

DEPARTMENT OF HUMANITIES & SCIENCES

ACADEMIC REGULATIONS & SYLLABI (R-25)

B. Tech I Year **(Electronics & Communication 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
(Electronics & Communication Engineering)
Semester – I

S. No	Course Code	Course Title	L	T	P	Credits
1	A251002	Mathematics-I (Matrices and 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	A251201	Basic Electrical Engineering	2	0	0	2.0
5	A251001	English for Skill Enhancement	3	0	0	3.0
6	A251082	Advanced Engineering Physics Lab	0	0	2	1.0
7	A251583	Programming for Problem Solving Lab	0	0	2	1.0
8	A251081	English Language & Communication Skills Lab	0	0	2	1.0
9	A251281	Basic Electrical Engineering Lab	0	0	2	1.0
10		Induction Program				
Total			14	01	08	19

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	A252402	Network Analysis & Synthesis	3	0	0	3.0
6	A252381	Engineering Work Shop	0	0	2	1.0
7	A252302	Engineering Drawing and computer aided drafting	2	0	2	3.0
8	A252083	Engineering Chemistry Lab	0	0	2	1.0
9	A252582	Data Structures Essentials Lab	0	0	2	1.0
10	A252584	Applied Python Programming Lab	0	0	2	1.0
Total			17	0	10	22

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 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, 9th Edition, 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 a 1-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
	3	0	0	3	40	60
						Total
						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.

BASIC ELECTRICAL ENGINEERING

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251201	L	T	P	C	CIE	SEE	Total
	2	0	0	2	40	60	100

Course Objectives:

1. To understand DC and Single & Three phase AC circuits
2. To study and understand the different types of DC, AC machines and Transformers.
3. To import the knowledge of various electrical installations and the concept of power, power factor and its improvement.

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

1. Explain basic principles of electrical elements.
2. Apply the concepts of AC circuits to various elements and combinations.
3. Examine principle and tests of transformer.
4. Contrast the working of DC machines and induction motors.
5. Assess working principle of AC generator and electrical installations.

UNIT-I:

D.C. Circuits: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin's and Norton's Theorems – simple problems.

UNIT-II:

A.C. Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase series ac circuits consisting of R, L, C, RL, RC, RLC combinations – simple problems, resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III:

Transformers: Construction and working of Single-Phase Transformer, Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Working Principle and applications of Auto-transformer.

UNIT-IV:

Electrical Machines: Construction of DC Machine, working principle of DC Motor, performance characteristics of DC Shunt motor. Construction and working of a Three-phase induction motor – Torque – Speed Characteristics, Construction and working of Single-phase induction motor, Construction and working of Three Phase Alternator – No Load Characteristics.

UNIT-V:

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, battery backup.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, “Basic Electrical Engineering”, S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009
M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1st Edition,

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
	0	0	2	1	40	60
						Total
						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:
 $5 \times 1 = 5$
 $5 \times 2 = 10$
 $5 \times 3 = 15$
- d) Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

- a) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, % and use Switch Statement).
- b) Write a program that finds if a given number is a prime number.
- c) Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
- d) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

Arrays, Pointers, and Functions:

- a) Write a C program to find the minimum, maximum, and average in an array of integers.
- b) Write a C program that uses functions to perform the following:
 - i) Addition of Two Matrices
 - ii) Multiplication of Two Matrices.

- c) Write a program for reading elements using a pointer into an array and 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
	0	0	2	1	40	60
						Total
						100

Course Objectives:

Listening Skills:

1. To enable students, develop their active listening skills
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.

BASIC ELECTRICAL ENGINEERING LAB

Department of Humanities & Sciences					I B. Tech I Semester		
Course Code	Hours/Week			Credits	Marks		
A251281	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

Course Objectives:

1. To measure the electrical parameters for different types of DC and AC circuits using conventional and theorems approach.
2. To study the transient response of various R, L and C circuits using different excitations.
3. To determine the performance of different types of DC, AC machines and Transformers.

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

1. Explain basic principles of electrical elements.
2. Apply the concepts of AC circuits to various elements and combinations.
3. Examine principle and tests of transformer.
4. Contrast the working of DC machines and induction motors.
5. Assess working principle of AC generator and electrical installations.

Any Ten experiments should be conducted

1. Verification of Ohm's Law
2. Verification of KVL and KCL
3. Verification of Superposition theorem.
4. Verification of Thevenin's theorem
5. Verification of Norton's theorem
6. Calculations and Verification of Impedance and Current of RL and RC series circuits
7. Transient Response of Series RL and RC Circuits for DC Excitation.
8. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
9. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
10. Performance Characteristics of a DC Shunt Motor
11. Torque-Speed Characteristics of a Three-phase Induction Motor.
12. No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

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

REFERENCE BOOKS:

1. P. Ramana, M. Suryakalavathi, G.T.Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.

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, 9th Edition, 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- Dulong's 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
	3	0	0	3	40	60
						Total
						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

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
	3	0	0	3	40	60
						Total
						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.

NETWORK ANALYSIS AND SYNTHESIS

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252402	L	T	P	C	CIE	SEE	Total
	3	0	0	3	40	60	100

COURSE OUTCOMES: Upon successful completion of the course , students will be able to:

1. Analyze electrical networks and magnetic circuits using cut-set/tie-set methods and transformer concepts.
2. Evaluate transient and steady-state responses of RC, RL, and RLC circuits, including resonance.
3. Determine two-port parameters and apply them for impedance matching and attenuator design.
4. Design and classify filters, attenuators, and equalizers for given specifications.
5. Synthesize LC, RC, and RL networks using Foster and Cauer methods.

UNIT-I

Network Topology and Coupled Circuits: Basic cut set and tie set matrices for planar networks, Magnetic Circuits, Mesh Nodal analysis and review of theorems. Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT-II

Transient and Steady state analysis: RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT-III

Two port network parameters: Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions — using transformed (S) variables, Poles and Zeros. Standard T, π , L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT-IV

Filters: Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass

Attenuators: Types—T, π , L, Bridge T and lattice, Asymmetrical Attenuators T, π , L Equalizers— Types-Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers

UNIT-V

Network Synthesis: Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non-ladder networks, Poles, Zeros analysis of network functions, Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster and causer methods.

TEXTBOOKS:

1. VanValkenburg-NetworkAnalysis,3rdEd.,Pearson, 2019.
2. JDRyder-Networks,Lines andFields,2ndEd., PHI, 2015.
3. Charles K.Alexander and Matthew N.O.Sadiku-Fundamentals of Electric Circuits,6th Ed., McGraw Hill Company, 2016

REFERENCEBOOKS:

1. J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, McGraw Hills Education,1999.
2. A.Sudhakarand Shyammoan S Palli-Networks&Circuits,4thEd., TataMcGraw-Hill Publications
3. William HaytandJack E.Kimmerley-Engineering CircuitAnalysis,6thEd.,McGraw Hill Company

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.

1. TRADES FOR EXERCISES:

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. TRADES FOR DEMONSTRATION AND EXPOSURE:

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 2008 and Vol.II 2010, 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, 2012th edition, 2012

ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252302	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. Analyze projections and sectional views of regular solids using conventional and 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.

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.

APPLIED PYTHON PROGRAMMING LAB

Department of Humanities & Sciences					I B. Tech II Semester		
Course Code	Hours/Week			Credits	Marks		
A252584	L	T	P	C	CIE	SEE	Total
	0	0	2	1	40	60	100

Course Outcomes: The student will learn at the end of the course, student will be able to:

1. Install and configure Python 3, its essential packages, and work with basic Python programming constructs for problem solving.
2. Develop and use Python functions for mathematical, string, and file handling operations, applying standard libraries to solve real-world problems.
3. Apply NumPy, SciPy, and Matplotlib to perform matrix operations, data analysis, function fitting, and visualization tasks.
4. Install and configure Raspberry Pi OS, interface with GPIO pins, and control hardware components such as LEDs using Python.
5. Interface sensors with Raspberry Pi, collect and display sensor data using Python and relevant libraries.

LIST OF EXPERIMENTS:

Cycle – 1

1. Downloading and Installing Python and Modules
 - a. **Python 3 on Linux** - Follow the instructions given in the URL <https://docs.python-guide.org/starting/install3/linux/>
 - b. **Python 3 on Windows** - Follow the instructions given in the URL <https://docs.python.org/3/using/windows.html>
(Please remember that Windows installation of Python is harder!)
 - c. **pip3 on Windows and Linux** - Install the Python package installer by following the instructions given in the URL <https://www.activestate.com/resources/quick-reads/how-to-install-and-use-pip3/>
 - d. **Installing numpy and scipy** - You can install any python3 package using the command `pip3 install <packagename>`
 - e. **Installing jupyterlab** - Install from pip using the command `pip install jupyterlab`
2. **Introduction to Python3**
 - a. Printing your biodata on the screen
 - b. Printing all the primes less than a given number
 - c. Finding all the factors of a number and show whether it is a *perfect* number, i.e., the sum of all its factors (excluding the number itself) is equal to the number itself
3. **Defining and Using Functions**
 - a. Write a function to read data from a file and display it on the screen
 - b. Define a Boolean function *is palindrome*(<input>)

- c. Write a function `collatz(x)` which does the following: if x is odd, $x = 3x + 1$; if x is even, then $x = x/2$. Return the number of steps it takes for $x = 1$
- d. Write a function $N(m, s) = \exp(-(x-m)^2/(2s^2))/\sqrt{2\pi}s$ that computes the Normal distribution

4. The package **numpy**

- a. Creating a matrix of given order $m \times n$ containing *random numbers* in the range 1 to 99999
- b. Write a program that adds, subtracts and multiplies two matrices. Provide an interface such that, based on the prompt, the function (addition, subtraction, multiplication) should be performed
- c. Write a program to solve a system of n linear equations in n variables using matrix inverse

5. The package **scipy** and **pyplot**

- a. Finding if two sets of data have the same *mean* value
- b. Plotting data read from a file
- c. Fitting a function through a set of data points using *polyfit* function
- d. Plotting a histogram of a given data set

6. The strings package

- a. Read text from a file and print the number of lines, words and characters
- b. Read text from a file and return a list of all n letter words beginning with a vowel
- c. Finding a secret message hidden in a paragraph of text
- d. Plot a histogram of words according to their length from text read from a file.

