinary differential equations using Laplace transforms techniques.
4. The physical quantities involved in engineering field related to vector valued functions
5. The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course outcomes: After learning the contents of this paper, the student must be able to

1. Apply the concept of first order differential equations to solve real world problems
2. Solve higher differential equation and apply the concept of differential equation to real world problems.
3. Use the Laplace Transforms techniques for solving Ordinary Differential Equations.
4. Apply the concepts of vector differentiation to compute gradient, divergence, and curl, and interpret their physical significance in engineering problems.
5. Evaluate line, surface, and volume integrals, and apply vector integration theorems such as Green's, Gauss's, and Stokes's to solve engineering problems.

UNIT-I: First Order Ordinary Differential Equations

Exact differential equations – Equations reducible to exact differential equations – linear and Bernoulli's equations – Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling — Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order

Higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, $\sin ax$, $\cos ax$, polynomials in x, $e^{ax}V(x)$ and $x\,V(x)$ – Method of variation of parameters.

UNIT-III: Laplace Transforms

Laplace Transforms: Laplace Transform of standard functions — First and second shifting theorems — Laplace transforms of functions multiplied by 't' and divided by 't' — Laplace transforms of derivatives and integrals of function — Evaluation of integrals by Laplace transforms — Laplace transform of periodic functions — Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions — Gradient — Directional derivatives — Divergence — Solenoidal Vector — Curl — Irrotational vectors – Vector Identities.

UNIT-V: Vector Integration

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

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

ENGINEERING CHEMISTRY

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252004	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

Course Objectives:

1. To understand the industrial significance of water treatment, fundamental principles of battery chemistry, and the impact of corrosion along with its control methods for structural protection.
2. To impart foundational knowledge of various energy sources and their practical applications in engineering.
3. To equip students with an understanding of biosensors, and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

Course Outcomes:

1. **Identify** and **explain** the fundamental properties of water and its applications in domestic and industrial systems.
2. **Describe** the principles of electrochemical processes and **demonstrate** basic methods of corrosion prevention.
3. **Explain** the working of batteries and energy sources and **analyze** their relevance in engineering and entrepreneurial applications.
4. **Define** and **classify** polymers and other engineering materials based on their structure, properties, and applications.
5. **Apply** the principles of material properties and **analyze** analytical techniques for engineering and environmental problem-solving.

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

Introduction- Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation - Nalgonda technique. Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis.

UNIT-II: Electrochemistry and Corrosion: [8]

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

Corrosion: Introduction- Definition, causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Types of corrosion: galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion - Nature of the metal (Position of metal in galvanic series, Purity of metal, Nature

of corrosion product), Nature of the corroding environment (Temperature, Humidity, and pH). Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods.

UNIT–III: Energy sources: [8]

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air and Lithium-ion battery. Fuel Cells – Differences between a battery and a fuel cell, Construction and applications of Direct Methanol Fuel Cell (DMFC).
Fuels: Introduction, classification and characteristics of a good fuel, Calorific value – Units - HCV, LCV- Dulongs formula - Numerical problems.
Fossil fuels: Introduction, Petroleum - Refining of Crude oil, Cracking - Types of cracking - Moving bed catalytic cracking. LPG and CNG composition and uses.
Synthetic Fuels: Fischer-Tropsch process, Introduction and applications of Hythane and Green Hydrogen.

UNIT - IV: Polymers: [8]

Definition - Classification of polymers: Based on origin and tacticity with examples – Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization. Plastics, Elastomers and Fibers: Definition, preparation, properties and applications of PVC, Buna-S, Nylon-6,6. Differences between thermoplastics and thermo setting plastics, Fiber reinforced plastics (FRP).
Conducting polymers: Definition and Classification with examples - Mechanism of conduction in transpoly-acetylene and applications of conducting polymers.
Biodegradable polymers: Polylactic acid and its applications.

