R 25 Regulations
Course Structure
Computer Science and Engineering
Academic Year: 2025-26

I-Year, Semester-I

S.No	Course Code	Course Title	L	T	P	Credits
1		Matrices and Calculus	3	1	0	4
2		Engineering Chemistry	3	0	0	3
3		English for Skill Enhancement	3	0	0	3
4		Electronic Devices and Circuits	3	0	0	3
5		Programming for Problem Solving	3	0	0	3
6		Engineering Chemistry Lab	0	0	2	1
7		Programming for Problem Solving Lab	0	0	2	1
8		Engineering Workshop	0	0	2	1
9		English Language and Communication Skills Lab	0	0	2	1
10		Induction Program				
		Total Credits	**15**	**1**	**8**	**20**

I-Year, Semester-II

S.No	Course Code	Course Title	L	T	P	Credits
1		Ordinary Differential Equations and Vector Calculus	3	1	0	4
2		Advanced Engineering Physics	3	0	0	3
3		Engineering Drawing and Computer Aided Drafting	2	0	2	3
4		Basic Electrical Engineering	3	0	0	3
5		Data Structures	3	0	0	3
6		Advanced Engineering Physics Lab	0	0	2	1
7		Data Structures Lab	0	0	2	1
8		Basic Electrical Engineering Lab	0	0	2	1
9		IT Workshop	0	0	2	1
		Total Credits	**14**	**1**	**10**	**20**

R25 B.Tech Syllabus

MA101BS: MATRICES AND CALCULUS
Common to MECH, ECE, CSE, CSE(AI&ML)

I B.Tech – I Sem

L	T	P	C
3	1	0	4

Pre-requisite: Mathematical Knowledge at pre-university level

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 analyze the solution of the system of equations
2. Find the Eigen values and Eigenvectors
3. Reduce the quadratic form to canonical form using orthogonal transformations.
4. Solve the applications of the mean value theorems.
5. Find the extreme values of functions of two variables with/without constraints.
6. Evaluate the multiple integrals and apply the concept to find areas and volumes.

UNIT – I: Matrices

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 Jacobi iteration method, Gauss Seidel Iteration Method.

UNIT – II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values, Eigen vectors and their properties,Diagonalization of a matrix,CayleyHamilton Theorem (withoutproof) Finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic FormsReduction of Quadratic form to canonical form by Orthogonal Transformation.

UNIT – III: Single Variable Calculus

Limit and Continuous of functions and its properties. Mean value theorems: Rolle's theorem,Lagrange's Mean value theorem with their Geometrical Interpretation and applicationsCauchy'sMean value Theorem,Taylor's Series (Allthetheoremswithoutproof).Maclaurin's

series.

UNIT – IV: Multivariable Calculus (Partial Differentiation and applications)
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)
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.
Applications: Areas by double integrals and volumes by triple integrals.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Useful Links

B.Tech
CSE/ECE/CSE(AI&ML)

CH102BS: ENGINEERING CHEMISTRY

I B.Tech – I Sem

L	T	P	C
3	0	0	3

Pre-requisite: Pre-university knowledge

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 and Raman spectroscopy in analyzing pollutants in dye industries and biomedical applications.

UNIT – I: Water and its treatment

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:

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.

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

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 and characteristics of a good fuel, Calorific value – Units - HCV, LCV- Dulongs 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

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

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

Biodegradable polymers: Poly lactic acid and its applications.

UNIT – V: Advanced Functional Materials:

Smart materials: Introduction, Classification with examples - Shape Memory Alloys – Nitinol, Piezoelectric materials – quartz and their engineering applications.

Biosensor - Definition, 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 Monitoring- 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 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.

Useful Links

1. E-Content- https://doi.org/10.1142/13094 | October 2023

2. E-books: https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u

R25 B.Tech CSE Syllabus

English for Skill Enhancement

I B.Tech – I Sem

L	T	P	C
3	0	0	3

Course Objectives:

a. Improve their vocabulary
b. Use appropriate sentence structures in their oral and written communication.
c. Develop their reading and study skills.
d. Equip students to write paragraphs, essays, precis and draft letters
e. Acquire skills for Technical report writing.