Cycle -2

7. Installing OS on Raspberry Pi

- a. Installation using PiImager
- b. Installation using image file
 - Downloading an Image
 - Writing the image to an SD card
 - using Linux
 - using Windows
 - Booting up

Follow the instructions given in the URL:

<https://www.raspberrypi.com/documentation/computers/getting-started.html>

8. Accessing GPIO pins using Python

- a. Installing GPIO Zero library.
First, update your repositories list: `sudo apt update`
Then install the package for Python 3: `sudo apt install python3-gpiozero`
- b. Blinking an LED connected to one of the GPIO pin
- c. Adjusting the brightness of an LED
- d. Adjust the brightness of an LED (0 to 100, where 100 means maximum brightness) using the in-built PWM wavelength.

9. Collecting Sensor Data

- a. DHT Sensor interface
 - Connect the terminals of DHT GPIO pins of Raspberry Pi.
 - Import the DHT library using `import Adafruit_DHT`
 - Read sensor data and display it on screen.



Department of Electronics and Communication Engineering
(Accredited by NBA)

I B.Tech-I Semester

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	A251201	Basic Electrical Engineering	2	0	0	2.0
5	A251001	English for Skill enhancement	3	0	0	3.0
6	A251082	Advanced Engineering Physics Lab	0	0	2	1.0
7	A251583	Programming for Problem Solving Lab	0	0	2	1.0
8	A251081	English Language & Communication Skills Lab	0	0	2	1.0
9	A251281	Basic Electrical Engineering Lab	0	0	2	1.0
		Induction Program				
Total			14	01	08	19

I B.Tech-II Semester

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	A252402	Network Analysis & Synthesis	3	0	0	3.0
	A252381	Engineering Work Shop	0	0	2	1.0
6	A252302	Engineering Drawing and Computer Aided Drafting	2	0	2	3.0
7	A252083	Engineering Chemistry Lab	0	0	2	1.0
8	A252582	Data Structures Essentials Lab	0	0	2	1.0
9	A252584	Applied Python programming Lab	0	0	2	1.0
Total			17	0	10	22



II B.Tech-I Semester

S. No	Course Code	Course Title	L	T	P	Credits
1	A253402	Probability Theory and Stochastic Processes	3	0	0	3
2	A253403	Signals and Systems	3	0	0	3
3	A253401	Electronic Devices and Circuits	3	0	0	3
4	A253404	Digital Logic Design	3	0	0	3
5	A253405	Control Systems	2	0	0	2
6	A253005	Innovation and Entrepreneurship	2	0	0	2
7	A253482	Modelling and Simulation Lab	0	0	2	1
8	A253481	Electronic Devices and Circuits Lab	0	0	2	1
9	A253483	Digital Logic Design Lab	0	0	2	1
10	A253581	Linux and Shell Scripting	0	0	2	1
11	A253105	Environmental Science	1	0	0	1
			17	0	8	21

II B.Tech-II Semester

S. No	Course Code	Course Title	L	T	P	Credits
1	A254002	Numerical Methods and Complex Variables	3	0	0	3
2	A254402	Electromagnetic Fields and Transmission Lines	3	0	0	3
3	A254403	Analog and Digital Communications	3	0	0	3
4	A254404	Electronic Circuit Analysis	3	0	0	3
5	A254405	Linear and Digital IC Applications	3	0	0	3
6	A254081	Computational Mathematics Lab	0	0	2	1
7	A254483	Analog and Digital Communications Lab	0	0	2	1
8	A254484	Electronic Circuit Analysis Lab	0	0	2	1
9	A254485	Linear and Digital IC Applications Lab	0	0	2	1
10	A254581	Web and Mobile Applications	0	0	2	1
			15	0	10	20



PROBABILITY THEORY AND STOCHASTIC PROCESSES

II B.Tech I Semester (ECE)

Course Code: A253402

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

1. Understand the concept of random variable and its classification
2. Comprehend the significance of distribution and density functions of random variable.
3. Interpret the principle of joint random variables and computation of their statistical parameters.
4. Realize the concept of a random process and its analysis in both time and frequency domain.
5. Understand the effect of an LTI system on its random excitation and Noise

Course Outcomes:

After going through this course the student can

1. Determine the applications of various random variables based on individual Cumulative Distribution Function and Probability Density Function.
2. Compute the various statistical averages of single/multiple random variables and enumerate their significance.
3. Analyze a random variable as a function of time, with reference to its temporal and spectral characteristics.
4. Determine the effect of an LTI system on the time domain and frequency domain characteristics of the random excitation.
5. Analyze a noise in various basic Electrical and Communication System

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

UNIT-I

Probability: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events.

Random Variables: Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.



UNIT-II

Operations on Single Random Variable: Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable - Monotonic and Non-monotonic Transformations of Continuous and Discrete Random Variable, Generation of a Random Variable of a given PDF/CDF.

UNIT-III

Multiple random variables and Operations on Multiple random variables: Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution and Density Functions, Conditional Distribution and Density Functions, Statistical Independence, Sum of Two and more Random Variables, Central Limit Theorem, Equal and Unequal Distribution (Proof not expected).

Expected Value of a Function of Random Variables- Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties.

UNIT-IV

Random Processes–Temporal characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-Order and Wide- Sense Stationarity, (N-Order) and Strict-Sense Stationary, Definitions of The Time Averages and Ergodicity, Mean- Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT-V

Random processes – Spectral characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

Noise sources: Resistive / Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Basic Definitions of Narrow Band noise , Quadrature representation of narrow band noise.



TEXT BOOKS:

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles - TMH, 4th Edition
2. Murray R Spiegel, John Schiller, R Alu Srinivasan. – Probability and Statistics – Schaum's Outlines, 2nd Edition, TMH

REFERENCE BOOKS:

1. P Ramesh Babu - Probability Theory and Random Processes – McGraw Hill Education
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes – McGraw Hill Education, 4th Edition
3. K. N. Hari Bhat, K. Anitha Sheela and Jayant Ganguly - Probability Theory and Stochastic Processes for Engineers - Pearson, 1st Edition, 2011
4. Taub and Schilling - Principles of Communication systems by (TMH), 2008
5. Y Mallikarjuna Reddy - Probability Theory and Stochastic Processes, 4th Edition, University Press



SIGNALS AND SYSTEMS

II B.Tech I Semester (ECE)

Course Code: A253403

Pre-requisite: Mathematics

Course Objectives:

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI Systems, convolution and correlation properties.
3. Understand Laplace and Z-transforms and their properties for analysis of signals and systems.
4. Identify the need for sampling of CT signals, types and merits and demerits of each type.

Course Outcomes:

After going through this course the student can

1. Analyze and classify signals and systems using vector space concepts, orthogonality, and standard signal representations.
2. Represent and analyze continuous-time signals using Fourier series and Fourier Transform techniques.
3. Analyze signal transmission through linear systems using convolution, transfer functions, and bandwidth concepts.
4. Apply Laplace Transform and correlation techniques to analyze continuous-time signals and systems.
5. Apply sampling theorem and Z-Transform techniques for analysis of continuous-time and discrete-time signals.

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

UNIT - I

Signal Analysis: Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT - II

Fourier series: Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier



Series, Complex Fourier spectrum.

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT – III

Signal Transmission through Linear Systems: Linear System, Impulse response, Response of a Linear System, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution. Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time.

UNIT – IV

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Correlation: Auto Correlation and Cross Correlation Functions, Relation between Convolution and Correlation, Properties of Correlation Functions

UNIT – V

Sampling theorem: Graphical and analytical proof of Sampling Theorem for Base band/Band Limited Signals and Band Pass Signals, Types of Sampling: Impulse Sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing.

Z-Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS:

1. Lathi B P, Signals, Systems & Communications, B.S. Publications, 2003.
2. Alan V. Oppenheim, Alan S. Willsky, Syed Hamid Nawab , Signals and Systems, Prentice Hall India, 1997

REFERENCE BOOKS:

1. Simon S. Haykin, Barry Van Veen , Signals and Systems, Wiley, 2003
2. Rama Krishna Rao A, Signals and Systems, 2008, Tata McGraw Hill, 2008.