UNIT-V- Engineering Materials: [8]

Lubricants: Definition and Characteristics of a good lubricant- thin film mechanism of lubrication, properties of lubricants- viscosity, cloud and pour point, flash and fire point.
Biosensor - Definition, Classification, Amperometric Glucose monitor sensor.
Interpretative spectroscopic applications of UV-Visible spectroscopy for Analysis of pollutants in dye industry, IR spectroscopy in night vision-security, Pollution Under Control- CO sensor (Passive Infrared detection),

TEXT BOOKS:

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

REFERENCE TEXT BOOKS:

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
5. E-Content- https://doi.org/10.1142/13094 | October 2023
6. E-books: https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u

DATA STRUCTURES ESSENTIALS

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252502	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

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

1. Ability to select the data structures that efficiently model the information in a problem.
2. Understand the concepts of stacks and Queue with their applications
3. Examine various types of binary trees and its operations
4. Analyze the concepts of graph with real time applications
5. Outline the concepts of hashing and collision with their resolution techniques

UNIT-I

Introduction to Data Structures: Basic Terminology, Classification of Data Structures, Representation of Data Structures, abstract data types, Linear list - Introduction, singly linked list, Doubly Linked List.

UNIT-II

Linear Data Structures: Stacks - Operations, Stack algorithm, Stack ADT, Stack applications, Queues - operations, Queue Algorithm, Queue ADT, Queue Applications.

UNIT-III

Trees: Introduction, Types of Trees, Representation of Tree, traversing a Binary Tree.
Binary Search Trees (BST): BST Operations - Searching, Insertion and Deletion, BST ADT, BST Applications.
Multi-way Search Trees: Introduction, B Trees and B+ Trees – Properties, . B Trees Vs B+ Trees

UNIT-IV

Graphs: Introduction, Directed Graphs, Bi connected components, Representation of Graphs, Graph Traversal Algorithms, Applications of Graphs.

UNIT-V

Hashing and Collision: Introduction, Hash Tables, Hash Functions, Different Hash Functions - Division Method, Multiplication Method, Mid-square Method, Folding Method; **Collisions:** Collision Resolution by Open Addressing, Collision Resolution by Chaining.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

PYTHON PROGRAMMING

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252503	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

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

1. Write Python programs using variables, operators, expressions and control structures.
2. Implement Python programs using built-in data structures like lists, tuples, sets, and dictionaries.
3. Apply modular and object-oriented programming principles in Python.
4. Handle files, exceptions, and apply Python libraries for problem-solving.
5. Develop small-scale applications in Python for automation and data manipulation.

UNIT-I Introduction to Python and Basics of Programming

Introduction to Python: Features, Applications, Installation, IDEs, Python Syntax, Indentation, Comments, Variables, Data Types, Type Casting.
Operators: Arithmetic, Relational, Logical, Assignment, Membership, Identity, Bitwise. **Input/Output functions:** input(), print().
Control Structures: if, if-else, if-elif-else, Nested Conditions.
Looping: for, while, Nested Loops, break, continue, pass.

UNIT-II Data Structures in Python

Strings: Creation, Indexing, Slicing, Methods, String Formatting.
Lists: Creation, Indexing, Slicing, List Comprehension, Methods.
Tuples: Properties, Indexing, Methods.
Sets: Creation, Operations, Methods.
Dictionaries: Creation, Access, Methods, Dictionary Comprehension, Iterating over data structures.

UNIT-III Functions and Modules

Functions: Defining, Calling, Parameters, Return Values, Types of Arguments – Positional, Keyword, Default, Variable Length, Scope of Variables – Local and Global, Lambda Functions, Map, Filter, Reduce, Recursion.
Modules and Packages: Importing, Creating User-defined Modules, Standard Modules (math, random, datetime), Packages in Python.

UNIT-IV File Handling and Exception Handling

File Handling: Opening, Reading, Writing, Appending, File Modes, File Methods, Working with CSV and JSON Files.
Exception Handling: try, except, else, finally, Built-in Exceptions, Raising Exceptions. Introduction to Regular Expressions (re module).

UNIT-V Object-Oriented Programming and Applications

OOP Basics: Classes, Objects, Attributes, Methods, Constructor (**init**), self keyword. **Inheritance:** Single, Multiple, Multilevel, Hierarchical, Method Overriding, Method Overloading (conceptual), Encapsulation and Polymorphism.
Application Development: Data Processing Script, Basic Calculator, File Organizer, Simple Data Analysis with pandas.