Course Outcomes: Students will be able to:

a. Choose appropriate vocabulary in their oral and written communication.
b. Demonstrate their understanding of the rules of functional grammar and sentence structures.
c. Develop comprehension skills from known and unknown passages
d. Write paragraphs, essays, precis and draft letters
e. 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 andTenses
Reading: Sub-Skills of Reading – Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume –Difference between Writing a Letter and an Email - Email Etiquette

UNIT – IV:
Theme: Entrepreneurship
Lesson on 'Why a Start-Up Needs to Find its Customers First' by Pranav Jain from the prescribed textbook titled English for the Young in the Digital World published by Orient Black Swan Pvt. Ltd.
Vocabulary: Standard Abbreviations in English – Inferring Meanings of Words through Context – Phrasal Verbs – Idioms.
Grammar: Redundancies and Clichés in Written Communication – Converting Passive to Active Voice and Vice-Versa.
Reading: Prompt Engineering Techniques– Comprehending and Generating Appropriate Prompts - Exercises for Practice
Writing: Writing Practices- Note Making-Précis Writing.

UNIT – V:
Theme: Integrity and Professionalism
Lesson on 'Professional Ethics' from the prescribed textbook titled English for the Young in the Digital World published by Orient Black Swan Pvt. Ltd.
Vocabulary: Technical Vocabulary and their Usage– One Word Substitutes – Collocations.
Grammar: Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
Reading: Survey, Question, Read, Recite and Review (SQ3R Method) – Inferring the Meaning and Evaluating a Text- Exercises for Practice
Writing: Report Writing - Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.

TEXT BOOKS:
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 Education India Pvt. Ltd.

Useful Links

- https://hostnezt.com/cssfiles/english/Practical%20English%20Usage%20by%20Michael%20Swan.pdf
- https://mis.alagappauniversity.ac.in/siteAdmin/dde-admin/uploads/6/__UG_B.A._English_112%2064_Remedial%20English%20Grammar_4066.pdf
- https://aissmschmct.in/wp-content/uploads/2020/07/BOOK-BSc-HS-Sem-III-HS308-Communication-Skills-1.pdf
- https://ebooks.lpude.in/new-scheme/arts/ma_english/sem_1/DEENG539_ACADEMIC_ENGLISH.pdf

R25 B.Tech CSE Syllabus

ELECTRONIC DEVICES AND CIRCUITS

I B.Tech – I Sem

L	T	P	C
3	0	0	3

Pre-requisite: 10+2 Physics

Course Objectives:

1. Introduce the fundamental characteristics and applications of semiconductor diodes and their circuit implementations.
2. Explain the working principles, configurations, and characteristics of Bipolar Junction Transistors (BJTs).
3. Develop an understanding of BJT biasing techniques, operating point stability, and thermal considerations.
4. Analyze transistor amplifiers using small-signal models and h-parameter equivalent circuits.
5. Familiarize students with special-purpose diodes and their applications in electronic circuits.
6. Explore the structure, operation, and characteristics of Field Effect Transistors (FETs), MOSFETs, and advanced nanoscale devices like FinFETs and CNTFETs.

Course Outcomes:

1. Explain the I–V characteristics of semiconductor diodes and their use in rectifiers, clippers, clampers, and voltage regulation.
2. Analyze the operation and characteristics of BJTs in different configurations and extract h-parameters.
3. Apply various BJT biasing techniques to establish a stable operating point and mitigate thermal runaway
4. Evaluate the performance of transistor amplifiers (CE, CB, CC) using small-signal models and h-parameters.
5. Demonstrate the principle and applications of special-purpose diodes such as SCR, tunnel diode, varactor, photodiode, LED, and solar cell.
6. Compare and Contrast FET, MOSFET, FinFET, and CNTFET devices in terms of structure, characteristics, and scaling advantages for modern VLSI.

UNIT – I: Diode Characteristics and Applications

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

UNIT – II: Bipolar Junction Transistor (BJT)

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

UNIT – III: BJT Biasing

Need for biasing and stabilization, Load line and operating point, Biasing techniques: Fixed bias, Collector-

to-base bias, Voltage divider bias, Stability factors and thermal runaway

UNIT – IV: Transistor Amplifiers

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

UNIT – V: Special Devices

Special Purpose Diodes: Principle of Operation of – SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED and Schottky Diode
Field Effect Transistors and Advanced Devices: JFET: Structure, operation, and characteristics
MOSFET: Enhancement and Depletion modes – Structure, operation, and characteristics
Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET

TEXT BOOKS:

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

REFERENCE BOOKS:

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

R25 B.Tech CSE Syllabus

PROGRAMMING FOR PROBLEM SOLVING

I B.Tech – I Sem

L	T	P	C
3	0	0	3

Pre-requisite: 10+2 Maths

Course Objectives: The course aims to

1. Understand problem-solving methodologies using algorithms and flowcharts.
2. Learn fundamentals of C programming language constructs.
3. Implement control structures, functions, and modular programming techniques.
4. Use arrays, strings, structures, pointers, and file handling to solve computational problems.
5. Use pre-processor directives and user-defined data types to enhance code modularity and maintainability

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

1. Design algorithms and flowcharts to solve problems and Write C programs using appropriate data types, operators, and expressions.
2. Use control flow constructs such as conditional and loop statements to implement logic.
3. Manipulate arrays, strings, and structures to solve real-world problems.
4. Apply modular programming using functions and recursion effectively.
5. Demonstrate effective use of pointers and dynamic memory allocation.
6. Perform file operations and use pre processor directives in C programs.

UNIT – I: Introduction to C Programming

Problem Solving: Algorithms, Flowcharts, Pseudo code with examples

Structure of a C Program, Compilation and Execution Process, Variables, Constants, Data Types. Operators: Arithmetic, Relational, Logical, Assignment, Bitwise, Unary, Conditional Type Conversion ,Expressions and precedence and Expression Evaluation, Input and Output: formatted/unformatted I/O

UNIT – II: Control Structures and Arrays

Conditional Branching: if, if-else, nested if-else, if else if ladder, switch-case, Iteration: for, while, do-while ,Jump Statements: break, continue, goto

Arrays: Declaration, Initialization and Access, One Dimensional Arrays and Two Dimensional Arrays ,Applications in Problem Solving

UNIT – III: Strings and Functions

String Handling: Declaration, Initialization, Standard Functions: strlen, strcat, strcpy, strcmp, Manual string manipulation (without string.h)

Functions: Declaration, Definition, Calling, Types /Categories of user defined functions,

Parameter Passing: Call by Value Recursion: The Nature of Recursion, Tracing a Recursive Function,

Recursive Mathematical Functions, Scope and Storage Classes (auto, extern, static, register)

UNIT – IV: Structures, Pointers and Dynamic Memory

Structures and Unions: Declaration, Initialization, Nested Structures, Array of Structures, Passing Structures to Functions, Union

Pointers: Declaration, Initialization, Pointer Arithmetic, Pointers with Arrays, Functions: Call by Reference, Passing Arrays to Functions ,Pointers with Structures

Dynamic Memory Allocation: malloc, calloc, realloc, free ,Self-referential Structure

UNIT – V: File Handling and Preprocessor Directives

Text and Binary Files, File Operations: Opening, reading, writing, closing, File handling functions: fopen, fclose, fread, fwrite, fprintf, fscanf File Positioning: fseek, ftell, rewind, Preprocessor Directives: #define, #include, #ifdef, #ifndef, Command Line Arguments, User-Defined Data Types: enum, typedef

TEXT BOOKS:

2. Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson.

3. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

REFERENCE BOOKS:

7. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

8. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.
9. Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
10. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
11. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
12. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
13. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Useful Links

- https://onlinecourses.swayam2.ac.in/imb25_mg71/preview
- https://onlinecourses.nptel.ac.in/noc24_cs02/preview
- https://www.geeksforgeeks.org/c-programming-language/
- https://www.tutorialspoint.com/cprogramming/index.htm

B.Tech
CSE/ECE/CSE(AIML)

CH106BS: ENGINEERING CHEMISTRY LAB

I B.Tech – I Sem

L	T	P	C
0	0	2	1

Pre-requisite: Pre-university knowledge

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 and Nylon – 6, 6 in the laboratory.
5. Students will learn to determine the unknown concentration of potassium permanganate ($KMnO_4$) using a calibration curve.

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 and Nylon-6,6.
5. Students will understand the working principle of colorimetry and the relationship between absorbance and concentration (Beer-Lambert Law).

UNIT – I: Volumetric Analysis:

Estimation of Hardness of water by EDTA Complexometry method.

UNIT – 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

UNIT – III: Potentiometry:

Estimation of concentration of Fe+2ion by Potentiometry using KMnO4.

UNIT – IV: pH Metry:

Determination of an acid concentration using pH meter

UNIT – V: Preparations:

Preparation of Bakelite.

