CIVIL ENGINEERING
(For the batches admitted from the academic year 2023-24)

Vision
- To produce civil engineers with high technical competencies having value based professional and leadership qualities.

Mission
- To Impart quality education along with practice-based learning with ethical values.
- To impart knowledge in latest technologies and to develop highly competent professionals
- To promote quality education and research for industrial and societal needs.

Institutional Objectives
- To create a conducive and competitive environment for students through curricular and extra-curricular activities.
- Promote the culture of research among the faculty.
- To promote synergetic alliances with premier Institutions, Industry, CSIR laboratories and various Government organizations for Collaborative Research Projects.
- To promote economic and social enrichment of the society through Skill Development programmes, Entrepreneurship, and extension activities.
- To introduce demand-driven new UG&PG academic programmes.
- To ensure a high degree of quality in terms of providing infrastructure, research ambience, faculty and staff development.

Core Values
- *Thirst for Quality Education:* The stake holders of the institute particularly management, employees and students of the institution have a consistent thirst for quality improvement of the processes and services in the institution.
- *Lifelong Learning:* In the fast-changing technological world, acquiring a special skill at one point of time will not be enough for ever long survival. Hence to flourish in the workplace and to bring in innovations in the ways of doing, employee, student as well as alumni must be continuous learners and tech savvy.
- *Diversity and Participation:* PBRVITS promotes the involvement of faculty, staff, and students from all social, economic, ethnics, cultural and religious backgrounds

to get the synergy of combining the diversified agents. The focus is on involving students to exhibit their talent in various curricular and co-curricular activities and strengthening alumni link to share their experiences to the students.

- *Academic Integrity and Accountability:* Management induces accountability in the employees for the career of the students and the academic leadership establishes a mentoring mechanism for realization of responsibilities of students towards their parents and in turn to the society.

CIVIL ENGINEERING

(For the batches admitted from the academic year 2023-24)

**INDUCTION PROGRAM (3 weeks duration)**
S. No	**Course Name**
1	Physical Activities – Sports, Yoga and Meditation, Plantation
2	Career Counselling
3	Orientation to all branches – career options, tools, etc.
4	Orientation on admitted Branch – corresponding labs, tools and platforms
5	Proficiency Modules and Productivity Tools
6	Assessment on basic aptitude and mathematical skills
7	Remedial training in Foundation Courses
8	Human Values and Professional Ethics
9	Communication Skills – Focus on Listening, Speaking, Reading, Writing Skills
10	Concepts of Programming

Semester I (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11101A	Linear Algebra & Calculus	3	0	0	3	30	70	100
2	HSMC	23A11201A	Communicative English	2	0	0	2	30	70	100
3	ES	23A01301A	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
4	ES	23A05301A	Introduction to Programming	3	0	0	3	30	70	100
5	ES	23A03301A	Engineering Graphics	1	0	4	3	30	70	100
6	ES	23A05302A	Computer Programming Lab	0	0	3	1.5	30	70	100
7	HSMC	23A11202A	Communicative English Lab	0	0	2	1	30	70	100
8	ES	23A05303A	Engineering Workshop	0	0	3	1.5	30	70	100
9	ES	23A05304A	IT Workshop	0	0	2	1	30	70	100
10	BS	23A11109A	Health and Wellness, Yoga and Sports	-	-	1	0.5	-	-	100
\multicolumn{3}{c}{**Total**}					19.5			1000

Semester II (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11102A	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
2	BS	23A11103A	Engineering Physics	3	0	0	3	30	70	100
3	BS	23A11105A	Engineering Chemistry	3	0	0	3	30	70	100
4	ES	23A02301A	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
5	PC	23A03401A	Engineering Mechanics	3	0	0	3	30	70	100
6	BS	23A11106A	Engineering Physics Lab	0	0	2	1	30	70	100
7	BS	23A11108A	Engineering Chemistry Lab	0	0	2	1	30	70	100
8	ES	23A02302A	Electrical & Electronics Engineering Workshop	0	0	3	1.5	30	70	100
9	PC	23A01401A	Engineering Mechanics & Building Practices Lab	0	0	3	1.5	30	70	100
10	BS	23A11110A	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	-	-	100
Total							**20.5**			**1000**

Course Code	LINEAR ALGEBRA & CALCULUS		L	T	P	C
23A11101A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. **(K3)**

CO2: Demonstrate the ability to compute eigen values and eigen vectors for square matrices using methods such as characteristic polynomials, determinants, and numerical techniques. **(K3)**

CO3: Utilize mean value theorems to real life problems. **(K3)**

CO4: Familiarize with functions of several variables which are useful in optimization. **(K3)**

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	1	-

UNIT – I (9 Hrs)

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Learning Outcomes: At the end of this unit, students should be able to

- Solve systems of linear equations, using technology to facilitate row reduction and determine the rank (L3).
- Demonstrate an understanding of how to translate a system of simultaneous linear equations into a matrix (L2)
- Solve systems of linear equations using various methods including Gauss elimination

method and Gauss Seidel Iteration Methods (L3)

UNIT – II (9 Hrs)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors 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 forms by Orthogonal Transformation.

Learning Outcomes: At the end of this unit, students should be able to
- Demonstrate the process of finding eigenvalues and eigenvalues for square matrices. (L2)
- Describe the process of diagonalizing a matrix and its significance. (L3)
- Apply the Cayley-Hamilton Theorem to find powers of a matrix and compute the inverse of a matrix. (L3)
- Apply knowledge of the nature of a quadratic form to analyse and solve optimization process. (L3)
- Explain the process of using orthogonal transformations to reduce a quadratic form to its canonical form. (L5)

UNIT – III (9 Hrs)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Learning Outcomes: At the end of this unit, students should be able to
- Analyze the behaviour of functions by using mean value theorems (L4)
- Translate the given function as series of Taylor's and Maclaurin's with remainders (L2)

UNIT – IV (9 Hrs)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes: At the end of this unit, students should be able to
- Find partial derivatives numerically and symbolically and use them to analyze and   interpret the way a function varies. (L4)
- Acquire the Knowledge maxima and minima of functions of several variable (L3)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Course Code	COMMUNICATIVE ENGLISH		L	T	P	C
23A11201A	(Common to all branches)		**2**	**0**	**0**	**2**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To facilitate effective Listening, Reading, Speaking and Writing skills among the students.
➢ To enhance their comprehending abilities, oral presentations, reporting useful information.
➢ To provide knowledge of grammatical structures and vocabulary.
➢ To make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues, and also from reading content. **(K2)**
CO2: Apply grammatical structures to formulate sentences and correct word forms. **(K3)**
CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. **(K4)**
CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. **(K5)**
CO5: Create a coherent paragraph, essay, and resume. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	-	2	-	2	2	-	-	3	2	-	-	-
CO5	-	-	-	-	-	1	-	1	-	3	1	1	-	-

UNIT – I (9 Hrs)
Lesson : HUMAN VALUES: Gift of Magi (Short Story)

Listening	: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking	: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading	: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing	: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar	: Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary	: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Learning Outcomes: At the end of this unit, students should be able to
- Understand specific pieces of information through listening and reading. (L2)
- Demonstrate basic questioning and answering skills on general topics. (L2)
- Outline the main ideas and specific details from the given text.(L2)
- Apply grammatical knowledge to frame flawless sentences. (L3)
- Develop basic word knowledge. (L3)

UNIT – II (9 Hrs)
Lesson : NATURE: The Brook by Alfred Tennyson (Poem)

Listening	:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking	:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading	:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing	:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar	:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary	:	Homonyms, Homophones, Homographs.

Learning Outcomes: At the end of this unit, students should be able to
- Distinguish between main idea and supporting ideas through listening. (L4)
- Develop short structured talks. (L3)
- Identify the logical sequence of ideas in a given text. (L3)
- Organize ideas into a meaningful paragraph by using cohesive devices and also learn the right usage of articles and prepositions. (L3)
- Identify difference among homonyms, homophones and homographs.(L3)

UNIT – III (9 Hrs)
Lesson : BIOGRAPHY: Elon Musk

Listening	:	Listening for global comprehension and summarizing what is listened to.
Speaking	:	Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading	:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing	:	Summarizing, Note-making, paraphrasing
Grammar	:	Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary	:	Compound words, Collocations.

