



B.Tech. I Year COURSE STRUCTURE (SR25 Regulations)

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from the Academic Year 2025-26

I Year I Semester

S. No.	Course Code	Course Title	L	T	P	Credits
1	S25MA101BS	Matrices and Calculus	3	1	0	4
2	S25CH102BS	Engineering Chemistry	3	0	0	3
3	S25EN103HS	English for Skill Enhancement	3	0	0	3
4	S25EE104ES	Introduction to Electrical Engineering	2	0	0	2
5	S25CS105ES	Programming for Problem Solving	3	0	0	3
6	S25CH106BS	Engineering Chemistry Lab	0	0	2	1
7	S25CS107ES	Programming for Problem Solving Lab		0	2	1
8	S25EN108HS	English Language and Communication Skills Laboratory	0	0	2	1
9	S25EE109ES	Electrical Engineering Lab	0	0	2	1
10	S25MC110	YOGA/NSS/NCC				
		Induction Program				
		Total Credits	14	01	08	19

I Year II Semester

S. No.	Course Code	Course Title	L	T	P	Credits
1	S25MA201BS	Ordinary Differential Equations and Vector Calculus	3	0	0	3
2	S25PH202BS	Advanced Engineering Physics	3	1	0	4
3	S25ME203ES	Engineering Drawing and Computer Aided Drafting	0	1	2	2
4	S25CS204ES	Python Programming	3	0	0	3
5	S25CS205ES	Data Structures	3	0	0	3
6	S25PH206BS	Advanced Engineering Physics Lab	0	0	2	1
7	S25CS207ES	Data Structures Lab	0	0	2	1
8	S25EC208ES	Network Analysis and Synthesis	3	0	0	3
9	S25ME209ES	Engineering Workshop	0	0	2	1
10	S25EC210ES	Applied Python Programming Laboratory	0	0	2	1
		Total Credits	15	2	10	22

**S25MA101BS: Matrices And Calculus****B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING****Applicable from AY 2025-26****B.Tech. I Year I Sem.**

L	T	P	C
3	1	0	4

Course Objectives: To learn

1. Applying basic operations on matrices and their properties.
2. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
3. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical Form.
4. Geometrical approach to the mean value theorems and their application to the mathematical problems.
5. Finding maxima and minima of functions of two and three variables.
6. Evaluation of multiple integrals and their applications.

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

1. Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations.
2. Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
3. Solve the applications of the mean value theorems.
4. Find the extreme values of functions of two variables with/ without constraints.
5. Evaluate the multiple integrals and apply the concept to find areas, volumes.

UNIT - I: Matrices**8L**

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

UNIT - II: Eigen values and Eigen vectors**10L**

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

10L

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)

10L

Definitions of Limit and continuity, Partial Differentiation: Euler's Theorem, 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)

10L

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals, Change of variables (Cartesian to polar) for double Applications: Areas and volumes by double integrals.

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.



SPHOORTHY
ENGINEERING COLLEGE
(UGC AUTONOMOUS)

S25 CH102BS: ENGINEERING CHEMISTRY

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-26

B.Tech. I Year I Sem.

L T P C
3 0 0 3

Course Objectives:

1. To develop adaptability to new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.
2. 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.
3. To impart foundational knowledge of various energy sources and their practical applications in engineering.
4. To equip students with an understanding of smart materials, biosensors, and analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.

Course Outcomes:

1. Students will be able to understand the fundamental properties of water and its applications in both domestic and industrial purposes.
2. Students will gain basic knowledge of electrochemical processes and their relevance to corrosion and its control methods.
3. Students will comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs.
4. Students will learn the basic concepts and properties of polymers and other engineering materials.
5. Students will be able to apply the principles of UV-Visible, IR spectroscopy in analyzing pollutants in dye industries and biomedical applications.

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

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

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning, 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 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, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods.

UNIT-III: Energy sources: [8]

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

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

Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil, 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-preparation properties and applications of Bakelite

Plastics, Elastomers and Fibers: Definition and applications (PVC, Buna-S, Nylon-6,6). Differences between thermoplastics and thermosetting plastics.

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

Biodegradable polymers: Polylactic acid and its applications.

UNIT-V- Advanced Functional Materials: [8]

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

Smart materials: Introduction, Classification with examples - Shape Memory Alloys – Nitinol,

Piezoelectric materials: Classification with examples, properties and applications.