UNIT – VI: Corrosion:

Determination of rate of corrosion of mild steel in the presence and absence of inhibitor

UNIT – VII: Virtual lab experiments:

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

PROGRAMMING FOR PROBLEM SOLVING LAB

I B.Tech – I Sem

L	T	P	C
0	0	2	1

Pre-requisite: 10+2 Maths

Course Objectives: The course aims to

1. Develop proficiency in C programming by understanding syntax, semantics, and program structure.
2. Enhance problem-solving abilities using control structures, arrays, strings, functions, recursion, pointers, and structures.
3. Apply modular programming concepts to implement efficient and reusable code.
4. Utilize dynamic memory allocation, file handling, and command-line arguments for real-world programming scenarios.
5. Strengthen analytical thinking through implementation of numerical, pattern generation, and data processing problems.

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

1. Write and execute C programs using fundamental programming constructs such as input/output, operators, and control structures.
2. Implement problem solutions involving arrays, strings, and matrices for data processing applications.
3. Apply functions (including recursion) for modular and structured program development.
4. Use pointers and structures effectively for efficient data manipulation and storage.
5. Implement file operations and command-line arguments to handle persistent data storage and program flexibility.
6. Analyze, design, and test C programs for numerical, logical, and pattern-based problems with proper documentation and coding style.

Practice session:

1) Demonstration Programs on printf( ),scanf( )
2) Write a simple C program that prints the results of all the operators available in C. Read required operand values from standard input

Programs on numbers using control structures

1) Write a C program for find the max and min from the three numbers.
2) Write a C program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >=

   70% = Distinction. Read percentage from standard input.

3) 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).

4) Write a program that finds if a given number is a prime number.
5) 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.
6) Write a C program that finds if a given number is a Armstrong number or not
7) Write a C program that finds if a given number is strong number or not
8) Write a C program that finds if a given number is a Automorphic number or not
9) Write a C program to generate all the prime numbers between 1 and n.

Programs on Pyramid of stars and numbers

Write a C program to construct as follows:

1)
```
    *
   ***
  *****
 *******
```

2)
```
*
**
***
****
*****
****
***
**
*
```

3)
```
    *
   ***
  *****
 * ******
  *****
   ***
    *
```

4)
```
1111
2222
3333
4444
```

5)
```
1
22
333
4444
```

6)
```
1
23
456
78910
```

Programs using Arrays and Strings

1) Write a C program to find the minimum, maximum and average in an array of integers.
2) Write a C program to Finding the frequency of elements in an array
3) Write a C program to Counting Distinct Elements in an Array

4) Write a C program to Remove Duplicate elements from an array
5) Write a C program to find addition of two matrices of order m x n ,p x q
6) Write a C program to find multiplication of two matrices of order m x n ,p x q
7) Write a C program for Spiral traversal on a Matrix
8) Write a C program to rotate matrix by 90 degrees
9) Write a C program to Count the number of vowels in a given string.
10) Write a C program to check if two strings are anagrams or not.
11) Write a C program to insert a sub-string in to a given main string from a given position.
12) Write a C program to delete n Characters from a given position in a given string.
13) 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.)

14) Write a C program to count the lines, words and characters in a given text.
15) Write a C program to Count common sub-sequence in two strings

Programs using functions and Recursion

1. Write a C program to swap to numbers using call by value.
2. Write a C program that uses both non recursive and recursive functions for the following
   a) To find the factorial of a given integer.
   b) To find the GCD (greatest common divisor) of two given integers.
   c) To find X^n
   d) Find Nth term of a Fibonacci sequence

Programs using Pointers and Structures

1. Write a C program to swap two numbers using call by reference
2. Write a C program for reading elements into array using pointer and display them
3. Write a C program to create an one dimensional array dynamically using malloc() to store n elements and find sum, average of array elements
4. Write a C program to reverse the string using character pointer
5. Write a C program to create a student record with fields roll number, name and mobile number of the student using structures concept
6. Write a Cprogram to manage student records, where each record contains a student's name, roll number, and marks using array of structures concept.
7. Write a C Program to display the date using nested structures concept

Programs using SFiles

1. Write a C Program to read the data from a standard input device,store it in a file and then display the content of a file to standard output device
2. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
3. 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).
4. Write a C Program to reverse the contents of a File
5. Write a C program to demonstrate the concept of command line arguments
6. Write a C program to find the reverse of a number provided as a command line argument.

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.