ELECTRONIC DEVICES AND CIRCUITS
(Common for ECE & EEE)

II B.Tech I Semester

Course Code: A253401

L	T	P	C
3	0	0	3

Course Overview:

This course introduces fundamental semiconductor devices and their behavior, including diodes, BJTs, and FETs. It covers their characteristics, applications, and the analysis of basic electronic circuits. The course also explores rectifiers, voltage regulation, amplifier design, and advanced semiconductor technologies like FinFETs and CNTFETs. Emphasis is placed on developing a strong foundation for analog circuit design and understanding modern device technologies in electronics

Course Outcomes:

After going through this course the student can

1. Analyze the electrical characteristics and models of semiconductor diodes and apply them in rectifier and clipping circuits.
2. Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) & Field Effect Transistors and analyze their input and output characteristics.
3. Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications.
4. Analyze transistor amplifier circuits using small signal models and assess performance for various configurations.
5. Analyze the structure and working of Special purpose diodes and advanced devices like FinFETs and CNTFETs

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

UNIT - I:

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

UNIT - II:

Bipolar Junction Transistor (BJT): Structure and working principle of BJT, Current components and transistor action, Configurations: Common Base (CB), Common Emitter



(CE), Common Collector (CC), Input and output characteristics, Determination of h-parameters from transistor characteristics.

Field Effect Transistors (FET): JFET: Structure, operation, and characteristics, MOSFET: Enhancement and Depletion modes — Structure, operation and characteristics.

UNIT - III:

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

UNIT - IV:

Transistor Amplifiers: Transistor as a small-signal amplifier, h-parameter equivalent circuit, CE, CB, CC amplifier analysis using h-parameters, Approximate h parameter model for CE amplifier.

FET Amplifiers: FET Small Signal Model, Analysis of CS, CD, CG JFET Amplifiers.

UNIT - V:

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

Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET.

TEXT BOOKS:

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

REFERENCE BOOKS:

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



DIGITAL LOGIC DESIGN

II B.Tech I Semester (ECE)

Course Code: A253404

Course Overview:

This course introduces students to the fundamental principles of digital logic design. Starting from Boolean algebra and its simplification techniques, it covers the formal analysis and design of combinational and sequential circuits. Additionally, the course addresses memory elements and programmable logic devices, which are essential building blocks for complex digital systems.

Course Outcomes:

After going through this course the student can

1. Apply number systems, codes, and logic gates in digital system design
2. Minimize Boolean functions using K-maps and implement using logic gates.
3. Design and analyze combinational logic circuits.
4. Design and analyze sequential logic circuits.
5. Analyze Moore and Mealy machines and explain memory & PLDs.

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

UNIT-I:

Number Systems: Binary, Octal, Decimal, Hexadecimal, Fixed-point and Floating-point Number Representations, Complements of Numbers: 1's and 2's Complement, Error Detection and Correction Codes: Parity Check, Hamming Code.

Boolean Algebra and Logic Gates: Axiomatic definitions, basic theorems and properties, Boolean Functions: Canonical and standard forms, Digital Logic Gates Overview.

UNIT-II:

Gate-Level Minimization Techniques: Karnaugh maps: 2, 3, and 4 variables, Sum-of-products (SOP) and product-of-sums (POS) simplification, Don't care conditions, Implementation using NAND and NOR gates.

UNIT-III:

Combinational Logic Circuits: Analysis and design procedures, Binary adder-subtractor and BCD adder, magnitude comparator, decoders, encoders, multiplexers and demultiplexers.



UNIT-IV:

Sequential Logic Circuits: Gated latches, Flip-flops: Clocked S-R, D, T, JK, Master-Slave JK, Flip-Flop Conversions, Design of synchronous and asynchronous counters, Shift registers: types and applications.

UNIT-V:

Synchronous Sequential Logic Moore and Mealy state machines, State diagrams, state tables, and state reduction, Case studies: sequence detector, traffic light controller, vending machine.

Programmable Logic Devices: Memory devices - RAM, ROM, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL)

TEXT BOOKS:

1. M. Morris Mano, Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, 6th Edition, Pearson Education/PHI, 2017.

REFERENCE BOOKS:

1. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, Digital Systems: Principles and Applications, 10th Edition, Pearson Education.
2. Charles H. Roth Jr., Larry L. Kinney, Fundamentals of Logic Design, 6th Edition, Cengage Learning.



CONTROL SYSTEMS

II B.Tech I Semester (ECE)

Course Code: A253405

L	T	P	C
2	0	0	2

Pre-Requisites:

Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable Calculus
Laplace Transforms, Numerical Methods and Complex variables

Course Objectives:

1. To introduce the fundamental concepts, classifications, and mathematical modeling of control systems for mechanical and electrical domains.
2. To analyze control system behaviour in time and frequency domains and stability criteria using root locus, Bode plot, Nyquist plot, etc.
3. Design and evaluate compensators and controllers to improve system performance.
4. Explain state-space representation, solution of state equations, and assess system controllability and observability.

Course Outcomes:

After going through this course the student can

1. Describe open- and closed-loop systems, and develop mathematical models using block diagrams and signal flow graphs.
2. Analyze the time-domain response of control systems, evaluate transient and steady-state performance, and apply PID controllers to improve system behavior..
3. Determine the stability of control system using Routh-Hurwitz Criterion and root locus technique and assess the effects of poles and zeors on system performance.
4. Analyse frequency response plots including Bode, Polar, and Nyquist plots and investigate system stability.
5. Apply the state-variable approach and analyze controllability and observability.

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

UNIT - I

Control System fundamentals: Classification of control systems, Open and Closed loop systems. Mathematical modelling of Translational and Rotational mechanical systems, Block diagram reduction and Signal flow graphs.



UNIT - II

Time response Analysis: Transfer function and Impulse response, types of input. Transient response of second order system for step input. Time domain specifications. Types of systems, static error coefficients, Effects of proportional derivative, proportional integral systems and PID controllers, Application of Proportional, Integral and Derivative Controllers.

UNIT – III

Stability analysis in S- Domain:

The concept of stability – Routh’s stability criterion – qualitative stability & conditional stability – limitations of Routh’s stability.

Root Locus technique: The root locus concept – construction of root loci-effects of adding poles and zeros to $G(s)$ $H(s)$ on the root loci.

UNIT – IV

Frequency response Analysis: Frequency domain specifications, Bode plots, Gain margin and Phase Margin. Polar plot, Nyquist plot and Nyquist criterion for stability.

Compensation techniques: Types of Compensation, Introduction to phase Lag, Lead and Lead-Lag Compensators.

UNIT - V

State space representation: Concept of state and state variables. State models of linear time invariant systems, Derivation of State model from transfer function, Derivation of transfer function from State model, State transition matrix and its Properties, Controllability and observability.

TEXT BOOKS:

1. I.J. Nagrath and M. Gopal, Control System Engineering, 5ed., New Age Publishers, 2009.
2. Nagoor kani A, Control Systems Engineering, CBS PUB & DIST, 2020

REFERENCE BOOKS:

1. K. Ogata, Modern Control Engineering, 2ed., Prentice Hall, 2010.
2. M. Gopal, Control Systems: Principles and Design, Tata McGraw-Hill, 1997.
3. Norman S. Nise, Control Systems Engineering, 5ed., John Wiley & Sons, 2007.



INNOVATION AND ENTREPRENEURSHIP

II B.Tech I Semester (ECE)

Course Code: A253005

L	T	P	C
2	0	0	2

Course Objectives:

- 1 To familiarize on the basic concepts of innovation, entrepreneurship and its importance.
- 2 To Identify and analyze the process of problem-opportunity identification, market segmentation, and idea generation techniques.
- 3 To initiate prototype development and understand minimum viable product.
- 4 To develop initial Business and financial planning and Go-to-Market strategies
- 5 To impart knowledge on establishing startups, venture pitching and IPR

Course Outcomes:

- CO1 Understand the entrepreneurship and the entrepreneurial process and its significance in economic development.
- CO2 Assess the problem from an industry perspective and generate solutions using the design thinking principles.
- CO3 Assess market competition, estimate market size, and develop a prototype.
- CO4 Analyze Business and financial planning models and Go-to-Market strategies.
- CO5 Able to build a start-up, register IP and identify funding opportunities.

Syllabus:

UNIT – I:

Fundamentals of Innovation and Entrepreneurship Innovation: Introduction, need for innovation, Features, Types of innovations, fostering a culture of innovation, planning for innovation.

Entrepreneurship: Introduction, types of entrepreneurship attributes, mindset of entrepreneurial and intrapreneurial leadership, Role of entrepreneurs in economic development. Woman Entrepreneurship, Importance of on-campus startups, attributes and networks individuals while on campus.

Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16 industries to choose from), Venture Activity.

UNIT – II:

Problem and Customer Identification: Identification of gap, problem, analyzing the problem from a industry perspective, market and customer segmentation, validation of customer problem fit, Iterating problem-customer fit, Porter's Five Force Model. Idea generation, Ideation techniques: Brainstorming, SCAMPER, Design thinking principles.



Core Teaching Tool: Several types of activities including: Class, game, Gen AI, 'Get out of the Building' and Venture Activity.