Interpretative spectroscopic applications: Introduction- principle of spectroscopy-EMR - types of spectroscopy-applications of UV-Visible spectroscopy for Analysis of

pollutants in dye industry -applications of IR spectroscopy in night vision-security.

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 Books:

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. <https://archive.org/details/EngineeringChemistryByShashiChawla/page/n111/mode/2u>

**B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING****Applicable from AY 2025-26****S25EN103HS : ENGLISH FOR SKILL ENHANCEMENT****B.Tech. I Year I Sem****L T P C****3 0 0 3****INTRODUCTION**

National Education Policy-2020 aims at preparing students with knowledge, skills, values, leadership qualities and initiates them for lifelong learning. It also emphasizes language study and promotion of languages through understanding and proper interpretation. English language is central to the educational eco system. The importance of language as medium of communication for personal, social, official and professional needs to be emphasized for clear and concise expression. Teaching and learning of receptive and productive skills viz., Listening, Speaking, Reading and Writing (LSRW) are to be taught and learnt effectively in the undergraduate Engineering programs. Learners should be encouraged to engage in a rigorous process of learning to become proficient users of English language by adopting a deeply focused and yet flexible approach as opposed to rote learning.

In this connection, suitable syllabus, effective pedagogy, continuous assessments and students' involvement result in productive learning. This course supports the latest knowledge and skill requirements and shall meet specified learning outcomes. The main objectives of English language teaching and learning as medium of communication and for promotion of cultural values are embedded in this syllabus. Efforts are being made in providing a holistic approach towards value-based language learning which equips the learner with receptive as well as productive skills.

The focus in this syllabus is on skill development, fostering ideas and practice of language skills in various contexts and cultures in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed textbook for detailed study. The students should be encouraged to read the texts leading to reading comprehension. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material.

LEARNING OBJECTIVES: This course will enable the students to:

- Improve their vocabulary.
- Use appropriate sentence structures in their oral and written communication.
- Develop their reading and study skills.
- Equip students to write paragraphs, essays, précis and draft letters.
- 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.

SYLLABUS: The course content / study material is divided into **Five Units**.**UNIT –I**

Theme:	Perspectives Lesson on ‘The Generation Gap’ by Benjamin M. Spock from the prescribed textbook titled <i>English for the Young in the Digital World</i> 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 ‘ <i>Emerging Technologies</i> ’ from the prescribed textbook titled <i>English for the Young in the Digital World</i> published by Orient BlackSwan 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 ‘ <i>Leisure</i> ’ by William Henry Davies and ‘ <i>Be Thankful</i> ’ - Unknown Author from the prescribed textbook titled <i>English for the Young in the Digital World</i> published by Orient BlackSwan Pvt. Ltd.
Vocabulary:	Words Often Confused - Words from Foreign Languages and their Use in English.
Grammar:	Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading:	Sub-Skills of Reading – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.
Writing:	Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter

of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette.

UNIT –IV

- Theme: Entrepreneurship
Lesson on ‘*Why a Start-Up Needs to Find its Customers First*’ by Pranav Jain from the prescribed textbook titled *English for the Young in the Digital World* published by Orient BlackSwan 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 BlackSwan Pvt. Ltd.
- Vocabulary: Technical Vocabulary and their Usage– One Word Substitutes – Collocations.
- Grammar: Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
- Reading:** Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice
- Writing:** *Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.*

Note: *Listening and Speaking skills which are given under Unit-6 in AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.*

- (Note: As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech. First Year is **Open-ended**, besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.)

TEXT BOOK:

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* Mc Graw-Hill



SPHOORTHY

ENGINEERING COLLEGE

(UGC AUTONOMOUS)

B. Tech in ELECTRONICS COMMUNICATION ENGINEERING (ECE)

S25EE104HS: Introduction to Electrical Engineering

Applicable from AY 2025-26

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage 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 and Norton Theorems.

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 ac circuits consisting of R, L, C, RL, RC, RLC combinations (series resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III: Transformers

Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer

UNIT-IV: Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of Shunt dc motor.

UNIT-V: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of

Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. power factor improvement.

Suggested Text-Books/Reference-Books:

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S. Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson, 2010
5. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.



S25CS105ES: PROGRAMMING FOR PROBLEM SOLVING

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-26

B.Tech. I Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

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

Course Outcomes: The student will learn

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C programs.
3. To code and test a given logic in the C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs.
6. Searching and sorting problems.