Useful Links

- https://www.hackerrank.com/domains/c
- https://leetcode.com/problemset/all/?difficulty=EASY
- https://www.codechef.com/practice?end_rating=999

ENGINEERING WORKSHOP

I B.Tech – I Sem

L	T	P	C
0	0	2	1

Pre-requisite: Practical Skills

Course Objectives:

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

Course Outcomes: At the end of the course, 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 teamwork, time management, and quality awareness in a workshop environment

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 Sand 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. Black Smithy: Round to Square, Fan Hook and S- Hook

2. TRADES FOR DEMONSTRATION AND EXPOSURE:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

English Language and Communication Skills

I B.Tech – I Sem

L	T	P	C
3	0	0	3

Listening Skills

Course 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 focuses on listening skills**
b. **Interactive communication Skills (ICS) Lab which focuses on speaking skills**

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
2) University Press

3) Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities.
4) Orient BlackSwan Pvt. Ltd

5) Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge
6) University Press

7) (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage
8) Learning India Pvt. Ltd
9) Ur, Penny and Wright, Andrew. 2022. Five Minute Activities – A Resource Book for Language
10) Teachers. Cambridge University Press

R25 B.Tech Syllabus

MA201BS: ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
Common to MECH, ECE, CSE, CSE(AI&ML)

I B.Tech – II Sem	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Pre-requisite: Mathematical Knowledge at pre-university level

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 completion of the course, the student must be able to
1. Identify whether the given differential equation of first order is exact or not
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. Evaluate the Line, Surface and Volume integrals and converting them from one to another

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 $x^k\ V(x)$, Method of variation of parameters.

UNIT – III:Laplace Transforms

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

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

UNIT – V: Vector Integration

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

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
4. H. K. Dass and Er. RajnishVerma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi.

R25 B.Tech

PH102BS: ADVANCED ENGINEERING PHYSICS

I B.Tech – I & II Sem

L	T	P	C
3	0	0	3

Pre-requisite: 10+2 Physics

Course Objectives:

1. To study crystal structures, defects, and material characterization techniques like XRD and SEM.
2. To understand fundamental concepts of quantum mechanics and their applications in solids and nano-materials.
3. To introduce quantum computing principles, quantum gates, and basic quantum algorithms.
4. To learn the properties and applications of magnetic and dielectric materials.
5. To explore the working and applications of lasers and fiber optics in modern technology.

Course Outcomes:

CO1: Analyze crystal structures, identify defects, and apply XRD and SEM techniques for material Characterization.
CO2: Apply quantum mechanical principles to explain particle behavior and energy band formation in solids.
CO3: Understand quantum computing concepts, use quantum gates and Explain basic quantum algorithms CO4: Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.
CO4: Explain the principles of lasers and fibre optics and their applications in communication and sensing.

UNIT – I: Crystallography & Material Characterization

Introduction: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance; defects in crystals (Qualitative): point defects, line defects, surface defects and volume defects. Concept of nanomaterials –Surface to volume ratio , X -ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye-Scherer's formula, scanning electron microscopy (SEM): block diagram, working principle

UNIT - II: Quantum Mechanics

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

UNIT - III: Quantum Computing

Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits,

multiple Qubit system, quantum computing system for information processing, development of of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, quantum algorithms: Shor, Grover.

UNIT - IV: Magnetic and Dielectric Materials

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using Sol-gel method, Applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.
Introduction to dielectric materials, types of polarization (qualitative): electronic, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM).

UNIT - V: Laser and Fibre Optics

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, meta stable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, CO2 laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for automatic vehicle.

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

TEXT BOOKS:

1. Walter Borchardt-Ott, *Crystallography: An Introduction*, Springer
2. Charles Kittel, *Introduction to Solid State Physics*, John Wiley & Sons, Inc
3. Thomas G. Wong, *Introduction to Classical and Quantum Computing*, Rooted Grove

REFERENCE BOOKS:

1. Jozef Gruska, *Quantum Computing*, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, *Quantum Computation and Quantum Information*, Cambridge University Press.
3. John M. Senior, *Optical Fiber Communications Principles and Practice*, Pearson Education Limited

Useful Links :

- https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber-communications-principles-and-pr.pdf
- https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
- https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles-Kittel.pdf
- https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf
- https://www.fi.muni.cz/usr/gruska/qbook1.pdf
- https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and-quantum-information-nielsen-chuang.pdf

R25 B.Tech MECH Syllabus

ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING

I B.Tech – II Sem

L	T	P	C
2	0	2	3

Course Objectives:

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

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

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 (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.