UNIT- III:

Opportunity assessment and Prototype development: Identify and map global competitors, review industry trends, and understand market sizing: TAM, SAM, and SOM. Understanding prototyping and Minimum Viable Product (MVP). Developing a prototype: Testing, and validation.

Core Teaching Tool: Venture Activity, Class activity

UNIT- IV:

Business & Financial Models: Introduction to Business Model and types, Business planning: components of Business plan- Sales plan, People plan and financial plan, Financial Planning: Types of costs, preparing a financial plan for profitability using a financial template, analyzing financial performance. Go-To-Market (GTM) approach,

Core Teaching Tool: Founder Case Studies – Sama and Securely Share; Class activity and discussions; Venture Activities.

UNIT – V:

Startups and IPR: Startup requirements, building founding team members and mentors, pitch preparation, start-up registration process, funding opportunities and schemes, startup lifecycle, documentation, legal aspects in startup, venture pitching readiness, National Innovation Startup Policy (NISP) and its features. Patents, Designs, Patentability, Procedure for grants of patents. Indian Scenario of Patenting, International Scenario: International cooperation on Intellectual Property. Patent Rights, Copyright, trademark, and GI. Licensing and transfer of technology.

Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.

TEXT BOOKS:

1. John R Bessant, Joe Tidd, Innovation and Entrepreneurship, 4E, Wiley, Latest Edition.
2. Ajay Batra, The Startup Launch Book- A Practical Guide for Launching Customer Centric Ventures, Wiley, 2020. (For Core Teaching Tool).

REFERENCES:

1. Entrepreneurship Development and Small Business Enterprises, Poornima M Charantimath, 3E, Pearson, 2018.
2. D.F. Kuratko and T.V. Rao, Entrepreneurship: A South-Asian Perspective, Cengage Learning, 2013.
3. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGrawHill, 11th Edition.



MODELLING & SIMULATION LAB

II B.Tech I Semester (ECE)

Course Code: A253482

L	T	P	C
0	0	2	1

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 12 experiments are to be completed / simulated.

Course Outcomes:

After going through this course the student

1. Will be able to use a simulation tool for generating, analyzing and performing various operations on Signals / Sequences both in time and Frequency domain
2. Will be able to use a simulation tool for Analyzing and Characterizing Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling
3. Will be able to use a simulation tool for generating different Random Signals
4. Analyze their Characteristics by finding different higher order Moments and noise removal applications.
5. Will be able to use a Simulink for Control System applications

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

List of Experiments:

Signals and Systems (Minimum 7 Experiments)

1. Write the code / script for generating various standard viz: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
2. Perform different operations viz: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power on them.
3. Write the code / script for finding the Even and Odd parts of Signal / Sequence and Real and Imaginary parts of Signal.
4. Write the code / script for finding the output of a System for a given input and Impulse Response.
5. Write the code / script for finding Auto Correlation and Cross Correlation of Signals /



sequences

6. Write the code / script for Verifying whether a given Continuous/Discrete System is Linear, Time Invariant.
7. Write the code / script for obtaining Sinusoidal response and Impulse response of a given Continuous / Discrete LTI System.
 - a) Plot the Real and Imaginary part and
 - b) Magnitude and Phase Plot of the response
8. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Fourier Transform.
9. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Laplace Transform. Also plot pole-zero diagram in S-plane.
10. Write the code/ script for finding and plotting the Magnitude and Phase Spectrum of any given Sequence by finding its Z-Transform. Also plot pole — zero diagram in Z-plane.
11. Gibbs Phenomenon.

Probability Theory and Stochastic Processes (Any 3 Experiments)

12. Write the code / script for generating Gaussian noise and for finding its mean, Skewness, Kurtosis, PDF and PSD.
13. Write the code / script for Verifying Sampling theorem for different sampling rates, Sampling types and Duty Cycles and for plotting the sampled and reconstructed Signals.
14. Write the code / script for Removal of noise from the signal using Cross correlation.
15. Write the code / script for Extraction of Periodic Signal masked by noise using Auto Correlation

Control Systems (Minimum 2 Experiments)

16. Build and Simulate a DC Motor using Simulink
17. Implementation of a PID Controller from equations using Simulink
18. Controllability and Observability

Application on Real Time signals

1. Application of Autocorrelation: GPS Synchronization Satellite communication toolbox is required for this experiment.
Generate the GPS signal. Visualize the GPS signal. Plot of autocorrelation of C/A code and
visualize the spectrum of GPS signals. For exact steps, go through the following page:
<https://www.mathworks.com/help/satcom/ug/gps-waveform-generation.html>



2. Sampling of Speech Signals

Record and play speech in MATLAB. For steps, go through the following page:

https://in.mathworks.com/help/matlab/import_export/record-and-play-audio.html

Change the sampling rate of the recorded speech signal and play back to see the effect of aliasing. For steps, go through the following page:

<https://in.mathworks.com/help/signal/ug/changing-signal-sample-rate.html>



ELECTRONIC DEVICES AND CIRCUITS LAB
(Common for ECE & EEE)

II B.Tech I Semester

Course Code: A253481

L	T	P	C
0	0	2	1

Note:

- Minimum of 12 experiments are to be completed.

Course Overview:

This laboratory course aims to provide hands-on experience and simulation-based learning of semiconductor devices and basic electronic circuits. Students will analyze the characteristics and applications of diodes, BJTs, and FETs, design rectifiers and amplifiers, and simulate modern electronic circuits using software tools. The course bridges theoretical concepts with practical implementation, developing foundational skills essential for analog electronics and circuit analysis.

Course Outcomes:

After completing this course, students will be able to:

1. Analyze the V–I characteristics of semiconductor devices such as diodes, BJTs, and FETs.
2. Design and evaluate basic rectifier circuits.
3. Demonstrate biasing techniques for BJT and determine their operating point using DC load line analysis.
4. Design and analyze transistor amplifier circuits in various configurations using small signal models.
5. Simulate and interpret electronic circuits using appropriate simulation tools.

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

List of Experiments:

A. Hardware-Based Experiments (7):

1. Plot the V–I characteristics of a PN junction diode in forward and reverse bias to determine cut-in voltage and dynamic resistance.
2. Plot the V–I characteristics of a Zener in forward and reverse bias to determine cut-in voltage and break down voltage.
3. Implement clipper and clamper circuits to observe waveform shaping through positive, negative, and biased configurations.



4. Design and analyze half-wave with and without capacitor filters to evaluate ripple factor and output voltage.
5. Design and analyze full-wave rectifiers (center-tap) with and without capacitor filters to evaluate ripple factor and output voltage.
6. Plot the input and output characteristics of a BJT in common emitter configuration to determine the value of h parameters.
7. Design and test voltage divider bias circuit to establish a stable operating point for a BJT amplifier and draw the DC load line behavior.

B. Software-Based Simulation Experiments (7):

1. Simulate a full-wave bridge rectifier with capacitor filter to analyze waveform smoothing and ripple reduction in DC power supply design.
2. Simulate a Zener diode-based voltage regulator to study voltage stabilization against varying supply voltages and load resistances.
3. Simulate the output and transfer characteristics of a JFET to determine parameters such as pinch-off voltage, drain resistance, and transconductance.
4. Simulate a common emitter amplifier to analyze the effect on voltage gain and signal amplification.
5. Simulate a common source amplifier to analyze the effect on voltage gain and signal amplification.
6. Simulate BJT operation as a switch and small-signal amplifier to understand its dual functionality in digital and analog applications.
7. Design and simulate a CMOS inverter to study digital switching behavior and low-power logic design.

Hardware Requirements:

1. Regulated DC Power Supply (0-30 V)
2. Function Generators
3. Digital Multimeter
4. Cathode Ray oscilloscope or DSO
5. Breadboards and connecting wires
6. Resistors, Capacitors Diodes
7. BJTs, JFETs, and MOSFETS
8. Trainer kits (optional)

Software Requirements (any one of the listed tools or equivalent)

1. LTSpice (Free from Analog Devices)
2. NI Multisim (Academic License or Student version)
3. Proteus Design Suite (Simulation and PCB design)
4. TINA-TI (Free from Texas Instruments)
5. PSICE for TI or OrCAD Lite
6. Windows PC



DIGITAL LOGIC DESIGN LAB

II B.Tech I Semester (ECE)

Course Code: A253483

L	T	P	C
0	0	2	1

Note:

- Minimum of 12 experiments are to be completed.

Course Overview:

This laboratory course provides hands-on experience with the design, analysis, and simulation of digital circuits. Students begin by constructing and testing basic digital components using logic gate ICs, covering Boolean minimization, arithmetic circuits, code converters, and combinational building blocks. The second part focuses on implementing equivalent and advanced designs using Verilog HDL, exploring various modeling styles—dataflow, behavioral, and structural—along with simulation tools. The course emphasizes both foundational logic principles and modern digital system development practices.

Course Outcomes:

After completing this course, students will be able to

1. Analyze and simplify Boolean expressions and implement them using logic gates and ICs.
2. Design and realize combinational and sequential logic circuits using logic gate hardware.
3. Model digital systems in Verilog HDL using dataflow, behavioral, and structural styles.
4. Simulate and verify digital designs using industry-standard EDA tools and test benches.
5. Build modular and hierarchical designs such as counters, FSMs, and shift registers.