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.

Repetition and 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: Top-Down Design with Functions: Building Programs from Existing Information, Library Functions, Top-Down Design and Structure Charts, Functions without Arguments, Functions with Input Arguments.

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.

UNIT - III: Arrays: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Array Arguments, Searching and Sorting an Array, Parallel Arrays and Enumerated Types, Multidimensional Arrays.

Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, Arrays of Pointers.

UNIT - IV: Recursion: The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, Recursive Functions with Array and String Parameters.

Structure and Union Types: User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Union Types.

UNIT- V: Text and Binary File Pointers: Input/ Output Files - Review and Further Study, Binary Files, Searching a Database.

Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms)

Text Books:

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

Reference Books:

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



SPHOORTHY

ENGINEERING COLLEGE

(UGC AUTONOMOUS)

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

S25 CH106BS: ENGINEERING CHEMISTRY LAB

Applicable from AY 2025-26

B.Tech. I Year I Sem.

L T P C
0 0 2 1

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

Course Objectives

1. 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, potentiometry, and pH metry.
4. Students will gain hands-on experience in synthesizing polymers like Bakelite in the laboratory.
5. Students will learn to determine the strength of sulphuric acid in batteries.
6. Students will understand and perform pH testing for beverages
7. Students will acquire the knowledge about the softwares used to draw chemical structures

Course Outcomes:

1. Students will develop practical skills through hands-on chemistry experiments relevant to engineering.
2. Students will learn to determine important parameters such as water hardness and the corrosion rate of mild steel under various conditions.
3. Students will be able to apply techniques like conductometry, potentiometry, and pH metry to determine concentrations or equivalence points in acid-base reactions.
4. Students will gain experience in synthesizing polymers such as Bakelite
5. Students are able to determine the strength of sulphuric acid in acid batteries.
6. Students are able to perform pH testing for beverages
7. Students will be able to draw the chemical structures using chemdraw/chemsketch softwares which are generally employing in chemical field.

List of Experiments:

- I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometry method.
- II. Conductometry:
 1. Estimation of the concentration of strong acid by Conductometry.
 2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.
- III. Estimation of KMnO_4 using std. oxalic acid by titrimetric method.
- IV. Potentiometry: Estimation of concentration of Fe^{+2} ion by Potentiometry using KMnO_4 .
- V. pH Metry: Determination of an acid concentration using pH meter.
- VI. Preparations: Preparation of Bakelite.
- VII. Battery: Determination of strength of sulphuric acid in Lead-acid battery by acid-base titration.
- VIII. Food analysis: Determination of pH of mineral water, soft drinks and fruit juice a comparative method using universal indicator, universal pH paper and pH-meter

Computer based lab (virtual lab):

Draw the following chemical structures using Chemdraw / Chems sketch softwares

i. EDTA ii. EBT iii. M-EDTA iv. M-EBT

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).
5. <https://www.acdlabs.com/resources/free-chemistry-software-apps/chemsketch-freeware/>

<https://www.youtube.com/watch?v=JXBu1qMyO0A>

**S25CS107ES: PROGRAMMING FOR PROBLEM SOLVING LAB****B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING**

Applicable from AY 2025-26

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

*[Note: The programs may be executed using any available Open Source/ Freely available IDE**Some of the Tools available are:**CodeLite: <https://codelite.org/>**Code::Blocks: <http://www.codeblocks.org/>**DevCpp : <http://www.bloodshed.net/devcpp.html>**Eclipse: <http://www.eclipse.org>**This list is not exhaustive and is NOT in any order of preference]***Course Objectives:** The students will learn the following:

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

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

1. formulate the algorithms for simple problems
2. translate given algorithms to a working and correct program
3. correct syntax errors as reported by the compilers
4. identify and correct logical errors encountered during execution
5. represent and manipulate data with arrays, strings and structures
6. use pointers of different types
7. create, read and write to and from simple text and binary files
8. modularize the code with functions so that they can be reused

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 display the values using the array.
- d) Write a program for display values reverse order from an array using a pointer.

Files:

- a) Write a C program which 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 n Characters from a given position in a given string
- b) Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
- c) Write a C program that displays the position of a character ch in the string S or - 1 if S doesn't contain ch.
- d) Write a C program to count the lines, words and characters in a given text.