Note:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

R25 B.Tech CSE Syllabus

BASIC ELECTRICAL ENGINEERING

I B.Tech – II Sem

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

1. Introduce the fundamental concepts of electrical circuit elements, DC circuit laws, and basic theorems for circuit analysis.
2. Develop an understanding of AC circuit analysis using phasor representation, power calculations, and three-phase systems.
3. Explain the principles, construction, and performance evaluation of transformers.
4. Familiarize students with the construction, operation, and characteristics of DC machines, induction motors, and synchronous generators.
5. Provide knowledge of essential electrical installation components such as LT switchgear, cables, earthing, and batteries.
6. Enable students to perform practical calculations for energy consumption, power factor correction, and battery backup for real-world applications.

Course Outcomes:

1. Apply KVL, KCL, and network theorems (Superposition, Thevenin, Norton) to analyze DC circuits and transient behavior of RL/RC circuits.
2. Analyze single-phase and three-phase AC circuits using phasor representation and determine active, reactive, and apparent power along with resonance conditions.
3. Explain the construction, equivalent circuit, losses, and performance characteristics of single-phase and three-phase transformers.
4. Evaluate the operating principles and performance of DC machines, induction motors, and synchronous generators.
5. Demonstrate the applications of LT switchgear, cables, earthing systems, and batteries in electrical installations.
6. Calculate practical electrical parameters such as energy consumption, power factor improvement, and battery backup for given systems.

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. Time-domain analysis of first-order RL and RC circuits.

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 and parallel), 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 and three-phase transformer connections.

UNIT – IV: Electrical Machines

Construction and working principle of dc machine, performance characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque-slip characteristics. Single-phase induction motor, Construction and working. Construction and working of synchronous generator

UNIT – V: Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and 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
3) M. S. Sukhija, T. K. Nagsarkar, “Basic Electrical and Electronics Engineering”, Oxford, 1st Edition, 2012.
4) Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, “Basic Electrical Engineering”, 2nd Edition, McGraw Hill, 2021.
5) L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011
6) E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010
7) V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

R25 B.Tech CSE Syllabus

DATA STRUCTURES

I B.Tech – II Sem

L	T	P	C
3	0	0	3

Pre-requisite: PPS

Course Objectives: The course aims to

1. Understand fundamental concepts, classifications, and operations of data structures.
2. Implement and analyze searching and sorting algorithms for efficient data processing
3. Learn linear and non-linear data structures and their applications.
4. Apply suitable data structures for problem-solving and algorithm optimization
5. Gain proficiency in advanced concepts like balanced search trees, hashing, and collision resolution.

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

1. Select appropriate searching and sorting techniques for given application.
2. Understand Linear data structures operations
3. Perform Various Linked List operations and its types
4. Implement Linear data structures Applications
5. Solve the given Problem using Non Linear data structures
6. Apply the concepts of Graph Traversals and Hashing for efficient Searching.

UNIT – I: Searching and Sorting

INTRODUCTION TO DATA STRUCTURES: Introduction, Classification of DataStructures, Operations on Data Structures

SEARCHING AND SORTING: linear search, jump search, binary search, interpolation search, bubble sort, selection sort, insertion sort, shell sort, Radix sort

UNIT – II: Stacks and Queues

STACKS: Introduction, Array Representation of Stack, Operations on Stack.

APPLICATIONS OF STACKS: Infix-to- Postfix conversion, evaluating Postfix expressions.

QUEUES: Introduction, Array representation of Queue, Operations on a Queue, Circular Queue, Operations on a Circular Queue, Double Ended Queue, Operations on Double Ended Queue

UNIT – III: Linked Lists

LINKED LISTS: Introduction, Singly Linked List: Representation of a Singly Linked List, Operations on a Single Linked List (Create, insert, delete, reverse, traverse and count), and Operations on a Double linked list (Create, insert, delete, reverse, traverse and count), Circular Linked Lists.