Learning Outcomes: At the end of this unit, students should be able to
- Summarize what is listened to. (L2)
- Discuss on specific topics and report what is discussed. (L6)

- Interpret specific clues and use different strategies to comprehend a text. (L5)
- Summarize and paraphrase a given text by using different methods of note-making. (L2)
- Make use of right form of the verbs, compound words and collocations. (L3)

UNIT – IV (9 Hrs)
Lesson : INSPIRATION: The Toys of Peace by Saki

Listening	:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video
Speaking	:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading	:	Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/relationships, communicate processes or display complicated data.
Writing	:	Letter Writing: Official Letters, Resumes
Grammar	:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary	:	Words often confused, Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Make Predictions while listening to video and audio texts. (L6)
- Construct a dialogue in academic contexts. (L3)
- Analyze the data from the given graphic elements and present it verbally. (L4)
- Build effective resumes and draft formal letters. (L6)
- Apply grammatical rules to transform sentences into different speech or voice. (L3)
- Identify correct word for the context and also jargons. (L3)

UNIT – V (9 Hrs)
Lesson : MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening	:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking	:	Formal oral presentations on topics from academic contexts.
Reading	:	Reading Comprehension.
Writing	:	Writing structured essays on specific topics.
Grammar	:	Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary	:	Technical Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Interpret a given text and answer the questions. (L5)
- Present a topic of academic context. (L5)
- Interpret and comprehend a given text. (L5)
- Develop structured essays on specific topics. (L3)

- Identify common errors in grammar and usage.(L3)
- Make use of technical Jargons. (L3)

TEXTBOOKS:
1. "Pathfinder: Communicative English for Undergraduate Students", 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3)
2. "Empowering with Language", Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:
1. "English for Engineers", Dubey, Sham Ji & Co., Vikas Publishers, 2020
2. "Academic writing: A Handbook for International Students", Stephen Bailey, Routledge, 2014.
3. "English Grammar in Use", Raymond Murphy, 4th Edition, Cambridge University Press, 2019.
4. "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary", Norman Lewis, Anchor, 2014.

ONLINE LEARNING RESOURCES:
GRAMMAR:
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY:
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Code	BASIC CIVIL AND MECHANICAL		L	T	P	C
23A01301A	**ENGINEERING** (Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To get familiarized with scope and importance of Civil and Mechanical Engineering in different sectors and industries.
➢ To introduce the preliminary concepts of Building Planning, Construction, Materials and related tests.
➢ To acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.
➢ To explain different engineering materials and manufacturing processes.
➢ To provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand various sub-divisions of Civil Engineering and appreciate their role in ensuring better society. **(K2)**
CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. **(K3)**
CO3: Realize the importance of Transportation in nation's economy and engineering measures related to highways in terms of geometrics. **(K3)**
CO4: Understand the importance of water resources and storage structures so that social responsibilities of water conservation will be appreciated.**(K1)**
CO5: Understand the different manufacturing processes and explain the basics of thermal engineering and its applications. **(K2)**
CO6: Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	3	-	-	-	-	-	-	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT – I (8 Hrs)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel / Theatre.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the role of civil Engineers in the society and Various Disciplines of Civil Engineering. (L2)
- Develop typical layouts for different residential commercial and Industrial buildings. (L3)

UNIT – II (7 Hrs)

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements-Angular Measurements- Leveling instruments used for leveling- Introduction to Bearings Simple problems on leveling and bearings-Contour mapping.

Learning Outcomes: At the end of this unit, students should be able to

- Describe objectives of surveying and Horizontal and vertical measurements (L2)
- Measure Horizontal and vertical angles using surveying Instruments (L3)

UNIT – III (8 Hrs)

Transportation Engineering, Water Resources and Environmental Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water - Specifications and Tests- Introduction to Hydrology- Hydrograph -Rain water Harvesting - Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

Learning Outcomes: At the end of this unit, students should be able to

- Explain various types of pavements, their differences and basics of design (L2)
- Examine the quality of different sources of water and its storage (L3)

PART B: BASIC MECHANICAL ENGINEERING

UNIT – I (7 Hrs)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace,

and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

Learning Outcomes: At the end of this unit, students should be able to

- Know the importance of machine and utilization in different fields. (L1)
- Know different kinds of materials and its classification. (L1)

UNIT – II (8 Hrs)

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering - working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

Learning Outcomes: At the end of this unit, students should be able to

- Know different production technologies used in industries. (L1)
- Know working principles and elements of automobiles. (L2)

UNIT – III (7 Hrs)

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Learning Outcomes: At the end of this unit, students should be able to

- Know working principles and elements used for power generation. (L1)
- Understand the concepts of various power transmission systems. (L2)
- Learn the robotics basic terminology and its usage in different sectors. (L1)

TEXTBOOKS:

For Basic Civil Engineering:

1. "Basic Civil and the Mechanical Engineering", G. Shanmugam and M. S. Palanisamy, Tata McGraw Hill publications (India) Pvt, Ltd.
2. "Basic Civil Engineering", S.S. Bhavikatti, New Age International Publishers.
3. "Engineering Materials", Dr. S.C. Rangwala, Charotor Publishing House.
4. "Highway Engineering", S. K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications.
5. "Irrigation Engineering and Hydraulic Structures", Santosh Kumar Garg, Khanna Publishers, Delhi.
6. "Building Construction", Dr. B. C. Punmia, Lakshmi Publications, Delhi.

For Basic Mechanical Engineering:

1. "Internal Combustion Engines", V. Ganesan, Tata McGraw Hill publications (India) Pvt.

Ltd.

2. "A Tear book of Theory of Machines", S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.

3. "An introduction to Mechanical Engineering", Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:
For Basic Civil Engineering:
1. "Surveying, Vol- I and Vol-II", S.K. Duggal, Tata McGraw Hill Publishers.
2. "Hydrology and Water Resources Engineering", Santosh Kumar Garg, Khanna Publishers, Delhi.

For Basic Mechanical Engineering:
1. "Robotics", Appuu Kuttan K K, I. K. International Publishing House Pvt. Ltd. Volume-I
2. "3D printing & Additive Manufacturing Technology", L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. "Thermal Engineering", Mahesh M Rathore, Tata McGraw Hill publications (India) Pvt. Ltd.
4. "Basic Civil and Mechanical Engineering", G. Shanmugam and M. S, Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.

Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.

Course Code	INTRODUCTION TO PROGRAMMING		L	T	P	C
23A05301A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To introduce students to the fundamentals of computer programming.
➢ To provide hands-on experience with coding and debugging.
➢ To foster logical thinking and problem-solving skills using programming.
➢ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
➢ To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. **(K2)**

CO2: Analyse a problem and develop an algorithm to solve it. **(K4)**

CO3: Implement various algorithms using the C programming language. **(K3)**

CO4: Understand more advanced features of C language. **(K2)**

CO5: Develop problem-solving skills and the ability to debug and optimize the code. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-	-	2
CO5	1	2	3	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Learning Outcomes: At the end of this unit, students should be able to

- Translate algorithms into programs. (L4)
- Solve complex problems using language independent notations. (L3)

- Use C basic concepts to write simple C programs. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Analyze the algorithms for time and space complexities. (L4)

UNIT – II (9 Hrs)

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

Learning Outcomes: At the end of this unit, students should be able to
- Implement conditional branching and iteration statements. (L2)
- Select the control structures for solving the problem statements (L4)
- Use iterative statements for writing C programs. (L3)

UNIT – III (8 Hrs)

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Learning Outcomes: At the end of this unit, students should be able to
- Use arrays to process multiple homogeneous data. (L3)
- Solve mathematical problems using C programming language. (L3)
- Apply string-handling functions. (L3)

UNIT – IV (9 Hrs)

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Learning Outcomes: At the end of this unit, students should be able to
- Structure the individual data elements to simplify the solution. (L6)
- Facilitate efficient memory utilization. (L6)
- Use pointers and structures to formulate algorithm and write programs. (L3)
- Understand the basic differences between structure and union. (L2)

UNIT – V (9 Hrs)

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope   and Lifetime of Variables, Basics of File Handling.

Learning Outcomes: At the end of this unit, students should be able to
- Understand basic terminology of modular programming. (L2)
- Writing structured programs using C Functions. (L5)
- Apply modular approach for solving the problem statements. (L3)
- Writing C programs using various storage classes to control variable access. (L5)

- Apply input and output statements to process the data in various formats. (L3)

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:
1. "Computing fundamentals and C Programming", E. Balagurusamy, McGraw-Hill Education, 2008.
2. "Programming in C", Rema Theraja, Oxford, 2016, 2nd Edition.
3. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

ONLINE LEARNING RESOURCES:
1. www.learn-c.org
2. www.programmeiz.com
3. www.github.com

Course Code	ENGINEERING GRAPHICS		L	T	P	C
23A03301A	(Common to all branches)		**1**	**0**	**4**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:
- ➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- ➢ To impart knowledge on the projection of points, lines and plane surfaces
- ➢ To improve the visualization skills for better understanding of projection of solids
- ➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.
- ➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. **(K2)**

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. **(K1)**

CO3: Understand and draw projection of solids in various positions in first quadrant. **(K2)**

CO4: Explain principles behind development of surfaces. **(K2)**

CO5: Prepare isometric and perspective sections of simple solids. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO2	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	3	-	-	-	-	2	-	2	2	2

UNIT – I (12 Hrs)

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the significance of engineering drawing (L2)

- Know the conventions used in the engineering drawing (L1)
- Identify the curves obtained in different conic sections (L2)
- Draw different cycloidal and involute curves. (L1)
- Know about the scale conversion techniques (L1)

UNIT – II (12 Hrs)