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

List of Experiments:

A. Realization in Hardware Laboratory (Using Logic ICs)

These are fundamental hands-on experiments conducted using logic ICs such as AND, OR, NOT, NAND, NOR, XOR gates, flip-flops, multiplexers, and decoders.

1. Realize and minimize Boolean functions using basic gates and universal gates (NAND/NOR) in SOP/POS form.



2. Design and implement Half Adder, Full Adder, Half Subtractor, and Full Subtractor using logic gates.
3. Construct and analyze basic logic gates (AND, OR, NOT, XOR, XNOR) using only NAND and NOR gates.
4. Design and implement parity bit generators (even and odd) and a 4-input majority logic circuit.
5. Design and implement code converters such as Binary to Gray, Gray to Binary, and BCD to Excess-3 using gates.
6. Design and implement simple combinational circuits: 2-to-1 multiplexer, 1-bit comparator, and 7-segment decoder logic.

B. Verilog HDL-Based Digital Design Experiments(Simulation-Based)

These experiments are implemented using **Verilog HDL** with different modeling styles (dataflow, behavioral, structural) and simulated using tools like **Vivado, ModelSim, or Xilinx ISE**.

1. Design and simulate a 2-bit comparator using data flow modeling; extend it to 4-bit using structural modeling.
2. Implement a 2:1 multiplexer using data flow modeling and design an 8:1 multiplexer using structural modeling.
3. Design a 2-to-4 decoder using data flow modeling and realize a 3-to-8 decoder using structural modeling.
4. Implement a given Boolean function using a decoder-based approach in behavioral modeling.
5. Design and simulate a universal n-bit shift register(left, right, hold, parallel load)using behavioural modeling.
6. Design a synchronous MOD-n counter using behavioural modeling with D or JK flip-flops.
7. Design and simulate an asynchronous (ripple) counter for a custom sequence using structural modeling.
8. Implement a sequence detector for a given binary pattern using FSM(Moore/Mealy)in behavioural modeling.

Required Hardware (for Hardware Lab Experiments)

Component	Description
Digital Trainer Kit	Breadboard with power supply and clock generator
Logic ICs	7400 (NAND), 7402 (NOR), 7408 (AND), 7432 (OR), 7486 (XOR), 7404 (NOT), etc.
Flip-Flop ICs	7474 (D Flip-Flop), 7476 (JK Flip-Flop)
MUX/Decoder ICs	74153, 74138, 74139
LEDs, switches, connecting wires	For I/O interface and testing



Required Software Tools (for Verilog HDL Experiments) (Any one of the tools given below)

Software	Purpose
Xilinx Vivado	HDL simulation and synthesis (preferred tool)
ModelSim	Verilog simulation and waveform analysis
Xilinx ISE	Legacy support for simulation and FPGA design



LINUX AND SHELL SCRIPTING

II B.Tech I Semester (ECE)

Course Code: A253581

L	T	P	C
0	0	2	1

Course Outcomes:

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

1. Understand Linux system structure, OS architecture, and command-line environment.
2. Perform Linux installation and basic administration including file, user, and permission management.
3. Develop shell scripts to automate tasks such as backups, monitoring, and data processing.
4. Use Linux tools for software management, networking, and service configuration.
5. Implement backup, recovery, and basic troubleshooting techniques through practical labs.

List of Experiments:

Week 1: Introduction to OS Concepts

Lab Activity: Linux History, Opensource software basics & Licenses, Why Linux vs windows Identify system and application software on your PC. Differentiate their roles and explain basic OS functions.

Week 2: Linux Architecture & Kernel Types

Lab Activity: Compare Monolithic and Microkernel architectures using diagrams. Discuss how Linux's structure supports device-level control.

Week 3: Installing Linux (Ubuntu/CentOS)

Lab Activity: Install Linux using VirtualBox or WSL. Document each installation step and troubleshoot any permission or hardware issues.

Week 4: Linux Filesystem & Navigation

Lab Activity: Navigate key directories like /home, /etc, and /var. Create folder structures for a team project.

Week 5: File Permissions & Ownership

Lab Activity: Set permissions on project folders so only group members can access/edit them. Verify permissions using multiple users.

Week 6: User and Group Management

Lab Activity: Create users and groups for a coding team. Set up shared access using group permissions and configure hidden config files.

Week 7: Process Management Lab Activity: Identify and terminate frozen or unresponsive processes during compilation using commands like ps and top.



Week 8: Process Priorities & Memory Tools

Lab Activity: Adjust priority of background jobs using nice and monitor system memory usage with vmstat and free. Display information about the processes using top and kill the applications/processes with the task id

Week 9: Shell Scripting Basics

Use Case: System Info Script for Lab Login

Lab Activity: Create a shell script that automatically displays system uptime, current date/time, available disk space, and active users each time a lab user logs in. Use variables and echo statements to present the information in a readable format.

Week 10: Loops, Functions, and Cron Jobs

Use Case: Automated Backup Scheduler for Project Folders

Lab Activity: Write a shell script that loops through all user folders in /home and backs them up to a predefined backup location. Add functions for logging success/failure. Schedule it to run daily at 2 AM using cron. Handle missing folders gracefully.

Week 11: Text Processing & Networking Utilities

Use Case: Security Log Analysis & Network Check After Intrusion Alert

Lab Activity: Analyze /var/log/auth.log or /var/log/secure to detect failed login attempts using grep, awk, cut, and sort. Use ping, trace route, net stat, nbt stat, arp and scp to check remote system connectivity and transfer reports securely.

Concepts of Linux clusters, Virtual machines (virtual box in chapter 3), creating VMs, allocating resources, interconnection between VMs, Containers concepts

Week 12: Service Management & Disk Mounting

Use Case: Adding Extra Storage Without Reboot

Lab Activity: Create a new virtual disk in Virtual Box. Partition and format it. Mount it to /mnt/data and ensure it auto-mounts on reboot. Enable a required service (like ssh or apache2) using system ctl and check its status.

Week 13: Backup & Recovery

Use Case: Disaster Recovery After Accidental Deletion

Lab Activity: Use a backup script to create a backup of critical folders. Simulate file deletion and restore them using your backup. Analyze /var/log/sys log or equivalent to trace user activity that led to the issue.

Week 14: Mini Project – Tool Development

Use Case: Custom Shell Tool for New Employee On boarding or Admin Task

Lab Activity: Develop a complete shell-based tool. Examples:

A user account creation wizard for new employees

A disk usage monitoring alert system

A log cleaner tool that archives and clears logs weekly

Include user prompts, help menu, error checks, and logging features

Final Demo & Viva



ENVIRONMENTAL SCIENCE

II B.Tech I Semester (ECE)

Course Code: A253105

L	T	P	C
0	0	2	1

Course Objectives: This Course Is Expected To Enable The Student:

1. Describe Ecosystem Components, Functions, And Their Societal Relevance.
2. Explain Natural Resource Classification, Management, And Challenges.
3. Analyze Pollution Types, Impacts, And Control Measures.
4. Evaluate Global Environmental Issues, Policies, And EIA'S Role In Sustainability.

Course Outcomes: After Completion Of the Course, The Student Will be able To

1. Describe Ecosystem Structure, Functions, And Biodiversity Conservation.
2. Analyze Natural Resource Management And Alternative Energy Options.
3. Evaluate Biodiversity Threats And Conservation Frameworks.
4. Identify Pollution Sources, Impacts, And Control Technologies.
5. Apply Environmental Policies And EIA For Sustainable Management.

UNIT – I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity

UNIT – II

Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Sources and types of pollution, drinking water quality standards. Soil Pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Pollution control technologies; Overview of air pollution control technologies, Concepts of bioremediation. Global Environmental Issues and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification.



UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). Contemporary Environmental Issues, Climate change; Sustainable development goals (SDGs); Global environmental challenges; Environmental policies and international agreements.

TEXT BOOKS:

1. Anjaneyulu, Y., Introduction to Environmental Science, BS Publications, 2nd Edition, 2017.
2. Bharucha, E., Textbook of Environmental Studies for Undergraduate Courses, University Grants Commission, 3rd Edition, 2021.
3. Rajagopalan, R., Environmental Studies, Oxford University Press, 3rd Edition, 2023.

REFERENCE BOOKS:

1. Wright, R. T., Environmental Science: Towards a Sustainable Future, PHI Learning Pvt.Ltd., Revised Edition, 2008.
2. Masters, G. M., & Ela, W. P., Environmental Engineering and Science, PHI Learning Pvt. Ltd., 1st Edition, 2008.
3. Botkin, D. B., & Keller, E. A., Environmental Science: Earth as a Living Planet, Wiley India, 8th Edition, 2012.
4. Kaushik, A., & Kaushik, C. P., Perspectives in Environmental Studies, New Age International Publishers, 7th Edition, 2021.
5. Reddy, M. A., Textbook of Environmental Science and Technology, BS Publications, 2nd Edition, 2007.

ONLINE RESOURCES:

1. <https://nptel.ac.in/courses/109105203>



MATHEMATICS-III (NUMERICAL METHODS & COMPLEX VARIABLES)

II B.Tech II Semester (ECE)

Course Code: A254002

L	T	P	C
3	0	0	3

Pre-requisites: Mathematics courses of first year of study.