APPLICATIONS OF LINKED LISTS: Implementation of Stack using Linked List, Implementation of Queue

using linked list

UNIT – IV: Trees

TREES: Definition, Basic Terminologies, Binary Trees: Properties, Types, Representation of a Binary Tree using Array and Linked List and Tree Traversals: Pre order, In order and Post order, HEAPS: Binary Heap. SEARCH TREES: Binary Search Trees: Definition, Operations: Insertion, searching, find Minimum, find Maximum and Deletion, BALANCED SEARCH TREES: AVL Trees: Definition, Rotations, Operations – Insertion, deletion and Searching, B Trees, B+ Trees

UNIT – V: Graphs and Hashing

GRAPHS: Definition, Basic Terminologies and Representation, Graph Traversals- Breadth First Search (BFS) and Depth First Search (DFS).

HASHING: Hash table representation, hash functions, collision resolution Techniques: separate chaining, open addressing-linear probing, quadratic probing, double hashing, and rehashing.

TEXT BOOKS:

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 BOOKS:

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

2. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan , Fundamentals of Data Structure in C, 2nd Edition, University Press, India

3. Samanta Debasis , Classic Data Structures, 2nd Edition, Prentice Hall of India

Useful Links

- https://onlinecourses.swayam2.ac.in/cec24_cs17/preview
- https://onlinecourses.swayam2.ac.in/cec21_cs02
- https://www.geeksforgeeks.org/data-structures/
- https://www.programiz.com/dsa

R25 B.Tech CSE Syllabus

ADVANCED ENGINEERING PHYSICS LAB

I B.Tech – II Sem

L	T	P	C
3	0	0	3

Pre-requisite: 10+2 Physics

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:

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

List of Experiments :

1. Synthesis of magnetite (Fe_3O_4) powder using sol-gel method.
2. Determination of energy gap of a semiconductor.
3. Determination of Hall coefficient and carrier concentration of a given semiconductor.
4. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
5. Study of B-H curve of a ferro magnetic material.
6. Study of P-E loop of a given ferroelectric crystal.
7. Determination of dielectric constant of a given material
8. Determination of Curie's temperature of a given ferroelectric material.
9. A. Determination of wavelength of a laser using diffraction grating.
   B. Study of V-I & L-I characteristics of a given laser diode.
10. A. Determination of numerical aperture of a given optical fibre.
    B. Determination of bending losses of a given optical fibre.

R25 B.Tech CSE Syllabus

BASIC ELECTRICAL ENGINEERING LAB

I B.Tech – II Sem

L	T	P	C
3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

1. Provide hands-on experience in verifying basic electrical laws (KVL, KCL) and theorems (Thevenin, Norton, Superposition).
2. Develop practical skills to analyze DC transients and AC resonance phenomena in RLC circuits.
3. Familiarize students with the performance evaluation of single-phase transformers through voltage, current, efficiency, and regulation tests.
4. Demonstrate the characteristics of DC and AC machines, including DC shunt motors, three-phase induction motors, and alternators.
5. Train students in experimental measurement of electrical quantities such as voltage, current, active power, reactive power, and impedance.
6. Strengthen the ability to apply theoretical concepts of Basic Electrical Engineering to real-world systems through laboratory practice.

Course Outcomes:

1. Verify KVL, KCL, and network theorems (Thevenin, Norton, and Superposition) experimentally.
2. Analyze the transient response of RL/RC circuits and resonance behavior in RLC circuits.
3. Determine impedance, current, and power in AC series circuits (RL, RC, RLC) using experimental methods
4. Evaluate the voltage, current, efficiency, and regulation characteristics of single-phase and three-phase transformers.
5. Examine the performance characteristics of rotating machines such as DC shunt motors, induction motors, and alternators.
6. Measure and Interpret active and reactive power in balanced three-phase systems using practical setups.

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: Minimum 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

R25 B.Tech CSE Syllabus

IT WORKSHOP

I B.Tech – II Sem

L	T	P	C
0	0	2	1

Pre-requisite: 10+2 Maths

Course Objectives: The course aims to

1. The IT Workshop for engineers is a training lab course spread over 60 hours. The modules include training on PC Hardware, Internet & World Wide Web and Productivity tools including Word, Excel, PowerPoint and Publisher.

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

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheet

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy

settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

PowerPoint

Task 1: Students will be working on basic power point utilities and tools which help them create basic PowerPoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text,

Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

REFERENCE BOOKS:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech

2.The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dream tech

3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education

4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)

5.LaTeX Companion – Leslie Lamport, PHI/Pearson

6.IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education

7.IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

Useful Links

- https://www.netcad.com/courses/pchardware
- https://microsoft.com/
- https://www.overleaf.com/