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

Learning Outcomes: At the end of this unit, students should be able to
- Know how to draw the projections of points, lines (L1)
- Find the true length of the lines. (L2)
- Understand the procedure to draw projection of planes. (L2)
- Draw the projection of plane inclined to one plane and both the planes. (L1)

UNIT – III (18 Hrs)

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solid inclined to one plane. (L1)

UNIT – IV (15 Hrs)

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw sectional views and true shape of solids. (L2)
- Represent the surface development of simple solids. (L3)

UNIT – V (18 Hrs)

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

Learning Outcomes: At the end of this unit, students should be able to

- Learn the basics convectional representation of different projections (L1)
- Draw the Orthographic projection of simple solids. (L1)
- Draw the Isometric projection of simple solids. (L1)
- Understand the different commands used in Computerized drawing (L2)

TEXTBOOKS:

1. "Engineering Drawing", N. D. Bhatt, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. "Engineering Drawing", K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. "Engineering Drawing", M. B. Shah and B. C. Rana, Pearson Education Inc, 2009.
3. "Engineering Drawing with an Introduction to AutoCAD", Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Code	COMPUTER PROGRAMMING LAB		L	T	P	C
23A05302A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. **(K2)**

CO2: Select the right control structure for solving the problem. **(K1)**

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. **(K3)**

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. **(K3)**

CO5: Develop C programs to handle File handling operations. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

UNIT – I

Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab 1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 2: Converting algorithms/flow charts into C Source code. Developing the algorithms/ flowcharts for the following sample programs

    i) Sum and average of 3 numbers

    ii) Conversion of Fahrenheit to Celsius and vice versa

    iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions.

Lab 3: Simple computational problems using arithmetic expressions

    i) Finding the square root of a given number

    ii) Finding compound interest

    iii) Area of a triangle using heron's formulae

    iv) Distance travelled by an object

UNIT – II

Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity.

Lab 4: Simple computational problems using the operator' precedence and associativity

    i) Evaluate the following expressions

        a. A+B*C+(D*E) + F*G

        b. A/B*C-B+A*D/3

        c. A+++B---A

        d. J= (i++) + (++i)

    ii) Find the maximum of three numbers using conditional operator

    iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions.

Lab 5: Problems involving if-then-else structures
   i) Write a C program to find the max and min of four numbers using if-else.
   ii) Write a C program to generate electricity bill.
   iii) Find the roots of the quadratic equation.
   iv) Write a C program to simulate a calculator using switch case.
   v) Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops.

Lab 6: Iterative problems e.g., the sum of series
   i) Find the factorial of given number using any loop.
   ii) Find the given number is a prime or not.
   iii) Compute sine and cos series
   iv) Checking a number palindrome
   v) Construct a pyramid of numbers

UNIT – III
Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1-D Arrays: searching.

Lab 7: 1-D Array manipulation, linear search
   i) Find the min and max of a 1-D integer array.
   ii) Perform linear search on1D array.
   iii) The reverse of a 1D integer array
   iv) Find 2's complement of the given binary number.
   v) Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will

reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort
   i)   Addition of two matrices
   ii) Multiplication two matrices
   iii) Sort array elements using bubble sort
   iv) Concatenate two strings without built-in functions
   v)   Reverse a string using built-in and without built-in string functions

UNIT – IV
Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereference
   i)   Write a C program to find the sum of a 1D array using malloc()
   ii) Write a C program to find the total, average of n students using structures
   iii) Enter n students data using calloc() and display failed students list
   iv) Read student name and marks from the command line and display the student details along with the total.
   v)   Write a C program to implement realloc()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists.

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields
   i)   Create and display a singly linked list using self-referential structure.
   ii) Demonstrate the differences between structures and unions using a C program.
   iii) Write a C program to shift/rotate using bitfields.
   iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT – V
Week 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.
   i) Write a C function to calculate NCR value.
   ii) Write a C function to find the length of a string.
   iii) Write a C function to transpose of a matrix.
   iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls.

Lab 12: Recursive functions
   i) Write a recursive function to generate Fibonacci series.
   ii) Write a recursive function to find the lcm of two numbers.
   iii) Write a recursive function to find the factorial of a number.
   iv) Write a C Program to implement Ackermann function using recursion.
   v) Write a recursive function to find the sum of series.

Week 13:
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.
   i) Write a C program to swap two numbers using call by reference.
   ii) Demonstrate Dangling pointer problem using a C program.
   iii) Write a C program to copy one string into another using pointer.
   iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling.

Lab 14: File operations

i) Write a C program to write and read text into a file.
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file.
iv) Write a C program to merge two files into the third file using command-linearguments.
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. "Programming in C: A practical approach", Ajay Mittal, Pearson
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

Course Code	COMMUNICATIVE ENGLISH LAB		L	T	P	C
23A11202A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
➢ To train in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. **(K2)**
CO2: Apply communication skills through various language learning activities. **(K3)**
CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **(K4)**
CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. **(K5)**
CO5: Take part effectively in job interviews. **(K5)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	2	-	2	-	-	-	1	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	2	-	-

TOPICS:

1. Vowels and Consonants

Learning Outcomes: At the end of this session, students should be able to

• Distinguish different speech sounds while listening and speaking with a view to effectively comprehend texts of various difficulty levels. (L4)

2. Neutralization and Accent Rules

Learning Outcomes: At the end of this session, students should be able to

• Identify syllabification, stress, rhythm and intonation for effective inference of comprehended texts. (L3)
• Apply accent neutralized speech approach to communicate with fluency. (L3)
• Develop various transactional models of communication while listening to native speakers of English. (L3)

3. Communication skills and JAM
Learning Outcomes: At the end of this session, students should be able to
- Take part in short structured talks. (L4)
- Make use of effective communication skills in varied contexts. (L4)

4. Role Play or Conventional Practice
Learning Outcomes: At the end of this session, students should be able to
- Develop conversational skills both in academic and professional contexts. (L3)

5. E-mail Writing
Learning Outcomes: At the end of this session, students should be able to
- Construct structured and well-organized emails for different professional purposes. (L3)

6. Resume Writing, Cover Letter
Learning Outcomes: At the end of this session, students should be able to
- Build effective resumes along with cover letters. (L3)

7. Group Discussions – Methods and Practices
Learning Outcomes: At the end of this session, students should be able to
- Understand the key skills and behavioural requirements to facilitate the group discussion. (L2)
- Take part in group discussions effectively. (L4)

8. Debates – Methods and Practices
Learning Outcomes: At the end of this session, students should be able to
- Take part in brain storming sessions. (L4)
- Compare and contrast different viewpoints to arrive at a consensus. (L5)

9. PPT Presentations/Poster Presentations
Learning Outcomes: At the end of this session, students should be able to
- Create effective power point and poster presentations. (L6)

10. Interview Skills
Learning Outcomes: At the end of this session, students should be able to
- Develop required skills to participate in interviews. (L3)
- Analyze the dynamics of interviews to increase the chances of employment. (L4)

REFERENCE BOOKS:
1. "Technical Communication", Meenakshi Raman, Sangeeta Sharma, Oxford Press, 2018.
2. "English Conversation Practice", Taylor Grant, Tata McGraw-Hill Education India, 2016.
3. "Cambridge Academic English (B2)", Martin Hewings. CUP, 2012.

4. "A Course in Phonetics and Spoken English", J. Sethi & P.V. Dhamija, 2nd Edition, Kindle, 2013.

ONLINE LEARNING RESOURCES:
SPOKEN ENGLISH:
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & ACCENT:
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Course Code	ENGINEERING WORKSHOP		L	T	P	C
23A05303A	(Common to all branches)		0	0	3	1.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:
➢ To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities. **(K3)**

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, welding and plumbing. **(K3)**

CO3: Apply fitting operations in various applications. **(K3)**

CO4: Apply basic electrical engineering knowledge for House Wiring Practice **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO2	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO3	3	2	2	-	3	-	1	-	2	1	-	3	2	2
CO4	3	2	2	-	3	-	1	-	2	1	-	3	2	2

LIST OF EXPERIMENTS:
1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
    a) Half – Lap joint
    b) Mortise and Tenon joint
    c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
    a) Tapered tray
    b) Conical funnel
    c) Elbow pipe
    d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
    a) V-fit

b) Dovetail fit

c) Semi-circular fit

d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.

a) Parallel and series

b) Two-way switch

c) Godown lighting

d) Tube light

e) Three phase motor

f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:

1. "Basic Workshop Technology: Manufacturing Process", Felix W.; Independently Published, 2019.

2. "Workshop Processes, Practices and Materials", Bruce J. Black, Routledge Publishers, 5th Edition, 2015.

3. "A Course in Workshop Technology Vol I. & II", B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCE BOOKS:

1. "Elements of Workshop Technology - Vol. I", S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th Edition

2. "Workshop Practice", H. S. Bawa, Tata-McGraw Hill, 2004.

3. "Wiring Estimating, Costing and Contracting", P.M. Soni & P.A. Upadhyay, Atul Prakashan, 2021-22.