Sorting and Searching:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)

5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.



B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING
S25EN108HS : ENGLISH LANGUAGE AND COMMUNICATION
SKILLS LAB

Applicable from AY 2025-26

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

The English Language and Communication Skills (ELCS) Lab focuses on listening and speaking skills, particularly on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Listening Skills:

Objectives

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 practise speaking in social and professional contexts

Learning 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

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

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

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

Exercise – I

CALL Lab:

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

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

ICS Lab:

❖ **Diagnostic Test – Activity titled ‘Express Your View’**

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

Practice: Any Ice-Breaking Activity

Exercise – II CALL

Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

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

Exercises (It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: Features of Good Conversation – Strategies for Effective Communication

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

Exercise - III CALL

Lab:

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

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

ICS Lab:

Instruction: Describing Objects, Situations, Places, People and Events

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

Exercise – IV CALL

Lab:

Instruction: Techniques for Effective Listening

Practice: Listening for Specific Details - Listening - Gap Fill Exercises - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:

Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity

Practice: Activity on Telling and Retelling Stories - Collage

Exercise – V CALL

Lab:

Instruction: Identifying the literal and implied meaning

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

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

ICS Lab:

Instruction: Understanding Non-Verbal Communication

Practice: Silent Speech - Dumb Charades Activity

❖ **Post-Assessment Test on ‘Express Your View’**

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

- i) Computers with Suitable Configuration
- ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio- visual aids with a Public Address System, a T. V. or LCD, a digital stereo — audio & video system and camcorder etc.

□ **Note: English Language Teachers are requested to prepare Materials / Handouts for each Activity for the Use of those Materials in CALL & ICS Labs.**

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 (Series 1-4), 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 BlackSwan Pvt. Ltd.**
3. Mishra, Veerendra et al. (2020). *English Language Skills: A Practical Approach*. Cambridge University Press
4. (2022). *English Language Communication Skills – Lab Manual cum Workbook*. Cengage Learning India Pvt. Ltd.
5. Ur, Penny and Wright, Andrew. 2022. *Five Minute Activities – A Resource Book for Language Teachers*. Cambridge University Press.



SPHOORTHY

ENGINEERING COLLEGE

(UGC AUTONOMOUS)

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

S25EE109ES: Electrical Engineering Lab

Applicable from AY 2025-26

B.Tech. I Year I Sem.

L	T	P	C
0	0	2	1

Prerequisites: Basic Electrical Engineering

Course Objectives:

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

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

- Verify the basic Electrical circuits through different experiments.
- Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
- Analyze the transient responses of R, L and C circuits for different input conditions.

List of experiments/demonstrations:

PART- A (compulsory)

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
4. Resonance in series RLC circuit
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
7. Performance Characteristics of a DC Shunt Motor
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

1. Verification of Superposition theorem.
2. Three Phase Transformer: Verification of Relationship between Voltages and Currents(Star-Delta, Delta-Delta, Delta-star, Star-Star)
3. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit
5. 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.
4. Abhijit Chakrabarthy, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
6. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
7. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989.



S25MA201BS: Ordinary Differential Equations and Vector Calculus

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-26

B.Tech. I Year II Sem.

L	T	P	C
3	0	0	3

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 content of this course, students will be able to

1. Recognise and solve first-order differential equations, and apply this to Newton's law of cooling and the Law of natural growth and decay.
2. Solve higher order linear differential equation with constant coefficients and few specific non homogeneous terms.
3. Find Laplace and Inverse Laplace transform of various functions and apply it to solve ordinary differential equations.
4. Evaluate the directional derivative and scalar potential for given vector functions.
5. Evaluate the line, surface and volume integrals and establish the relation among them.

UNIT - I: First Order Ordinary Differential Equations

8 L

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

10L

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

10L

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, 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

10L

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

UNIT- V: Vector Integration

10L

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.



B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-2026 Batch

S25PH202BS : ADVANCED ENGINEERING PHYSICS

L	T	P	C
3	1	0	4

B.Tech. I Year II Sem.