TEXTBOOKS:

1. Python Programming: Using Problem Solving Approach by Reema Thareja.
2. Python Crash Course by Eric Matthes, Learning Python by Mark Lutz.

REFERENCE BOOKS:

1. Introduction to Python Programming by Gowrishankar S., Veena A.
2. Python Cookbook by David Beazley and Brian K. Jones.
3. Fluent Python by Luciano Ramalho, Automate the Boring Stuff with Python by Al Sweigart.

ELECTRICAL CIRCUITS – II

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252202	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

Course Objectives:

1. To study the transient and steady state analysis of RL, RC and RLC circuits (Series and Parallel)
2. To understand the applications of Laplace transform.
3. To learn about two-port networks and concept of filters.

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

1. Explain the significance of initial conditions in R, L, and C elements, and transient responses of series and parallel RL, RC, and RLC circuits.
2. Apply Laplace Transform techniques to determine transient responses of series and parallel RL, RC, and RLC circuits
3. Analyze electrical networks using graph theory concepts including graph theory
4. Evaluate two-port network parameters (Z, Y, ABCD, h) and their inter-relationships
5. Design and classify different types of filters for specified frequency characteristics.

UNIT-I:

Transient analysis:

Significance of Initial conditions of R, L and C elements

Transient response of series RL, RC and RLC circuits using integro-differential approach for DC and Sinusoidal excitations.

Transient response of parallel RL and RC circuits using integro-differential approach for DC and Sinusoidal excitations.

UNIT-II:

Electrical circuit Analysis using Laplace Transforms:

Laplace Transforms of step, ramp, exponential, impulse functions (inputs)

Transient response of series RL, RC and RLC circuits using Laplace Transforms approach for DC and Sinusoidal excitations.

Transient response of parallel RL and RC circuits using Laplace Transforms approach for DC and Sinusoidal excitations.

UNIT-III:

Network Topology

Graph, tree, chord, Tie-set, cut-set, incident matrices, Problems on Tie-set and cut-set matrices.

UNIT-IV:

Two port network parameters: Open circuit impedance, short-circuit admittance, Transmission, Hybrid parameters & inter-relationships, Series, parallel and cascade connection of two port networks.

UNIT-V:

Filters: Classification of filters – Low pass, High pass, Band pass and Band Elimination, Elementary treatment of Constant-k and M-derived filters-Low pass and High pass Filters, Band pass and Band elimination filters

TEXTBOOKS:

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W. Nilsson, Susan A.Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGrawHill, 5th Edition, 2017.

Online Resourses:

1. https://nptel.ac.in/courses/108/104/108104139/
2. https://nptel.ac.in/courses/108/106/108106172/
3. https://www.digimat.in/nptel/courses/video/108105159/L01.html
4. https://www.digimat.in/nptel/courses/video/108102042/L01.htm

ENGINEERING WORKSHOP

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252381	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

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

1. Understanding the tools and methods of using to fabricate Engineering Components.
2. Applying the methods to read and interpret work shop drawings.
3. Evaluating various methods and trades of workshop in the component building.

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1. TRADESFOREXERCISES:

At least two exercises from each trade:

I. Carpentry: T-Lap Joint, Dovetail Joint, Mortise and Tenon Joint
II. Fitting: V-Fit, Dovetail Fit and Semi-circular fit
III. Tin Smithy: Square Tin, Rectangular Tray and Conical Funnel
IV. Foundry: Preparation of Green S and Mould using Single Piece and Split Pattern
V. Welding Practice: Arc Welding and Gas Welding
VI. House wiring: Parallel and Series, Two-way Switch and Tube Light
VII. Lathe: Facing and Step Turning

2. TRADESFORDEMONSTRATIONANDEXPOSURE:

Plumbing, Machine Shop, Power tools in construction and Wood Working

TEXTBOOKS:

1. Elements of Workshop Technology, Hajra Choudhury S. K., Hajra Choudhury A. K. and Nirjhar Roy S.K., Vol.I 2008andVol.II2010, Media promoters and publishers private limited, Mumbai.
2. Workshop Practice Manual, K. Venkata Reddy, BS Publication,6th Edition, Rpt.2025.