Course Code	IT WORKSHOP		L	T	P	C
23A05304A	(Common to all branches)		0	0	2	1
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:
- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning.
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:
After completion of the course, the student will be able to

   CO1: Perform Hardware troubleshooting. **(K2)**

   CO2: Understand Hardware components and inter dependencies. **(K2)**

   CO3: Safeguard computer systems from viruses/worms. **(K3)**

   CO4: Document/ Presentation preparation. **(K3)**

   CO5: Perform calculations using spreadsheets. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	1	2	-	-	-	-	-	-	-	1	-
CO3	1	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	1	2	-	-	-	-	-	-	-	-	2
CO5	1	3	2	2	2	-	-	-	-	-	-	-	-	2

PC Hardware & Software Installation:
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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:

Task 1: 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 power point 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.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCE BOOKS:
1. "Comdex Information Technology course tool kit", Vikas Gupta, WILEY Dream tech, 2003
2. "The Complete Computer upgrade and repair book", Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd Edition
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2012, 2nd Edition
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", David Anfinson and Ken Quamme, CISCO Press, Pearson Education, 3rd Edition
7. "IT Essentials PC Hardware and Software Labs and Study Guide", Patrick Regan, CISCO Press, Pearson Education, 3rd Edition

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to all branches)		L	T	P	C
23A11109A			0	0	1	0.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To make the students maintain their mental and physical wellness by balancing emotions in their life

➢ To enhance the essential traits required for the development of the personality.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health. **(K2)**

CO2: Demonstrate an understanding of health-related fitness components. **(K3)**

CO3: Compare and contrast various activities that help enhance their health. **(K4)**

CO4: Assess current personal fitness levels. **(K2)**

CO5: Develop Positive Personality. **(K5)**

UNIT – I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity, Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

- Organizing health awareness programmes in community
- Preparation of health profile
- Preparation of chart for balance diet for all age groups

UNIT – II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

- Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

- Participation in one major game and one individual sport viz., Athletics, Volleyball,

Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
- Practicing general and specific warm up, aerobics
- Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:
1. "Health and Wellness", Gordon Edlin, Eric Golanty. 14th Edition, Jones & Bartlett Learning, 2022
2. "The Heart of Yoga: Developing a Personal Practice", T. K. V. Desikachar
3. "Yoga Sutras of Patanjali", Archie J. Bahm, Jain Publishing Company, 1993
4. "SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere", Wiseman, John Lofty, 3rd Edition, William Morrow Paperbacks, 2014
5. "The Sports Rules Book/ Human Kinetics with Thomas Hanlon", 3rd Edition, Human Kinetics, Inc.2014

GENERAL GUIDELINES:
1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:
- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS (Common to all branches)		L	T	P	C
23A11102A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➤ To enlighten the learners in the concept of differential equations and multivariablecalculus.
- ➤ To furnish the learners with basic concepts and techniques at plus two level to lead theminto advanced level by handling various real-world applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Apply first order and first degree differential equations to model and solve problems in various scientific and engineering disciplines, including electrical circuits. **(K3)**

CO2: Solve the differential equations related to various engineering fields**. (K3)**

CO3: Identify solution methods for partial differential equations that model physical processes. **(K3)**

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. **(K2)**

CO5: Estimate the work done against a field, circulation and flux using vector calculus. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	-	-	-	-	-	-	2	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	1	-
CO5	2	3	2	2	-	-	-	-	-	-	-	1	1	-

UNIT – I (9 Hrs)
Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Learning Outcomes: At the end of this unit, students should be able to
- Learn the effective mathematical tools for solutions of first order differential equations(L2)
- Apply mathematical tools to model physical processes such as Newton's law of cooling, electrical circuits (L3).

UNIT – II (9 Hrs)
Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit

problems and Simple Harmonic motion.

Learning Outcomes: At the end of this unit, students should be able to
- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L4)
- Formulate and solve the higher order differential equation by analyzing physical situations (L6)

UNIT – III (9 Hrs)

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Learning Outcomes: At the end of this unit, students should be able to
- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT – IV (9 Hrs)

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes: At the end of this unit, students should be able to
- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT – V (9 Hrs)

Vector integration: Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Learning Outcomes: At the end of this unit, students should be able to
- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXTBOOKS:
1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th

Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. "Higher Engineering Mathematics", B. V. Ramana, McGraw Hill Education, 2017

Course Code	ENGINEERING PHYSICS		L	T	P	C
23A11103A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To identify the importance of the physical optics i.e., interference, diffraction and polarization related to its engineering applications

➢ To present the basic concepts needed to understand the crystal structure of materials, X-ray diffraction

➢ To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices

➢ To enlighten the concepts of Quantum mechanics and to provide fundamentals of the de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory.

➢ Evolution of band theory to distinguish materials and explain the properties of semiconductors

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the intensity variation of light due to interference, diffraction & polarization. **(K3)**

CO2: Familiarize with the basics of crystals and their structures**. (K2)**

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials. **(K3)**

CO4: Explain the basic concepts of quantum mechanics and the band theory of solids. **(K2)**

CO5: Identify the type of semiconductor using Hall effect **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Wave Optics:

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double

refraction - Nicol's Prism -Half wave and Quarter wave plates.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify scientific & engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary light and polarized light (L2)

UNIT – II (9 Hrs)
Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

Learning Outcomes: At the end of this unit, students should be able to

- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by using Laue method & powder method (L4)

UNIT – III (9 Hrs)
Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius- Mosotti relation indielectrics (L2)
- Classify magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)

UNIT – IV (9 Hrs)

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concepts of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Understand the concept of density of states (L2)

UNIT – V (8 Hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and applications.

Learning Outcomes: At the end of this unit, students should be able to

- Classify the energy bands of semiconductors (L2)
- Understand the differences between intrinsic and extrinsic semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)

TEXTBOOKS:

1. "A Text book of Engineering Physics", M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition, 2019.
2. "Engineering Physics", D. K. Bhattacharya and Poonam Tandon, Oxford press, 2015

REFERENCE BOOKS:

1. "Engineering Physics", B. K. Pandey and S. Chaturvedi, Cengage Learning, 2021.
2. "Engineering Physics", Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. "Engineering Physics", Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010
4. "Engineering Physics", M. R. Srinivasan, New Age international publishers, 2009

ONLINE LEARNING RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Course Code	ENGINEERING CHEMISTRY		L	T	P	C
23A11105A	(Common to CE, ME)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:
- ➢ To familiarize engineering chemistry and its applications
- ➢ To impart the concept of soft and hard waters, softening methods of hard water
- ➢ To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Analyze the hardness of water through its softening techniques for domestically and industrially. **(K4)**

CO2: Demonstrate the corrosion prevention methods and factors affecting corrosion. **(K3)**

CO3: Differentiate the types of Plastomers and Elastomers. **(K4)**

CO4: Explain the setting and hardening of cement. (**K2**)

CO5: Summarize the concepts of colloids, micelle and nanomaterials. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
CO2	3	-	-	-	2	-	-	-	-	-	-	-	1	1
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CO4	3	1	-	-	-	-	-	-	-	-	-	-	2	2
CO5	3	2	-	-	2	-	-	-	-	-	-	-	1	1

UNIT – I (10 Hrs)

Water Technology: Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

Learning Outcomes: At the end of this unit, students should be able to

- List the differences between temporary and permanent hardness of water (L1)
- Explain the principles of reverse osmosis and electro dialysis.(L2)
- Compare quality of drinking water with BIS and WHO standards. (L2)
- Illustrate problems associated with hard water – sludge and scale.(L2)

UNIT – II (9 Hrs)
Electrochemistry and Applications:
Electrodes –electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium-ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bed worth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Learning Outcomes: At the end of this unit, students should be able to
- Apply the Nernst equation for calculating electrode and cell potentials (L3)
- Apply Pilling-Bed worth rule for corrosion and corrosion prevention (L3)
- Demonstrate the corrosion prevention methods and factors affecting corrosion (L2)
- Compare different batteries and their applications (L2)

UNIT – III (9 Hrs)
Polymers and Fuel Chemistry:
Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC Nylon 6,6 and Bakelite.

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers. Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number-alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

Learning Outcomes: At the end of this unit, students should be able to
- Explain different types of polymers and their applications (L2)
- Select suitable fuels for IC engines (L3)
- Explain calorific values, octane number, refining of petroleum (L2)

UNIT – IV (9 Hrs)
Modern Engineering materials:
Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractoriness- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland cement, constituents, Setting and Hardening of cement.

Learning Outcomes: At the end of this unit, students should be able to

- Demonstrate the applications of fullerenes, CNT'S and Graphene nanoparticles (L2)
- Identify the factors affecting the refractory material (L3)
- Illustrate the functions and properties of lubricants (L2)

UNIT – V (8 Hrs)

Surface Chemistry and Nanomaterials:

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Learning Outcomes: At the end of this unit, students should be able to

- Summarize the applications of SEM, TEM and X-ray diffraction
- Explain the synthesis of colloids with examples (L2)
- Outline the preparation of nanomaterials and metal oxides (L2)
- Identify the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

TEXTBOOKS:

1. "Engineering Chemistry", Jain and Jain, Dhanpat Rai publications, 17th Edition, 2018
2. "A text book of Engineering Chemistry" Dr. S. S. Dara, Dr. S. S. Umare, S. Chand Publications, 12th Edition, 2010.
3. "A text book of Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2010.