Course Objectives:

1. Introduce the fundamental principles of quantum mechanics and their application to physical systems.
2. Develop an understanding of semiconducting and nanomaterials with relevance to modern electronic devices.
3. Analyze the electrical behavior of semiconducting materials and interpret the characteristics and applications of diodes and solar cells.
4. Illustrate the dielectric and magnetic properties of materials and their technological applications
5. Describe the working principles of lasers and optical fibres in communication and sensing technologies

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

1. Explain the fundamental principles of quantum mechanics and apply Schrödinger's equation to simple systems such as a particle in a box and energy band formation.
2. Analyze the electrical behavior of semiconducting materials and interpret the characteristics and applications of diodes and solar cells.
3. Describe the synthesis, properties, and characterization of nanomaterials and their significance in modern technology.
4. Illustrate the concepts of Qubits, quantum gates, and evaluate the advantages of quantum computing and cryptography.
5. Explain the dielectric, magnetic, and optical properties of materials and relate them to device applications such as FeRAM, GMR, and optical fibre communication

UNIT - I: Quantum Mechanics

Introduction, de-Broglie hypothesis, Davison and Germer Experiment, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, formation of energy bands, classification of solids, concept of discrete energy levels.

UNIT - II: Semiconducting and nanomaterials

Introduction to Semiconductors, Drift and Diffusion (qualitative), Hall effect, direct and indirect band gap semiconductors, Generation and Recombination, Construction, working principle, characteristics and applications of – P-N Junction diode, Zener diode LED, Photodiode, PIN diode and solar cell.

Introduction to nano materials, Quantum confinement, Surface area to volume ratio, Preparation of nano materials by Sol-Gel, Ball milling, Physical vapour deposition techniques, Characterization of nano materials - XRD (calculation of average crystallite size using Debye Scherrer's formula), scanning electron microscopy (SEM), Transmission Electron Microscopy (TEM).

UNIT - III: Quantum Computing

Introduction to quantum computing, challenges and advantages of quantum computing over classical computation, linear algebra for quantum computation (qualitative), Dirac's Bra and Ket notations and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, entanglement, quantum gates (Basic and universal gates), Quantum Cryptography.

UNIT - IV: Dielectric and Magnetic materials

Dielectric Materials: Basic definitions, Types of polarizations-Electronic, Ionic and orientation polarization (qualitative), ferroelectric, piezoelectric and pyroelectric materials and their application: Ferroelectric Random Access Memory (Fe-RAM).

Magnetic materials: Origin of magnetic moment – Classification of magnetic materials – Weiss domain theory of ferromagnetism - Hysteresis- soft and hard magnetic materials, Giant Magneto Resistance (GMR) device.

UNIT - V: Laser and Fibre Optics

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

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

Learning Resources:

1. Quantum Physics, H.C. Verma, 2nd Edition 2012, TBS Publication
2. Thomas G. Wong, *Introduction to Classical and Quantum Computing*, Rooted Grove
3. Donald A. Neamen, “*Semiconductor Physics and Devices- Basic Principle*”, Mc Graw Hill, 4th Edition 2021.
4. B.K. Pandey and S. Chaturvedi, “*Engineering Physics*”, Cengage Learning, 2nd Edition 2022.
5. “*Essentials of Nanoscience and Nanotechnology*” by Narasimha Reddy Katta, Typical Creatives Nanodigest 1st Edition 2021.

Useful Links

- <https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fibercommunications-principles-and-pr.pdf>
- <https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf>
- <https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf>
- <https://www.fi.muni.cz/usr/gruska/qbook1.pdf>
- <https://profmcrz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-andquantum-information-nielsen-chuang.pdf>



**S25ME203ES: ENGINEERING DRAWING AND COMPUTER AIDED
DRAFTING**

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from A.Y: 2025-26

B.Tech. I Year II Sem.

L T P C
0 1 2 2

Course Objectives:

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

Course Outcomes:

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

1. Understand and apply the principles of orthographic and isometric projections.
2. Create sectional views and dimensioned drawings using BIS standards.
3. Use CAD software to generate 2D engineering drawings.
4. Visualize and construct solid models from 2D views.
5. Interpret and produce engineering drawings of mechanical components and assemblies.
6. Demonstrate drafting skills for practical and industrial applications.

UNIT-I: Introduction to Engineering Graphics

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

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

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: Prism, Cylinder, Pyramid and Cone.

UNIT–V: Isometric Projections

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.

Note: Explanation, Practice, Internal & External evaluation both are to be conducted using computer aided drafting.