Objectives: To learn

- Various numerical methods to find roots of polynomial and transcendental equations.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations of first order using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
- Expansion of complex functions using Taylor's and Laurent's series.

Course Outcomes: After learning the contents of this course the students must be able to:

1. Apply the Knowledge to find the root of a given polynomial and transcendental equations.
2. Estimate the value for the given data using interpolation
3. Solve the given first order ODE's using Numerical Techniques
4. Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems
5. Expand the complex functions using Taylor's and Laurent's series expansions.

Syllabus:

UNIT-I: Numerical Methods-I: (Algebraic and Transcendental Equations)

Solution of polynomial and transcendental equations: Bisection method, Iteration Method, Newton- Raphson method and Regula-Falsi method. Jacobi and Gauss-Seidal iteration methods for solving linear systems of equations.

UNIT-II: Numerical Methods-II (Interpolation & Numerical Integration)

Finite differences: forward differences, backward differences, central differences, symbolic relations and separation of symbols, Interpolation using Newton's forward and backward difference formulae. Central difference interpolation: Gauss's forward and backward formulae, Lagrange's method of interpolation.

Numerical integration: Trapezoidal rule and Simpson's $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rules.



UNIT-III: Numerical Methods-III (Solutions of Initial Value Problems)

Solutions of Ordinary differential equations: Taylor's series, Picard's method, Euler and modified Euler's methods, Runge-Kutta method of second and fourth order for first order

UNIT-IV: Complex Analysis-I(Function of Complex Variables and Differentiation)

Introduction, Complex functions - limits and Continuity-Differentiability, Analytic functions and Properties, Cauchy-Riemann Equations (Cartesian and Polar), Harmonic functions, Construction of analytic functions.(All theorems without Proofs).

UNIT-V: Complex Integration:

Introduction, Complex integration-Line integral, Cauchy's integral theorem, Cauchy's integral formula, Generalized Cauchy's integral formula, Power series: Taylor's series, Laurent series, Singular points, Types of Singularities, Residue, Cauchy's Residue theorem.(All theorems without Proofs)

Textbooks:

1. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers.
2. Introductory methods of numerical analysis 2005. by S. S. Sastry, PHI, 4th Edition.

Reference Books:

1. Advanced Engineering Mathematics : Kreyszig, John Wiley & sons
2. Numerical methods for Scientific and Engineering Computations, by M. K. Jain, S. R. K. Iyengar, R. K. Jain, New Age International publishers.
3. Functions of Complex Variables by J.N.Sharma, Krishna Prakashan Media.



ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

II B.Tech II Semester (ECE)

Course Code: A254402

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields and apply them to solve engineering problems.
2. To distinguish between static and time-varying fields and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. To analyze the propagation of waves in transmission line and able to solve transmission line problem using Smith Chart.

Course Outcomes:

After going through this course the student will be able to

1. Apply electrostatic principles to analyze electric fields, potentials for various charge distributions and boundary conditions.
2. Analyze magnetostatic fields and forces using Biot–Savart's law, Ampere's law and magnetic potentials for steady current systems.
3. Apply Maxwell's equations to analyze time-varying electromagnetic fields and evaluate electric and magnetic boundary conditions at material interfaces
4. Analyze electromagnetic wave propagation and reflection–refraction characteristics in conducting and dielectric media
5. Evaluate and compare transmission line performance, reflections, and impedance matching techniques using analytical methods and Smith Chart.

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

UNIT I – Electrostatics

Coulomb's Law, Electric Field Intensity — Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and its applications, Electric Potential, Relation between E and V, Maxwell's Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics,



Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitors–Parallel Plate, Coaxial, Spherical.

UNIT II - Magnetostatics

Biot-Savart's Law, Ampere's Circuit Law and its applications, Magnetic Flux Density, Maxwell's equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

UNIT III - Maxwell's Equations (Time Varying Fields)

Faraday's Law, Transformer and Motional EMF, Inconsistency in Ampere's Law and Displacement Current Density, Maxwell's Equations in Differential, Integral and Phasor form. Electric and magnetic Boundary Conditions (Dielectric – Dielectric, Conductor– Dielectric, Conductor– Free Space interfaces).

UNIT IV - EM Wave Characteristics

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves– Definitions, Relation between E&H, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics — Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Skin Depth, Surface Impedance, Wave Polarization. Poynting Vector and Poynting Theorem.

UNIT V Transmission Lines

Types, Parameters, Equivalent Circuit, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless Lines, Types of Distortions, condition for Distortion less transmission lines, Minimum Attenuation, Loading — Types of Loading, Input Impedance, SC and OC Lines, Reflection Coefficient, VSWR, Impedance Transformations - $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, Smith Chart- Configuration and Applications.

TEXT BOOKS:

1. Principles of Electromagnetics –Matthew N.O. Sadiku and S.V. Kulkarni, 6th Ed., Oxford University Press, Asian Edition, 2015.
2. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, 8th Ed., McGraw Hill, 2014

REFERENCE BOOKS:

1. Electromagnetic Waves and Radiating Systems–E.C. Jordan and K.G. Balmain, 2nd Ed., PHI, 2000.
2. Engineering Electromagnetics — Nathan Ida, 2nd Ed., Springer (India) Pvt. Ltd., New Delhi, 2005.
3. Electromagnetic Field Theory Fundamentals –Bhag Singh Guru and Huseyin R. Hiziroglu, Cambridge University Press, 2nd Ed., 2006



ANALOG AND DIGITAL COMMUNICATIONS

II B.Tech II Semester (ECE)

Course Code: A254403

Pre-requisite: Signals and Systems

Course Objectives:

1. To develop ability to analyze system requirements of analog and digital communication systems.
2. To understand the generation, detection of various analog and digital modulation techniques.
3. To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

Course Outcomes:

After going through this course the student will be able to

1. Analyse AM, DSB-SC, SSB, FM and PM techniques and explain their generation and detection in time and frequency domains.
2. Explain the operation and performance of AM/FM transmitters and receivers, including superheterodyne and FM systems under noise.
3. Apply pulse modulation, detection and baseband shaping concepts to analyze signal detection in noise and intersymbol interference.
4. Analyse digital modulation schemes and evaluate their bandwidth efficiency, power spectra and noise performance.
5. Apply information theory to evaluate channel capacity and design efficient source and channel coding schemes.

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

UNIT – I

Amplitude Modulation

Need for modulation, amplitude modulation: time and frequency domain description, generation using switching modulator, detection using envelope detector, DSB-SC modulation: generation using balanced modulator, detection using synchronous detector, COSTAS loop, SSB modulation: time and frequency domain description, generation using phase discrimination method and demodulation using coherent detection, vestigial sideband modulation and demodulation.



Angle Modulation

Basic concepts of phase modulation, frequency modulation: single-tone frequency modulation, spectrum analysis, Carson's rule, generation of FM waves using Armstrong method, detection of FM waves using phase-locked loop, comparison of FM and AM.

UNIT – II

Transmitters & Receivers

Classification of transmitters, AM transmitters, FM transmitters, AM receiver – superheterodyne receiver, FM receivers, stereo FM multiplex reception, comparison of AM and FM receivers, noise analysis in AM, DSB, SSB and FM modulation systems, threshold effect in angle modulation systems, pre-emphasis and de-emphasis.

UNIT – III

Pulse Modulation

Pulse modulation techniques including PAM, PWM and PPM, and a comparison of FDM and TDM.

Detection and Estimation

Detection of signals in noise, probability of error, optimum coherent receivers including matched filter and correlation receivers and detection of signals with unknown phase.

Baseband Shaping for Data Transmission

Line encoding requirements, unipolar, polar and bipolar line coding, discrete PAM signalling, inter symbol interference, Nyquist criterion, Duobinary signalling, and eye pattern.

UNIT – IV

Digital Modulation Techniques

PCM generation and reconstruction, quantization noise, non-uniform quantization and companding, DPCM, DM and adaptive DM, noise in PCM and DM systems.

Digital modulation formats: coherent binary modulation techniques (BPSK, BFSK), coherent quadrature modulation techniques (QPSK), non-coherent binary modulation techniques (BFSK, DPSK), QAM, M-ary modulation techniques (PSK, FSK, QAM), comparison of M-ary digital modulation techniques, power spectra, bandwidth efficiency, and constellation diagrams.

UNIT – V

Information Theory and Coding

Entropy, information rate, mutual information, channel capacity of discrete channels, Shannon–Hartley law, trade-off between bandwidth and SNR.

Source coding: Huffman coding, Shannon–Fano coding; channel coding: linear block codes and cyclic codes.