REFERENCE BOOKS:

1. "Concise Inorganic Chemistry", J. D. Lee, Oxford University Press, 5th Edition, 2008
2. "Cement Chemistry", H. F. W. Taylor, 2nd Edition, Thomas Telford Publications, 1997.
3. "Introduction to Colloids and Surface Chemistry", D. J. Shaw, Butterworth-Heineman, 1992
4. "Textbook of Polymer Science", Fred W. Billmayer Jr, 3rd Edition

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to all branches)		L	T	P	C
23A02301A			3	0	0	3
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the problem solving concepts associated to AC and DC circuits. **(K2)**

CO2: Analyze the operating principles of motors, generators, MC and MI instruments. **(K4)**

CO3: Apply the mathematical tool for different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. **(K3)**

CO4: Explain the characteristics of diodes and transistors. **(K4)**

CO5: Familiarize with the number systems, codes, Boolean algebra and logic gates **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO2	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO3	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO4	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO5	3	3	1	-	1	3	2	-	-	-	-	1	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I (8 Hrs)
DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

Learning Outcomes: At the end of this unit, students should be able to

- Recall Kirchhoff's laws (L1) .
- Analyze simple electric circuits with DC excitation (L4)
- Understand fundamental definitions of 1-phase AC circuits (L2)

- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-phase elements R, L, and C. (L2)

UNIT – II (7 Hrs)
Machines and Measuring Instruments
Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.
Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.
Learning Outcomes: At the end of this unit, students should be able to
- Understand the principle and operation of DC Generator & Motor. (L2)
- Understand the operation of transformer and induction motor. (L2)
- Understand the construction of induction motor - DC motor (L2)
- Distinguish between MC and MI type of instruments (L3)

UNIT – III (7 Hrs)
Energy Resources, Electricity Bill & Safety Measures
Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.
Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.
Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.
Learning Outcomes: At the end of this unit, students should be able to
- Understand the Conventional and Non-Conventional Energy Sources. (L2)
- Understand the Power Ratings of house hold appliances (L2)
- Knowing the energy consumption of different electrical appliances(L3)
- Calculating the electricity bill (L2).

PART B: BASIC ELECTRONICS ENGINEERING
UNIT – I (8 Hrs)
Semiconductor Devices: Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier

Learning Outcomes: At the end of this unit, students should be able to
- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

UNIT – II (7 Hrs)
Basic Electronic Circuits and Instrumentation
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.
Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.
Electronic Instrumentation: Block diagram of an electronic instrumentation system.
Learning Outcomes: At the end of this unit, students should be able to
- Understand the various Rectifiers and Power Supplies(L3)
- Analyze the behaviour of common emitter Amplifier with its frequency response (L3)

UNIT – III (7 Hrs)
Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).
Learning Outcomes: At the end of this unit, students should be able to
- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's Theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)

TEXTBOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Basic Electronics Engineering:
1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson

Education, 2021.

2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.

REFERENCE BOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, 4th Edition
2. "Principles of Power Systems", V. K. Mehtha, S. Chand Technical Publishers, 202
3. "Basic Electrical Engineering", T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. "Basic Electrical and Electronics Engineering", S. K. Bhattacharya, Pearson Publications, 2018, 2nd Edition.

For Basic Electronics Engineering:
1. "A Textbook of Electronic Devices and Circuits", R. S. Sedha, S. Chand & Co, 2010.
2. "Basic Electronics- Devices, Circuits and IT Fundamentals", Santiram Kal, Prentice Hall, India, 2002.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

ONLINE LEARNING RESOURCES:
For Basic Electrical Engineering:
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Course Code	ENGINEERING MECHANICS		L	T	P	C
23A03401A	(Common to CE, ME)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		II		

COURSE OBJECTIVES:

➢ To get familiarized with different types of force systems.
➢ To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
➢ To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
➢ To apply the Work-Energy method to particle motion.
➢ To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact. **(K3)**

CO2: Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments. **(K4)**

CO3: Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes. **(K4)**

CO4: Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle. **(K3)**

CO5: Solve the problems involving the translational and rotational motion of rigid bodies. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	3	-	-	-	-	1	2	2
CO2	2	3	3	1	1	-	-	-	-	-	-	1	2	2
CO3	3	3	2	1	1	-	-	-	-	-	-	1	3	2
CO4	3	3	3	3	1	-	-	-	-	-	-	1	1	1
CO5	3	2	3	2	2	-	-	-	-	-	-	1	1	1

UNIT – I (10 Hrs)

Introduction to Engineering Mechanics– Basic Concepts. Scope and Applications

Systems of Forces: Coplanar Concurrent Forces– Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Friction: Introduction**,** limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

Learning Outcomes: At the end of this unit, students should be able to

- Use scalar and vector analytical techniques for analyzing forces (L4)
- Calculate the resultant of system of forces. (L4)
- Analyze various types of friction. (L4)
- Apply types of motions and also understand, applications of friction. (L3)

UNIT – II (9 Hrs)

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples

Learning Outcomes: At the end of this unit, students should be able to

- Use scalar and vector analytical techniques for analyzing forces (L4)
- Calculate the resultant of system of forces. (L4)

UNIT – III (9 Hrs)

Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures.

Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.

Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

Learning Outcomes: At the end of this unit, students should be able to

- Understand distributed force systems, centroid center of gravity and method of finding centroids of composite figures and bodies. (L2)
- Analyze various types of problems related to Moment of Inertia (L4)

UNIT – IV (9 Hrs)

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

Learning Outcomes: At the end of this unit, students should be able to

- Understand practical examples related to curvilinear motion. (L2)
- Relate kinematics with kinetic equations on linear displacement, velocity and acceleration. (L4)

UNIT – V (8 Hrs)

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane

motion, Work Energy method and Impulse Momentum method.

Learning Outcomes: At the end of this unit, students should be able to

- Understand Kinetics of rigid body rotation. (L2)

TEXTBOOKS:

1. **"**Engineering Mechanics", S. Timoshenko, D. H. Young, J.V. Rao, S. Pati, McGraw Hill Education, 2017, 5th Edition.
2. "Engineering Mechanics", P. C. Dumir, S. Sengupta and Srinivas V veeravalli, University press, 2020, 1st Edition.
3. "A Textbook of Engineering Mechanics", S. S. Bhavikatti, New age international Publications, 2018, 4th Edition.

REFERENCE BOOKS:

1. "Engineering Mechanics, Statics and Dynamics", Rogers and M A. Nelson., McGraw Hill Education, 2017, 1st Edition.
2. "Engineering Mechanics, Statics and Dynamics", I. H. Shames, PHI, 2002, 4th Edition.
3. "Engineering Mechanics – Volume – I: Statics, Volume-II: Dynamics", J. L. Meriam and L. G. Kraige, John Wiley, 2008, 6th Edition.
4. "Introduction to Statics and Dynamics", Basudev Battachatia, Oxford University Press, 2014, 2nd Edition
5. "Engineering Mechanics: Statics and Dynamics", R. C. Hibbeler, Pearson Education, Inc., New Delhi, 2022, 14th Edition

Course Code	ENGINEERING PHYSICS LAB		L	T	P	C
23A11106A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors.

➢ To study the parameters and applications of dielectric and magnetic materials by conducting experiments

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Operate optical Instruments like travelling microscope and spectrometer. **(K2)**

CO2: Estimate the wavelengths of different colours using diffraction grating. **(K2)**

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance **(K3)**

CO4: Calculate the band gap of a given semiconductor. **(K3)**

CO5: Evaluate the acceptance angle and numerical aperture of an optical fiber. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determine the thickness of the wire using wedge shape method.
20. Determine the numerical aperture and acceptance angle of a given optical fiber.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCE BOOKS:
1. "A Textbook of Practical Physics", S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017.

ONLINE LEARNING RESOURCES:
1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Course Code	ENGINEERING CHEMISTRY LAB		L	T	P	C
23A11108A	(Common to CE, ME)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To get familiar with the basic concepts of Engineering Chemistry.
- ➢ To verify the fundamental concepts with experiments.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Develop skills in determining the effects of hardness of water. **(K3)**

CO2: Distinguish different types of titrations in the volumetric analysis. **(K4)**

CO3: Determine the cell constant and conductance of solutions. **(K5)**

CO4: Analyze the effect of temperature on viscosity by using Redwood viscometer. **(K4)**

CO5: Prepare advanced polymer Thiokol rubber materials. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	1	-
CO5	3	2	-	-	1	-	-	-	-	-	-	-	2	-

LIST OF EXPERIMENTS:
1. Determination of Strength of an acid in Lead-Acid battery
2. Determination of Total Hardness of Ground Water by EDTA Titration Method
3. Determination of Dissolved oxygen by Winkler's Method
4. Conductometry – Determination of cell constant and conductance of solutions.
5. Adsorption of acetic acid by charcoal
6. Determination of the rate of corrosion of Iron sample
7. Determination of percentage of Iron in cement sample by colorimetry.
8. Determination of percentage moister content in a Coal sample.
9. Determination of Viscosity of lubricating oil by Redwood Viscometer No-I
10. Determination of Viscosity of lubricating oil by Redwood Viscometer No-II
11. Preparation of Bakelite.
12. Preparation of Nanomaterials by Precipitation method.