TEXTBOOKS:

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

REFERENCEBOOKS:

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



S25CS204ES: PYTHON PROGRAMMING

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-26

B.Tech. I Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites: Basic knowledge of computer fundamentals, C programming

Course Objectives:

Introduce the fundamentals of Python programming for problem-solving.

1. Develop skills to write structured, modular, and efficient Python code.
2. Enable students to use Python's built-in data structures and libraries effectively.
3. Provide knowledge on file handling, exception handling, and object-oriented programming in Python.
4. Equip students with the ability to apply Python for real-world applications including data processing and automation.

Course Outcomes:

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-1 – 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-2 – 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-3 – 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 in Python, Modules: Importing, Creating User-defined Modules, Standard Modules (math, random, datetime), Packages in Python.

UNIT-4 – File Handling and Exception Handling

File Handling: Opening, Reading, Writing, Appending, File Modes, File Methods, Working with CSV R25 B.Tech. ECE Syllabus JNTUH Hyderabad and JSON Files, Exception Handling: try, except, else, finally, Built-in Exceptions, Raising Exceptions, Introduction to Regular Expressions (re module).

UNIT-5 – 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.

TEXT BOOKS:

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.



S25CS205ES: CS205ES: DATA STRUCTURES

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-26

B.Tech. I Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites: A course on “Programming for Problem Solving

Course Objectives

- ☐ 1.Exploring basic data structures such as stacks and queues.
- ☐ 2.Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
- ☐ 3.Introduces sorting and pattern matching algorithms.

Course Outcomes

- ☐ 1.Ability to select the data structures that efficiently model the information in a problem.
- ☐ 2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
- ☐ 3.Implement and know the application of algorithms for sorting and pattern matching.
- ☐ 4.Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT – I

Introduction to Data Structures: Basic Terminology, Classification of Data Structures, Operation on Data Structures, abstract data types, selecting a Data Structure, Linear list – Introduction, singly linked list, Circular Linked Lists, Doubly Linked List, Stacks- Operations, Stack algorithm, Stack ADT, Stack applications, Queues- operations, Queue Algorithm, Queue ADT, Queue Applications.

UNIT - II

Trees: Introduction, Types of Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree, Binary Search Trees (BST), BST Operations- Searching, Insertion and Deletion, BST ADT, BST Applications, Threaded Binary Trees, AVL Trees, Red –Black Trees, Splay Trees.

UNIT – III

Multi way Search Trees: Introduction, B Trees, B Trees ADT, 2-3 Trees, 2-3- Tree, B* Tree, B+ Trees
Heaps: Binary Heaps, Binomial heaps, Fibonacci heaps, Comparison of Various Heaps, Applications
Searching: Introduction, Interpolation Search, Jump search

UNIT - IV

Graphs: Introduction, Directed Graphs, Bi connected Components, Representation of Graphs, Graph Traversal Algorithms, Graph ADT, Applications of Graphs
Sorting: Radix Sort, Heap sort, Shell Sort, Tree Sort,

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

Files and their Organization: Introduction, Data hierarchy, File Attributes, Text and Binary Files, Basic File Operations, File Organization, Indexing.

TEXTBOOKS:

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

REFERENCE:

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



B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING
Applicable from AY 2025-2026 Batch
S25PH206BS : ADVANCED ENGINEERING PHYSICS LABORATORY

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Course Objectives:

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

Course Outcomes:

1. CO1: Synthesize and analyze nanomaterials such as magnetite (Fe_3O_4) using chemical methods.
2. CO2: Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
3. CO3: Characterize semiconductors using Hall effect and energy gap measurement techniques.
4. CO4: Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
5. CO5: Apply scientific methods for accurate data collection, analysis, and technical report writing.

List of Experiments:

1. Determination of work function and Planck's constant using photoelectric effect.
2. Determination of Energy gap of a semiconductor.
3. V-I characteristics of a p-n junction diode and Zener diode.
4. V-I and L-I characteristics of light emitting diode (LED).
5. V-I Characteristics of solar cell.
6. Determination of dielectric constant of a given material.
7. Study B-H curve of a magnetic material.
8. Determination of wavelength of given laser beam using diffraction Grating
9. Determination of the beam divergence of the given LASER beam
10. a) Calculate Acceptance angle and Numerical Aperture of Optical Fiber
b) Determination of bending losses in an optical fiber.

Note: Any 8 experiments are to be performed.



S25CS207ES:DATA STRUCTURES LAB

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-26

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Prerequisites: 1. A Course on “Programming for problem solving”.