TEXT BOOKS

1. Electronics Communication Systems – Fundamentals through Advanced, Wayne Tomasi, PHI, 2009



2. Digital and Analog Communication System – K. Sam Shanmugam, Wiley, 2019
3. Principles of Communication Systems – Herbert Taub, Donald L. Schilling, Goutam Saha, McGraw-Hill, 2008

REFERENCES

1. Electronic Communications – Dennis Roddy and John Coolen, PEA, 2004
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH, 2004
3. Communication System – Simon Haykin and Michael Moher, Wiley, 5th Edition



ELECTRONIC CIRCUIT ANALYSIS

II B.Tech II Semester (ECE)

Course Code: A254404

L	T	P	C
3	0	0	3

Course Overview:

The Electronic Circuit Analysis course provides foundational and advanced knowledge in the design and analysis of analog electronic circuits. This includes the study of multistage amplifiers, feedback amplifiers, oscillators, power amplifiers, and multivibrators. Emphasis is placed on frequency response, feedback theory, transistor behavior at high frequencies, and waveform generation techniques. The course equips students with the necessary analytical and practical skills required in analog circuit design and communication systems.

Course Outcomes:

After going through this course the student will be able to

1. Analyze and classify multistage amplifier configurations also apply the hybrid- π transistor model to evaluate high-frequency behavior of common-emitter amplifiers.
2. Examine feedback amplifier types and assess the influence of negative feedback on gain stability, bandwidth, and distortion.
3. Design and analyze LC, RC, and crystal oscillators based on the Barkhausen criterion to generate sinusoidal waveforms
4. Design and evaluate the performance analyze of power amplifiers and tuned amplifiers
5. Design and generate output waveforms of multivibrator circuits.

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

UNIT - I:

Multistage Amplifiers: Classification of Amplifiers, Distortion in Amplifiers, Coupling schemes: RC, Transformer, Direct coupling, Frequency response of multistage amplifiers, Transistor configuration choice in cascade amplifier, Cascode amplifier and Darlington pair amplifier.

High-Frequency Transistor Model: Hybrid- π model, Hybrid- π parameters: Conductances and capacitances, CE short-circuit current gain, Gain-bandwidth product



UNIT - II:

Feedback Amplifiers: Concept and need for feedback in amplifiers, Types and classification of feedback amplifiers, Characteristics of negative feedback: Gain stability, bandwidth, noise, distortion, Voltage series, Voltage shunt, Current series, Current shunt configurations.

UNIT - III:

Oscillators: Principle of positive feedback, Barkhausen Criterion for oscillations, LC Oscillators: Generalized analysis, Hartley, Colpitts, RC Oscillators: RC phase shift, Wien bridge, Crystal oscillator: Working and advantages

UNIT - IV:

Power Amplifiers: Classification: Class A, B, AB, C, Series-fed Class A amplifier, Transformer-coupled Class A amplifier, Class B amplifier: Push-pull, Complementary symmetry, Efficiency calculations and Crossover distortion.

Tuned Amplifiers: Introduction, single Tuned capacitive coupled Amplifier – Q factor, frequency response, Concept of stagger tuning amplifier.

UNIT - V:

Multivibrators: Analysis and design of Bistable, Monostable and Astable multivibrators and Schmitt Trigger using transistors.

Time Base Generators: General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators, Linearity improvement techniques

TEXT BOOKS:

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. McGraw-Hill Education, 2008.
2. Bell, David A. Electronic Devices and Circuits. Oxford University Press, 2008.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. 7th ed., Oxford University Press, 2015.

REFERENCE BOOKS:

1. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. 11th ed., Pearson Education, 2013.
2. Millman, Jacob, and Arvin Grabel. Microelectronics. 2nd ed., McGraw-Hill, 1987.
3. Malvino, Albert Paul. Electronic Principles. 7th ed., McGraw-Hill Education, 2007.
4. Millman, Jacob, and Herbert Taub. Pulse, Digital, and Switching Waveforms. McGraw-Hill Education, 1991.



LINEAR AND DIGITAL IC APPLICATIONS

II B.Tech II Semester (ECE)

Course Code: A254405

L	T	P	C
3	0	0	3

Course Objectives: The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To introduce the concepts of waveform generation and introduce some special function ICs.
4. To understand and implement the working of basic digital circuits.

Course Outcomes:

After going through this course the student will be able to

1. Explain the characteristics and functioning of ideal and practical operational amplifiers and analyze op-amp-based circuits and voltage regulators for analog applications.
2. Analyze and design active filter circuits, waveform generators using operational amplifiers, IC 555 timer, and IC 565 PLL for signal processing applications.
3. Acquire the knowledge and design the Data converters.
4. Apply TTL 74XX and CMOS 40XX series ICs to analyze and implement combinational logic circuits.
5. Apply 74XX series ICs to analyze and implement sequential logic circuits

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

UNIT - I

Operational Amplifier

Introduction to IC's-advantages, Ideal and Practical Op-Amp Characteristics, Features of 741 Op- Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Sample & hold Circuit, Differentiators and Integrators, Comparators, Schmitt Trigger, Voltage Regulators- Three Terminal Voltage Regulators, Features of IC 723.

UNIT - II

Op-Amp, IC-555 & IC565 Applications

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators — Triangular,



Sawtooth, Square Wave. IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, principle and Applications.

UNIT - III

Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

Combinational Logic ICs

Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters-Binary to Gray, Gray to Binary, BCD to Excess-3, Decoders, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Parity Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT - V

Sequential Logic IC's

Familiarity with commonly available 74XX & CMOS40XX Series ICs– All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers and Types.

TEXT BOOKS

1. Op-Amps & Linear ICs– Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals –Floyd and Jain, Pearson Education, 8th Ed., 2005.

REFERENCE BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Digital Design Principles and Practices–John. F. Wakerly, Pearson 3rd Ed., 2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH, 2008.
4. Operational Amplifiers with Linear Integrated Circuits, 4th Ed., William D. Stanley, Pearson Education India, 2009.



COMPUTATIONAL MATHEMATICS LAB
(Common for All Branches)

II year II Semester

Course Code: A254081

L	T	P	C
0	0	2	1

Course Objectives: To learn

1. Solve problems of Eigen values and Eigen Vectors using Python/MATLAB.
2. Solution of Algebraic and Transcendental Equations using Python/MATLAB
3. Solve problems of Linear system of equations
4. Solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients

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

1. Develop the code to find the Eigen values and Eigen Vectors using Python/MATLAB.
2. Develop the code to find solution of Algebraic and Transcendental Equations and Linear system of equations using Python/MATLAB
3. Write the code to solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients

Syllabus:

***Visualize all solutions Graphically through programmes**

UNIT-I: Eigen values and Eigen vectors:

6P

Programs:

- Finding real and complex Eigen values.
- Finding Eigen vectors.

UNIT-II: Solution of Algebraic and Transcendental Equations

6P

Bisection method, Newton Raphson Method

Programs:

- Root of a given equation using Bisection method.
- Root of a given equation Newton Raphson Method.

UNIT-III: Linear system of equations:

6P

Jacobi's iteration method and Gauss-Seidal iteration method

Programs:

- Solution of given system of linear equations using Jacobi's method
- Solution of given system of linear equations using Gauss-Seidal method



UNIT-IV: First-Order ODEs

8P

Exact and non-exact equations, Applications: exponential growth/decay, Newton's law of cooling.

Programs:

- Solving exact and non-exact equations
- Solving exponential growth/decay and Newton's law of cooling problems

UNIT-V: Higher order linear differential equations with constant coefficients

6P

Programs:

- Solving homogeneous ODEs
- Solving non-homogeneous ODEs

TEXTBOOKS:

1. MATLAB and its Applications in Engineering, Raj kumar Basal, Ashok Kumar Geo, Manoj Kumar Sharma, Pearson publication.
2. Kenneth A.Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.
3. Think Python First Edition, by Allen B.Downey, Orielly publishing.
4. Introduction to Python Programming, William Mitchell, Povel Solin,Martin Novaket al., NC Lab Public Computing, 2012.
5. Introduction to Python Programming, ©Jacob Fredslund,2007.

REFERENCEBOOKS:

1. An Introduction to Python, JohnC. Lusth, The University of Alabama,2011.
2. Introduction to Python, ©Dave Kuhlman,2008.



ANALOG AND DIGITAL COMMUNICATIONS LAB

II B.Tech II Semester (ECE)

Course Code: A254483

L	T	P	C
0	0	2	1

Note:

- Minimum 12 experiments should be conducted.
- All these experiments are to be simulated either using MATLAB, Commsim or any other simulation package.

Course Outcomes:

After going through this course the student will be able to

1. Apply analog communication principles to generate, demodulate, and analyze AM, FM, DSB-SC, and SSB-SC signals in time and frequency domains.
2. Implement and analyze multiplexing and sampling techniques, including FDM and sampling theorem verification, using practical observations.
3. Design and realize pulse modulation systems (PAM, PWM, PPM, PCM, and Delta modulation) using hardware and simulation tools.
4. Generate and evaluate digital modulation schemes (FSK, BPSK, DPSK, QPSK) and analyze constellation diagrams under noise.
5. Analyze advanced digital communication concepts such as ISI, eye diagrams, pulse shaping, source coding, and matched filter performance.