TEXTBOOKS:
1. "Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2014.
2. "Experiments in Applied Chemistry", Dr. Sunita Rattan, S. K. Kataria & Sons Publishers of Engineering, 2nd Edition, 2004.

REFERENCE BOOKS:
1. Vogel's Text Book of Quantitative Chemical Analysis", Mendham Jet.al, Pearson Education, 6th Edition, 2012.

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to all branches)			L	T	P	C
23A02302A				0	0	3	1.5
Pre-requisite	NIL	Semester		II			

COURSE OBJECTIVES:

- ➢ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
- ➢ To impart knowledge on the principles of digital electronics and fundamentals of electron devices and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

- **CO1:** Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. **(K2)**
- **CO2:** Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. **(K4)**
- **CO3:** Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. **(K3)**
- **CO4:** Identify & testing of various electronic components along with characteristics of various electron devices. **(K2)**
- **CO5:** Explain the operation of a digital circuit. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	2	-	-	-	-	2	3	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	3	3	2

PART A: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum six experiments should be performed

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: Minimum six experiments should be performed using both Hardware and Software

REFERENCE BOOKS:

For Electrical Engineering Lab:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Electronics Engineering Lab:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

Course Code	ENGINEERING MECHANICS & BUILDING PRACTICES LAB		L	T	P	C
23A01401A			**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
➢ Verify the Law of Parallelogram of Forces and Lami's theorem.
➢ Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
➢ Understand the layout of a building, concepts of Non-Destructive Testing and different alternative materials.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller. **(K5)**

CO2: Validate Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever. **(K6)**

CO3: Determine the Centre of gravity for different configurations. **(K3)**

CO4: Understand the Quality Testing and Assessment Procedures and principles of non-destructive testing. **(K1)**

CO5: Focus on safety practices in the construction industry. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	2	-	-	-	-	-	-	-	-	1	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	1	-
CO3	3	2	-	2	-	-	-	-	-	-	-	-	1	-
CO4	3	1	-	2	-	-	-	-	-	-	-	-	1	-
CO5	1	1	-	1	-	2	2	-	-	-	-	-	-	-

LIST OF EXPERIMENTS:
1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.

10. Safety Practices in Construction industry

11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV

12. Study of Plumbing in buildings.

Note: Students have to perform any 10 of the above Experiments

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to all branches)		L	T	P	C
23A11110A			**0**	**0**	**1**	**0.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of discipline, character and service motto. **(K2)**

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. **(K3)**

CO3: Explore human relationships by analyzing social problems. **(K4)**

CO4: Determine to extend their help for the fellow beings and downtrodden people. **(K3)**

CO5: Develop leadership skills and civic responsibilities. **(K5)**

UNIT – I

Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

● Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills

● Conducting orientations programs for the students –future plans-activities-releasing road map etc.

● Displaying success stories-motivational biopics- award winning movies on societal issues etc.

● Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II

Nature & Care

Activities:

● Best out of waste competition.

● Poster and signs making competition to spread environmental awareness.

● Recycling and environmental pollution article writing competition.

● Organizing Zero-waste day.

● Digital Environmental awareness activity via various social media platforms.

● Virtual demonstration of different eco-friendly approaches for sustainable living.

● Write a summary on any book related to environmental issues.

UNIT – III
Community Service
Activities:

- Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media, authorities, experts, etc.
- Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- Conducting consumer Awareness. Explaining various legal provisions etc.
- Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. "A Text Book of National Service Scheme Vol – I", Nirmalya Kumar Sinha & Surajit Majumder, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. "Red Book - National Cadet Corps – Standing Instructions Vol I & II", Directorate General of NCC, Ministry of Defence, New Delhi.
3. "Introduction to Environmental Engineering", M. L. Davis and D. A. Cornwell, McGraw Hill, New York, 4th Edition, 2008.
4. "Introduction to Environmental Engineering and Science", G. M. Masters, K. Joseph and R. Nagendran, Pearson Education, New Delhi, 2nd Edition, 2007.
5. "Social Problems in India", Ram Ahuja, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

ELECTRICAL AND ELECTRONICS ENGINEERING
(For the batches admitted from the academic year 2023-24)

Vision
- To be recognized for producing meritorious electrical engineers with research proficiency and social commitment

Mission
- To impart quality education with practice-based learning in producing electrical engineers with ethical values.
- To encourage the faculty and students to acquire mastery in cutting edge technologies.
- To implement research activities with social commitment.

Institutional Objectives
- To create a conducive and competitive environment for students through curricular and extra-curricular activities.
- Promote the culture of research among the faculty.
- To promote synergetic alliances with premier Institutions, Industry, CSIR laboratories and various Government organizations for Collaborative Research Projects.
- To promote economic and social enrichment of the society through Skill Development programmes, Entrepreneurship, and extension activities.
- To introduce demand-driven new UG&PG academic programmes.
- To ensure a high degree of quality in terms of providing infrastructure, research ambience, faculty and staff development.

Core Values
- *Thirst for Quality Education:* The stake holders of the institute particularly management, employees and students of the institution have a consistent thirst for quality improvement of the processes and services in the institution.
- *Lifelong Learning:* In the fast-changing technological world, acquiring a special skill at one point of time will not be enough for ever long survival. Hence to flourish in the workplace and to bring in innovations in the ways of doing, employee, student as well as alumni must be continuous learners and tech savvy.
- *Diversity and Participation:* PBRVITS promotes the involvement of faculty, staff, and students from all social, economic, ethnics, cultural and religious backgrounds

to get the synergy of combining the diversified agents. The focus is on involving students to exhibit their talent in various curricular and co-curricular activities and strengthening alumni link to share their experiences to the students.

- *Academic Integrity and Accountability:* Management induces accountability in the employees for the career of the students and the academic leadership establishes a mentoring mechanism for realization of responsibilities of students towards their parents and in turn to the society.

ELECTRICAL AND ELECTRONICS ENGINEERING
(For the batches admitted from the academic year 2023-24)

INDUCTION PROGRAM (3 weeks duration)	
S. No	Course Name
1	Physical Activities – Sports, Yoga and Meditation, Plantation
2	Career Counselling
3	Orientation to all branches – career options, tools, etc.
4	Orientation on admitted Branch – corresponding labs, tools and platforms
5	Proficiency Modules and Productivity Tools
6	Assessment on basic aptitude and mathematical skills
7	Remedial training in Foundation Courses
8	Human Values and Professional Ethics
9	Communication Skills – Focus on Listening, Speaking, Reading, Writing Skills
10	Concepts of Programming

Semester I (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11101A	Linear Algebra & Calculus	3	0	0	3	30	70	100
2	HSMC	23A11201A	Communicative English	2	0	0	2	30	70	100
3	ES	23A02301A	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
4	ES	23A05301A	Introduction to Programming	3	0	0	3	30	70	100
5	ES	23A03301A	Engineering Graphics	1	0	4	3	30	70	100
6	ES	23A02302A	Electrical and Electronics Engineering Workshop	0	0	3	1.5	30	70	100
7	ES	23A05302A	Computer Programming Lab	0	0	3	1.5	30	70	100
8	HSMC	23A11202A	Communicative English Lab	0	0	2	1	30	70	100
9	ES	23A05304A	IT Workshop	0	0	2	1	30	70	100
10	BS	23A11109A	Health and Wellness, Yoga and Sports	-	-	1	0.5	-	-	100
Total							19.5			1000

Semester II (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11102A	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
2	BS	23A11103A	Engineering Physics	3	0	0	3	30	70	100
3	BS	23A11104A	Chemistry	3	0	0	3	30	70	100
4	ES	23A01301A	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
5	PC	23A02401A	Electrical Circuit Analysis - I	3	0	0	3	30	70	100
6	BS	23A11106A	Engineering Physics Lab	0	0	2	1	30	70	100
7	BS	23A11107A	Chemistry Lab	0	0	2	1	30	70	100
8	PC	23A02402A	Electrical Circuits Lab	0	0	3	1.5	30	70	100
9	ES	23A05303A	Engineering Workshop	0	0	3	1.5	30	70	100
10	BS	23A11110A	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	-	-	100
Total							**20.5**			**1000**

Course Code	LINEAR ALGEBRA & CALCULUS		L	T	P	C
23A11101A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. **(K3)**

CO2: Demonstrate the ability to compute eigen values and eigen vectors for square matrices using methods such as characteristic polynomials, determinants, and numerical techniques. **(K3)**

CO3: Utilize mean value theorems to real life problems. **(K3)**

CO4: Familiarize with functions of several variables which are useful in optimization. **(K3)**

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	1	-

UNIT – I (9 Hrs)

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Learning Outcomes: At the end of this unit, students should be able to

- Solve systems of linear equations, using technology to facilitate row reduction and determine the rank (L3).
- Demonstrate an understanding of how to translate a system of simultaneous linear equations into a matrix (L2)
- Solve systems of linear equations using various methods including Gauss elimination

method and Gauss Seidel Iteration Methods (L3)

UNIT – II (9 Hrs)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors 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 forms by Orthogonal Transformation.