REFERENCE BOOKS:

1. Workshop Manual, K. Venugopal, Anuradha Publications,2012thedition,2012

ENGINEERING CHEMISTRY LAB

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252083	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

Course Objectives:

1. Students will understand and perform experiments based on core chemical principles relevant to engineering applications.
2. Students will learn to estimate the hardness of water to assess its suitability for drinking purposes.
3. Students will acquire the ability to perform acid-base titrations using instrumental methods such as conductometry and potentiometry.
4. Students will gain hands-on experience in synthesizing polymers like Thiokol rubber in the laboratory.

Course Outcomes:

1. Determine water quality parameters and lubricant properties through volumetric and viscometric methods, and analyze their relevance in industrial applications.
2. Apply electrochemical techniques such as conductometry and potentiometry to estimate concentrations of acids and assess chemical reactions.
3. Examine the corrosion behavior of metals under various conditions and evaluate the effect of inhibitors on corrosion rate.
4. Illustrate the synthesis and applications of advanced materials like Thiokol rubber, fuel cells, and smart biomedical materials using real and virtual lab tools.

List of Experiments:

1. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
2. Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.
3. Estimation of the concentration of strong acid by Conductometry.
4. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.
5. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone
6. Preparation of Thiokol rubber.
7. Estimation of acid value of given lubricant oil.
8. Estimation of viscosity of lubricant oil using Ostwald's Viscometer.
9. Construction of Fuel cell and it's working. (Virtual lab)
10. Smart materials for Biomedical applications (Virtual lab)

REFERENCE BOOKS:

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

DATA STRUCTURES ESSENTIALS LAB

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252582	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

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

1. Develop C programs to perform various operations on linked list.
2. Implement stacks and queues using static and dynamic representation.
3. Design binary trees and its operations.
4. Develop programs on graph traversal
5. Implement programs on hashing techniques

List of Experiments

1. Write a program that uses functions to perform the following operations on a singly linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on a doubly linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that implements a stack (its operations) using:
   i) Arrays ii) Linked Lists
4. Write a program that implements a queue (its operations) using:
   i) Arrays ii) Linked Lists
5. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
6. Write a program to implement Binary Search tree
7. Write a program to implement the graph traversal methods.
8. Write a program to implement the following Hash Functions:
   i) Division Method ii) Multiplication Method

TEXT BOOKS:

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

REFERENCE BOOKS:

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

PYTHON PROGRAMMING LAB

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252583	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

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

1. Develop application-specific codes using Python.
2. Understand strings, lists, tuples, and dictionaries in Python.
3. Write programs using functions and modules.
4. Illustrate file I/O operations, and Exception Handling.
5. Apply different data visualization using Python standard libraries.

Note: The lab experiments will be like the following experiment examples.

List of Experiments

1. I. Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.

   II. Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a calculator.
3. Write a program to calculate compound interest when principal, rate and number of periods are given.
4. Read the name, address, email and phone number of a person through the keyboard and print the details.
5. Print the below triangle using a for loop:
   ```
   5
   44
   333
   2222
   11111
   ```
6. Write a program to check whether the given input is a digit or a lowercase character or an uppercase character or a special character (use 'if-else-if' ladder).
7. Python program to print all prime numbers in a given interval (use break).
8. Write a program to convert a list and a tuple into arrays.
9. Write a program to find common values between two arrays.
10. Write a function called `palindrome` that takes a string argument and returns `True` if it is a palindrome and `False` otherwise. Remember that you can use the built-in function `len()` to check the length of a string.
11. Write a function called `is _sorted` that takes a list as a parameter and returns `True` if the list is sorted in ascending order and `False` otherwise.
12. Write a function called `has_ duplicates` that takes a list and returns `True` if there is any element that appears more than once. It should not modify the original list.
13. Write a function called `remove_ duplicates` that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
14. The word list provided `words.txt` doesn't contain single letter words. So you might want to add "I", "a", and the empty string.