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

List of Experiments:

1. Generate Amplitude modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
2. Generate Frequency modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
3. Generate modulated and demodulate DSB-SC Signal for different modulation indices and plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically



4. Generate and demodulate SSB-SC modulated Signal (Phase Shift Method) for different modulation indices and plot the corresponding waveforms and their spectrum. Also calculate theoretically and practically the modulation index in each case
5. Demonstrate the Frequency Division Multiplexing & De multiplexing practically by transmitting at least 4 different signals simultaneously with respect to time and recovering without distortion.
6. Verify Sampling theorem for different sampling rates, Sampling types and Duty Cycles and Plot the sampled and reconstructed Signals. Write the conclusions, based on practical observations
7. Design and implement a Pulse Amplitude Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
8. Design and implement a Pulse Width Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
9. Design and implement a Pulse Position Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
10. Generate PCM Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations
11. Generate Delta Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
12. Generate FSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
13. Generate practically Binary PSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
14. Generate practically DPSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
15. Generate practically QPSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
16. Plot Signal Constellation for BPSK, BFSK and QPSK
17. Analyze the performance of BPSK, BFSK and QPSK under noisy environment through constellation diagram
18. Demonstrate ISI through eye diagram
19. Simulate raised cosine signal and duo binary signals
20. Encode data using Shannon Fano /Huffman Coding through Hardware / Simulator
21. Analyze the performance of a Matched filter.



ELECTRONIC CIRCUIT ANALYSIS LAB

II B.Tech II Semester (ECE)

Course Code: A254484

L	T	P	C
0	0	2	1

Note:

- Minimum 12 experiments should be conducted.

Course Overview:

The Electronic Circuit Analysis Laboratory is designed to provide hands-on experience in designing, building, and analyzing analog electronic circuits. It focuses on the practical implementation of amplifiers, oscillators, power amplifiers, multivibrators, and waveform generators using discrete components and simulation tools. The lab strengthens understanding of frequency response, gain, feedback, waveform shaping, and time base generation.

Course Outcomes:

After going through this course the student will be able to

- Design and analyze multistage amplifier and evaluate their frequency response.
- Design and analyze feedback & power amplifiers and evaluate their frequency response.
- Develop and interpret waveform generation circuits such as oscillators, multivibrators and time base generators.
- Perform simulations to validate analog circuit performance using industry-standard software tools.
- Correlate practical results with theoretical predictions and identify deviations due to real-world constraints.

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

List of Experiments:

A. Hardware Experiments (7):

Perform practical design, implementation, and waveform analysis of amplifiers, oscillators, power stages, and multivibrators to validate theoretical concepts and observe real-world circuit behavior.

- Design and analyze a two-stage RC coupled amplifier to demonstrate gain enhancement.
- Design Hartley oscillator for a specified frequency and observe their output



waveforms.

3. Design an RC phase shift oscillator and derive the practical gain condition for oscillations at a given frequency.
4. Design a transformer-coupled class A power amplifier, observe input/output waveforms, and calculate efficiency.
5. Design a class B Push Pull power amplifier, analyze input/output waveforms and calculate its efficiency.
6. Design a bistable multivibrator, analyze commutating capacitor effects, and record transistor Waveforms.
7. Design an astable multivibrator and observe transistor base and collector waveforms.

B. Software Simulations (7):

Use circuit simulation software to design, analyze, and verify the performance of feedback amplifiers, waveform generators, and power amplifier circuits through virtual experimentation and frequency response evaluation.

1. Simulate voltage series/voltage shunt feedback amplifier topologies and compare their frequency responses with and without feedback.
2. Simulate a monostable multivibrator and analyze its input/output waveforms.
3. Simulate a Schmitt trigger for gain values greater than and less than one and analyze response behavior.
4. Simulate a bootstrap time base generator using BJT and observe the output sweep waveform.
5. Simulate a Miller sweep circuit using BJT and observe the time base output waveform.
6. Simulate a complementary symmetry push-pull amplifier and verify elimination of crossover distortion.
7. Simulate a single tuned amplifier and determine the quality factor (Q) of its tuned circuit.

Software Requirements:

Simulation Tools: LTspice / Multisim / PSpice / Proteus / NI Multisim Live or equivalent
Operating System: Windows 10/11 or Linux (Ubuntu preferred)

Hardware Requirements:

1. Dual Power Supply ($\pm 15\text{V}$, 0–30V)
2. Function Generator (up to 1 MHz)
3. CRO / DSO (Dual Channel, 20 MHz or more)
4. Digital Multimeters
5. Breadboards and Connecting Wires
6. BJTs: BC107, BC547, BC557, 2N2222, etc.
7. Resistors, Capacitors (Wide range of values)



LINEAR AND DIGITAL IC APPLICATIONS LAB

II B.Tech II Semester (ECE)

Course Code: A254485

L	T	P	C
0	0	2	1

Note:

- Minimum 12 experiments should be conducted.

Course Outcomes:

After going through this course the student will be able to

- Design and implementation of various analog circuits using IC 741.
- Design and Implementation of Various Multivibrators Using 555 timer.
- Design and implement low pass and High pass filters and DAC using IC 741.
- Design and implement various combinational circuits using digital ICs.
- Design and implement various sequential circuits using digital ICs.

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

List of Experiments:

- Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.
- Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
- Design a inverting Comparator with positive/negative/zero reference voltages using Op-Amp
- Design first order Active LPF, HPF using Op-Amp
- Design a Circuit using IC741 to generate square wave and draw the output waveform.
- Design a Circuit using IC741 to generate triangle wave and draw the output waveform
- Construct Mono-stable Multivibrator using IC555 and draw its output waveform.
- Construct Astable Multivibrator using IC555 and draw its output waveform and also find its duty cycle..
- Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.



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10. Design a 4-bit binary to Gray code converter and verify its truth table.
11. Verify the truth table of priority encoder using IC 74148
12. Design 4-bit function using 8x1 multiplexer digital IC 74138.
13. Design a 4-bit Adder/ Subtractor using digital ICs and Add/Sub the following bits.
(i)1010 (ii)0101 iii)1011
 0100 0010 1001
14. Verify the truth table of Decade counter using IC 7490
15. Verify the truth table of Up/down counter using IC74163
16. Verify the functionality of Universal shift register using IC74194/195
17. Verify the truth table magnitude comparator IC 7485



WEB AND MOBILE APPLICATIONS

II B.Tech II Semester (ECE)

Course Code: A254581

L	T	P	C
0	0	2	1

Course Objectives:

1. Understand and apply core web technologies (HTML, CSS, JavaScript) for structured, styled, and interactive webpages.
2. Build responsive websites using frameworks like Bootstrap and manage code using Git/GitHub.
3. Create simple server-side functionality using Node.js and store/retrieve data from basic databases.
4. Design and develop mobile applications using Flutter for Android and iOS.
5. Integrate web and mobile development into a functional mini-project with deployment.

Week-by-Week Syllabus

Week 1: Introduction to the Web

Understand web architecture, clients, servers, and workflows. Explore an existing website's structure and elements using browser DevTools.

Week 2: HTML Basics

Learn about different markup languages and their significance. Create a homepage for a static site using paragraphs, headings, lists, links, and images.

Week 3: CSS – Layout & Design Foundations

Apply colors, spacing, and layouts using CSS. Practice Flexbox and Grid techniques by cloning a simple website layout.

Week 4: Introduction to JavaScript

Understand the Document Object Model (DOM) and basic JavaScript constructs. Add interactivity to a webpage with a 'Contact Us' form that dynamically displays/hides details.

Week 5: Combining HTML, CSS, and JavaScript

Integrate skills from previous weeks to start building a personal portfolio website.

Week 6: Responsive Design using Bootstrap

Make your site adapt to different screen sizes (mobile, tablet, desktop) using Bootstrap's grid system and components.

Week 7: Deployment using GitHub

Learn version control basics with Git and GitHub. Publish your portfolio online via GitHub Pages and collaborate with classmates for code reviews.

Week 8: Basic Server Concepts & Node.js

Set up a basic Node.js server to serve web content. Understand server-side fundamentals and simple routing.

Week 9: Introduction to Databases

Learn to store and retrieve data using JSON or SQLite. Save contact form submissions from your portfolio into a database.

Week 10: Introduction to Flutter

Understand Flutter's widget structure and framework basics. Design a simple login and landing



page for a mobile app.

Week 11: Mobile App Interactivity

Create a Flutter app that displays a list of events. Add RSVP functionality with confirmation messages.

Week 12: Full-Stack Integration

Build a registration page that saves new members to a database and displays a welcome message. Connect your Flutter app to a database for data-driven functionality.

Week 13: Project Work

Apply all learned skills to build a real-world project such as a club/college event management application integrating both web and mobile interfaces.

Week 14: Final Presentations

Present your completed project to classmates, highlighting key features, responsive design, and integration. Gather peer feedback for improvement.

Mini-Project Example Themes

- Event registration & tracking for college clubs
- Simple inventory tracking system
- Student feedback & announcement portal
- IoT project dashboards (linking to electronics projects)
-

Reference Books:

1. “Web Technologies: HTML, CSS, JavaScript” – Uttam K. Roy (Oxford University Press)
2. “Web Technology: Theory and Practice” – M.N. Rao & P.S. Rao (Pearson)
3. “Web Technologies: TCP/IP, Web/HTTP, Web Servers, Web Applications, and Cloud Computing” – Achyut S. Godbole & Atul Kahate (McGraw-Hill Education)
4. “Mobile Application Development” – Debasis Samanta & Goutam Kumar Panda (Prentice Hall India)
5. “Full Stack Web Development” – V. Srinivasa Rao (Notion Press)