Learning Outcomes: At the end of this unit, students should be able to

- Demonstrate the process of finding eigenvalues and eigenvalues for square matrices. (L2)
- Describe the process of diagonalizing a matrix and its significance. (L3)
- Apply the Cayley-Hamilton Theorem to find powers of a matrix and compute the inverse of a matrix. (L3)
- Apply knowledge of the nature of a quadratic form to analyse and solve optimization process. (L3)
- Explain the process of using orthogonal transformations to reduce a quadratic form to its canonical form. (L5)

UNIT – III (9 Hrs)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Learning Outcomes: At the end of this unit, students should be able to

- Analyze the behaviour of functions by using mean value theorems (L4)
- Translate the given function as series of Taylor's and Maclaurin's with remainders (L2)

UNIT – IV (9 Hrs)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes: At the end of this unit, students should be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L4)
- Acquire the Knowledge maxima and minima of functions of several variable (L3)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

<u>**UNIT – V**</u> **(9 Hrs)**

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Learning Outcomes: At the end of this unit, students should be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L3)
- Evaluate triple integrals in Cartesian, cylindrical and spherical polar coordinates. (L5)
- Apply triple integration techniques in evaluating volumes. (L3)

<u>**TEXTBOOKS:**</u>

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

<u>**REFERENCE BOOKS:**</u>

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", Michael Greenberg, Pearson publishers, 9th Edition
5. "Higher Engineering Mathematics", H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, 3rd Edition (Reprint 2021)

Course Code	COMMUNICATIVE ENGLISH		L	T	P	C
23A11201A	(Common to all branches)		2	0	0	2
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To facilitate effective Listening, Reading, Speaking and Writing skills among the students.
➢ To enhance their comprehending abilities, oral presentations, reporting useful information.
➢ To provide knowledge of grammatical structures and vocabulary.
➢ To make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues, and also from reading content. **(K2)**

CO2: Apply grammatical structures to formulate sentences and correct word forms. **(K3)**

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. **(K4)**

CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. **(K5)**

CO5: Create a coherent paragraph, essay, and resume. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	-	2	-	2	2	-	-	3	2	-	-	-
CO5	-	-	-	-	-	1	-	1	-	3	1	1	-	-

UNIT – I (9 Hrs)

Lesson : HUMAN VALUES: Gift of Magi (Short Story)

Listening	:	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking	:	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading	:	Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing	:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar	:	Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary	:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Learning Outcomes: At the end of this unit, students should be able to

- Understand specific pieces of information through listening and reading. (L2)
- Demonstrate basic questioning and answering skills on general topics. (L2)
- Outline the main ideas and specific details from the given text.(L2)
- Apply grammatical knowledge to frame flawless sentences. (L3)
- Develop basic word knowledge. (L3)

UNIT – II (9 Hrs)
Lesson : NATURE: The Brook by Alfred Tennyson (Poem)

Listening	:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking	:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading	:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing	:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar	:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary	:	Homonyms, Homophones, Homographs.

Learning Outcomes: At the end of this unit, students should be able to

- Distinguish between main idea and supporting ideas through listening. (L4)
- Develop short structured talks. (L3)
- Identify the logical sequence of ideas in a given text. (L3)
- Organize ideas into a meaningful paragraph by using cohesive devices and also learn the right usage of articles and prepositions. (L3)
- Identify difference among homonyms, homophones and homographs.(L3)

UNIT – III (9 Hrs)
Lesson : BIOGRAPHY: Elon Musk

Listening	:	Listening for global comprehension and summarizing what is listened to.
Speaking	:	Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading	:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing	:	Summarizing, Note-making, paraphrasing
Grammar	:	Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary	:	Compound words, Collocations.

Learning Outcomes: At the end of this unit, students should be able to

- Summarize what is listened to. (L2)
- Discuss on specific topics and report what is discussed. (L6)

- Interpret specific clues and use different strategies to comprehend a text. (L5)
- Summarize and paraphrase a given text by using different methods of note-making. (L2)
- Make use of right form of the verbs, compound words and collocations. (L3)

UNIT – IV (9 Hrs)
Lesson : INSPIRATION: The Toys of Peace by Saki

Listening	:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video
Speaking	:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading	:	Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/relationships, communicate processes or display complicated data.
Writing	:	Letter Writing: Official Letters, Resumes
Grammar	:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary	:	Words often confused, Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Make Predictions while listening to video and audio texts. (L6)
- Construct a dialogue in academic contexts. (L3)
- Analyze the data from the given graphic elements and present it verbally. (L4)
- Build effective resumes and draft formal letters. (L6)
- Apply grammatical rules to transform sentences into different speech or voice. (L3)
- Identify correct word for the context and also jargons. (L3)

UNIT – V (9 Hrs)
Lesson : MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening	:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking	:	Formal oral presentations on topics from academic contexts.
Reading	:	Reading Comprehension.
Writing	:	Writing structured essays on specific topics.
Grammar	:	Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary	:	Technical Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Interpret a given text and answer the questions. (L5)
- Present a topic of academic context. (L5)
- Interpret and comprehend a given text. (L5)
- Develop structured essays on specific topics. (L3)

- Identify common errors in grammar and usage.(L3)
- Make use of technical Jargons. (L3)

TEXTBOOKS:
1. "Pathfinder: Communicative English for Undergraduate Students", 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3)
2. "Empowering with Language", Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:
1. "English for Engineers", Dubey, Sham Ji & Co., Vikas Publishers, 2020
2. "Academic writing: A Handbook for International Students", Stephen Bailey, Routledge, 2014.
3. "English Grammar in Use", Raymond Murphy, 4th Edition, Cambridge University Press, 2019.
4. "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary", Norman Lewis, Anchor, 2014.

ONLINE LEARNING RESOURCES:
GRAMMAR:
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY:
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to all branches)		L	T	P	C
23A02301A			3	0	0	3
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the problem solving concepts associated to AC and DC circuits. **(K2)**

CO2: Analyze the operating principles of motors, generators, MC and MI instruments. **(K4)**

CO3: Apply the mathematical tool for different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. **(K3)**

CO4: Explain the characteristics of diodes and transistors. **(K4)**

CO5: Familiarize with the number systems, codes, Boolean algebra and logic gates **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO2	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO3	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO4	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO5	3	3	1	-	1	3	2	-	-	-	-	1	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I (8 Hrs)

DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

Learning Outcomes: At the end of this unit, students should be able to

- Recall Kirchhoff's laws (L1) .
- Analyze simple electric circuits with DC excitation (L4)
- Understand fundamental definitions of 1-phase AC circuits (L2)

- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-phase elements R, L, and C. (L2)

UNIT – II (7 Hrs)
Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the principle and operation of DC Generator & Motor. (L2)
- Understand the operation of transformer and induction motor. (L2)
- Understand the construction of induction motor - DC motor (L2)
- Distinguish between MC and MI type of instruments (L3)

UNIT – III (7 Hrs)
Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the Conventional and Non-Conventional Energy Sources. (L2)
- Understand the Power Ratings of house hold appliances (L2)
- Knowing the energy consumption of different electrical appliances(L3)
- Calculating the electricity bill (L2).

PART B: BASIC ELECTRONICS ENGINEERING

UNIT – I (8 Hrs)
Semiconductor Devices: Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier

Learning Outcomes: At the end of this unit, students should be able to
- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

UNIT – II (7 Hrs)

Basic Electronic Circuits and Instrumentation

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.

Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.

Electronic Instrumentation: Block diagram of an electronic instrumentation system.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the various Rectifiers and Power Supplies(L3)
- Analyze the behaviour of common emitter Amplifier with its frequency response (L3)

UNIT – III (7 Hrs)

Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Learning Outcomes: At the end of this unit, students should be able to
- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's Theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)

TEXTBOOKS:

For Basic Electrical Engineering:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Basic Electronics Engineering:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson

Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.

REFERENCE BOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, 4th Edition
2. "Principles of Power Systems", V. K. Mehtha, S. Chand Technical Publishers, 202
3. "Basic Electrical Engineering", T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. "Basic Electrical and Electronics Engineering", S. K. Bhattacharya, Pearson Publications, 2018, 2nd Edition.