Course Objectives:

1. It covers various concepts of C programming language
2. It introduces searching and sorting algorithms
3. It provides an understanding of data structures such as stacks and queues.

Course Outcomes:

1. Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
2. Ability to Implement searching and sorting algorithms

List of Experiments

1. Write a program that uses functions to perform the following operations on singly linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
i) Arrays ii) ADT
5. Write a program that implement Queue (its operations) using
i) Arrays ii) ADT
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
i) Radix Sort, ii) Heap sort, iii) Shell Sort, iv) Tree Sort
7. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
8. Write a program to implement
i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Write a program to implement the following Hash Functions: i) Division Method, ii) Multiplication Method, iii) Mid-square Method, iv) Folding 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 BOOK:

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



SPHOORTHY

ENGINEERING COLLEGE

(UGC AUTONOMOUS)

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

S25EC208ES: NETWORK ANALYSIS AND SYNTHESIS

Applicable from AY 2025-26

B.Tech. I Year II Sem.

L T P C
3 0 0 3

Course Objectives:

1. To understand the basic concepts on RLC circuits.
2. To know the behavior of the steady state and transient states in RLC circuits.
3. To understand the two port network parameters.
4. Learn the design concepts of various filters and attenuators

Course Outcomes: Upon successful completion of the course, students will be able to:

1. Gain the knowledge on basic RLC circuits behaviour.
2. Analyse the Steady state and transient analysis of RLC Circuits.
3. Characterization of two port network parameters.
4. Analyse the Design aspect of various filters and attenuators

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	1	-	-	-	-	1
CO2	2	3	2	-	-	-	1	-	-	-	-	1
CO3	3	2	1	-	-	-	-	-	-	-	-	1
CO4	2	3	3	-	-	-	1	-	-	-	-	1

UNIT - I

Network Topology: Basic cutset and tie set matrices for planar networks, Magnetic Circuits, 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.

TEXT BOOKS:

1. Van Valkenburg -Network Analysis, 3rd Ed., Pearson, 216.
2. JD Ryder - Networks, Lines and Fields, 2nd Ed., PHI, 1999.

REFERENCE BOOKS:

1. J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, Mc Graw Hills Education, 1999.
2. A. Sudhakar and Shyammohan S Palli - Networks & Circuits, 4th Ed., Tata McGraw- Hill Publications
3. William Hayt and Jack E. Kimmerley - Engineering Circuit Analysis, 6th Ed., William Hayt and Jack E. Kimmerley, McGraw Hill Company



S25ME209ES: ENGINEERINGWORKSHOP

B.Tech. in ELECTRONICS AND COMMUNICATION ENGINEERING

Applicable from AY 2025-26

B.Tech. I Year II Sem

L T P C
0 0 2 1

Pre requisites : Practical skill

Course Objectives:

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

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

1. Understand the basic manufacturing processes and operations.
2. Use hand tools and equipment safely and efficiently.
3. Perform basic operations in carpentry ,fitting ,welding ,sheet metal work ,and machining
4. Read and interpret workshop drawings
5. Develop team work, time management ,and quality awareness in a workshop environment.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

- I. Carpentry – (**Planning Practice & Cutting**, T-Lap Joint, Dovetail Joint, Mortise & Tenon Joint)
- II. Fitting – (**Cutting & Square Filing-Fit**, **Square Fit & Semi-circular fit**)
- III. Tin-Smithy – (Square Tin, Rectangular Tray & Cone **Making**)
- IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
- V. Welding Practice – (Arc Welding & **Soldering**)
- VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
- VII. Black Smithy – (Round to Square, Fan Hook and S-Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE : (Any Four)

Plumbing, **3-D printing**, **Laser cutting**, **Introduction to Pneumatics**, Power tools in construction and Wood Working.

TEXTBOOKS:

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

REFERENCEBOOK:

1. Work shop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012.



S25EC210ES: APPLIED PYTHON PROGRAMMING LAB

Syllabus to ECE

Applicable from AY 2025-26

B.Tech. I Year II Sem.

L	T	P	C
0	0	2	1

Course Outcomes: Upon completing this course, the students will be able to

1. Build basic programs using fundamental programming constructs
2. Write and execute python codes for different applications
3. Capable to implement on hardware boards

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.org/3/using/windows.html>

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.