15. Write a python code to read dictionary values from the user. Construct a function to invert its content i.e., keys should be values and values should be keys.
16. Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
17. Remove the given word in all the places in a string ?
18. Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lowercase without using a built-in function ?
19. Write a recursive function that generates all binary strings of n-bit length.
20. Write a python program that defines a matrix and prints it.
21. Write a python program to perform multiplication of two square matrices.
22. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
23. Use the structure of exception handling in all general-purpose exceptions.
24. Write a python code to read a phone number and an email id from the user and validate it for correctness.
25. Write a Python code to merge two given file contents into a third file.
26. Write a Python code to open a given file and construct a function to check for given words present in it and display if found.
27. Write a Python code to read text from a text file, find the word with the most number of occurrences.
28. Write a function that reads a file and displays the number of words, number of vowels, blank spaces, lowercase letters and uppercase letters.
29. Import numpy, Plotpy and Scipy and explore their functionalities.
30. Install NumPy package with pip and explore it.
31. Write a program to implement Digital Logic Gates-AND, OR, NOT, EX-OR.
32. Write a GUI program to create a window with two text labels, two text fields and two buttons as Submit and Reset.

TEXT BOOKS:

1. Super charged Python: Take your code to the next level, Overland
2. Learning Python, MarkLutz, O'reilly

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming: A Modular Approach with Graphics, Database, Mobile and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Introduction to Python Programming, Gowrishankar S, Veena A, CRC Press
4. Programming with Python: A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Python for Data Science, Dr. Mohd Abdul Hameed, Wiley publications
6. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech press
7. Introduction to Python, Gowrishankar S, Veena A, CRC Press

ELECTRICAL CIRCUITS LAB

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252282	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

Course Objectives:

1. To design electrical systems and analyze them by applying various Network Theorems
2. To measure three phase Active and Reactive power.
3. To understand the concept of resonance.

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

1. Explain the basic electrical laws, network theorems, and fundamental circuit parameters through experimental setups.
2. Perform measurements of voltage, current, resistance, and power in AC/DC circuits using appropriate instruments and standard procedures.
3. Analyze experimental data to verify Kirchhoff's laws, network theorems, resonance conditions, and parameter determinations in electrical circuits.
4. Evaluate circuit performance by comparing experimental results with theoretical calculations for different load conditions and circuit configurations.
5. Design and conduct experiments to determine advanced circuit parameters, such as Z, Y, Transmission, and Hybrid parameters, and interpret their practical significance.

Any Ten experiments should be conducted

1. Measurement of Voltage, Current and Equivalent Resistance of Various Circuits and verification of Kirchhoff's laws.
2. Verification of Thevenin's Theorem & Verification of Norton's Theorem.
3. Verification of Maximum Power Transfer Theorem on DC Excitation for different loads (R, RL).
4. Verification of Compensation Theorem &Verification of Superposition theorem.
5. Verification of Reciprocity Theorem &Verification Millmann's Theorem.
6. Resonance in series, parallel R L and R C Circuits.
7. Determination of Self-inductance, Mutual inductance and Coefficient of coupling

8. Current locus Diagrams of RL and RC Series Circuits
9. Determination of Z & Y Parameters
10. Determination of Transmission & Hybrid Parameters.
11. Measurement of Active power for balanced loads.
12. Measurement of Reactive power for balanced loads

TEXT BOOKS:

1. Van Valkenburg M.E, "Network Analysis", Prentice Hall of India, 3rd Edition, 2000.
2. Ravish R Singh, "Network Analysis and Synthesis", McGrawHill, 2nd Edition, 2019.

REFERENCE BOOKS:

1. B. Subramanyam, "Electric Circuit Analysis", Dreamtech Press & Wiley, 2021.
2. James W.Nilsson, Susan A. Riedel, "Electric Circuits", Pearson, 11th Edition, 2020.
3. A Sudhakar, Shyammohan S Palli, "Circuits and Networks: Analysis and Synthesis", McGrawHill, 5th Edition, 2017.

Online Resourses:

1. https://nptel.ac.in/courses/108/104/108104139/
2. https://nptel.ac.in/courses/108/106/108106172/
3. https://ocw.mit.edu/search/ocwsearch.htm?qlaboratory