For Basic Electronics Engineering:
1. "A Textbook of Electronic Devices and Circuits", R. S. Sedha, S. Chand & Co, 2010.
2. "Basic Electronics- Devices, Circuits and IT Fundamentals", Santiram Kal, Prentice Hall, India, 2002.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

ONLINE LEARNING RESOURCES:
For Basic Electrical Engineering:
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Course Code	INTRODUCTION TO PROGRAMMING		L	T	P	C
23A05301A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To introduce students to the fundamentals of computer programming.
➢ To provide hands-on experience with coding and debugging.
➢ To foster logical thinking and problem-solving skills using programming.
➢ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
➢ To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. **(K2)**

CO2: Analyse a problem and develop an algorithm to solve it. **(K4)**

CO3: Implement various algorithms using the C programming language. **(K3)**

CO4: Understand more advanced features of C language. **(K2)**

CO5: Develop problem-solving skills and the ability to debug and optimize the code. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-	-	2
CO5	1	2	3	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Learning Outcomes: At the end of this unit, students should be able to

● Translate algorithms into programs. (L4)
● Solve complex problems using language independent notations. (L3)

- Use C basic concepts to write simple C programs. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Analyze the algorithms for time and space complexities. (L4)

UNIT – II (9 Hrs)

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

Learning Outcomes: At the end of this unit, students should be able to

- Implement conditional branching and iteration statements. (L2)
- Select the control structures for solving the problem statements (L4)
- Use iterative statements for writing C programs. (L3)

UNIT – III (8 Hrs)

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Learning Outcomes: At the end of this unit, students should be able to

- Use arrays to process multiple homogeneous data. (L3)
- Solve mathematical problems using C programming language. (L3)
- Apply string-handling functions. (L3)

UNIT – IV (9 Hrs)

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Learning Outcomes: At the end of this unit, students should be able to

- Structure the individual data elements to simplify the solution. (L6)
- Facilitate efficient memory utilization. (L6)
- Use pointers and structures to formulate algorithm and write programs. (L3)
- Understand the basic differences between structure and union. (L2)

UNIT – V (9 Hrs)

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling.

Learning Outcomes: At the end of this unit, students should be able to

- Understand basic terminology of modular programming. (L2)
- Writing structured programs using C Functions. (L5)
- Apply modular approach for solving the problem statements. (L3)
- Writing C programs using various storage classes to control variable access. (L5)

- Apply input and output statements to process the data in various formats. (L3)

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:
1. "Computing fundamentals and C Programming", E. Balagurusamy, McGraw-Hill Education, 2008.
2. "Programming in C", Rema Theraja, Oxford, 2016, 2nd Edition.
3. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

ONLINE LEARNING RESOURCES:
1. www.learn-c.org
2. www.programmeiz.com
3. www.github.com

Course Code	ENGINEERING GRAPHICS		L	T	P	C
23A03301A	(Common to all branches)		**1**	**0**	**4**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing

➢ To impart knowledge on the projection of points, lines and plane surfaces

➢ To improve the visualization skills for better understanding of projection of solids

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. **(K2)**

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. **(K1)**

CO3: Understand and draw projection of solids in various positions in first quadrant. **(K2)**

CO4: Explain principles behind development of surfaces. **(K2)**

CO5: Prepare isometric and perspective sections of simple solids. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO2	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	3	-	-	-	-	2	-	2	2	2

UNIT – I (12 Hrs)

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Learning Outcomes: At the end of this unit, students should be able to

● Understand the significance of engineering drawing (L2)

- Know the conventions used in the engineering drawing (L1)
- Identify the curves obtained in different conic sections (L2)
- Draw different cycloidal and involute curves. (L1)
- Know about the scale conversion techniques (L1)

UNIT – II (12 Hrs)

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

Learning Outcomes: At the end of this unit, students should be able to

- Know how to draw the projections of points, lines (L1)
- Find the true length of the lines. (L2)
- Understand the procedure to draw projection of planes. (L2)
- Draw the projection of plane inclined to one plane and both the planes. (L1)

UNIT – III (18 Hrs)

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane

Learning Outcomes: At the end of this unit, students should be able to

- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solid inclined to one plane. (L1)

UNIT – IV (15 Hrs)

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the procedure to draw sectional views and true shape of solids. (L2)
- Represent the surface development of simple solids. (L3)

UNIT – V (18 Hrs)

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

Learning Outcomes: At the end of this unit, students should be able to

- Learn the basics convectional representation of different projections (L1)
- Draw the Orthographic projection of simple solids. (L1)
- Draw the Isometric projection of simple solids. (L1)
- Understand the different commands used in Computerized drawing (L2)

TEXTBOOKS:

1. "Engineering Drawing", N. D. Bhatt, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. "Engineering Drawing", K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. "Engineering Drawing", M. B. Shah and B. C. Rana, Pearson Education Inc, 2009.
3. "Engineering Drawing with an Introduction to AutoCAD", Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to all branches)		L	T	P	C
23A02302A			0	0	3	1.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
➢ To impart knowledge on the principles of digital electronics and fundamentals of electron devices and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. **(K2)**

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. **(K4)**

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. **(K3)**

CO4: Identify & testing of various electronic components along with characteristics of various electron devices. **(K2)**

CO5: Explain the operation of a digital circuit. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	2	-	-	-	-	2	3	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	3	3	2

PART A: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum six experiments should be performed

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: Minimum six experiments should be performed using both Hardware and Software

REFERENCE BOOKS:

For Electrical Engineering Lab:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Electronics Engineering Lab:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

Course Code	COMPUTER PROGRAMMING LAB		L	T	P	C
23A05302A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. **(K2)**

CO2: Select the right control structure for solving the problem. **(K1)**

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. **(K3)**

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. **(K3)**

CO5: Develop C programs to handle File handling operations. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

UNIT – I

Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab 1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 2: Converting algorithms/flow charts into C Source code. Developing the algorithms/ flowcharts for the following sample programs

- i) Sum and average of 3 numbers
- ii) Conversion of Fahrenheit to Celsius and vice versa
- iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions.

Lab 3: Simple computational problems using arithmetic expressions

- i) Finding the square root of a given number
- ii) Finding compound interest
- iii) Area of a triangle using heron's formulae
- iv) Distance travelled by an object

UNIT – II

Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity.

Lab 4: Simple computational problems using the operator' precedence and associativity

- i) Evaluate the following expressions
    - a. A+B*C+(D*E) + F*G
    - b. A/B*C-B+A*D/3
    - c. A+++B---A
    - d. J= (i++) + (++i)
- ii) Find the maximum of three numbers using conditional operator
- iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions.

Lab 5: Problems involving if-then-else structures

    i) Write a C program to find the max and min of four numbers using if-else.

    ii) Write a C program to generate electricity bill.

    iii) Find the roots of the quadratic equation.

    iv) Write a C program to simulate a calculator using switch case.

    v) Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops.

Lab 6: Iterative problems e.g., the sum of series

    i) Find the factorial of given number using any loop.

    ii) Find the given number is a prime or not.

    iii) Compute sine and cos series

    iv) Checking a number palindrome

    v) Construct a pyramid of numbers

UNIT – III

Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1-D Arrays: searching.

Lab 7: 1-D Array manipulation, linear search

    i) Find the min and max of a 1-D integer array.

    ii) Perform linear search on1D array.

    iii) The reverse of a 1D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will

reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

    i) Addition of two matrices

    ii) Multiplication two matrices

    iii) Sort array elements using bubble sort

    iv) Concatenate two strings without built-in functions

    v) Reverse a string using built-in and without built-in string functions

UNIT – IV

Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereference

    i) Write a C program to find the sum of a 1D array using malloc()

    ii) Write a C program to find the total, average of n students using structures

    iii) Enter n students data using calloc() and display failed students list

    iv) Read student name and marks from the command line and display the student details along with the total.

    v) Write a C program to implement realloc()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists.

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

    i) Create and display a singly linked list using self-referential structure.

    ii) Demonstrate the differences between structures and unions using a C program.

    iii) Write a C program to shift/rotate using bitfields.

    iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT – V
Week 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration
Suggested Experiments/Activities:
Tutorial 11: Functions, call by value, scope and extent.
Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.
  i)   Write a C function to calculate NCR value.
  ii) Write a C function to find the length of a string.
  iii) Write a C function to transpose of a matrix.
  iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.
Suggested Experiments/Activities:
Tutorial 12: Recursion, the structure of recursive calls.
Lab 12: Recursive functions
  i)   Write a recursive function to generate Fibonacci series.
  ii) Write a recursive function to find the lcm of two numbers.
  iii) Write a recursive function to find the factorial of a number.
  iv) Write a C Program to implement Ackermann function using recursion.
  v)   Write a recursive function to find the sum of series.

Week 13:
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers
Suggested Experiments/Activities:
Tutorial 13: Call by reference, dangling pointers
Lab 13: Simple functions using Call by reference, Dangling pointers.
  i)   Write a C program to swap two numbers using call by reference.
  ii) Demonstrate Dangling pointer problem using a C program.
  iii) Write a C program to copy one string into another using pointer.
  iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling.

Lab 14: File operations

    i) Write a C program to write and read text into a file.

    ii) Write a C program to write and read text into a binary file using fread() and fwrite()

    iii) Copy the contents of one file to another file.

    iv) Write a C program to merge two files into the third file using command-linearguments.

    v) Find no. of lines, words and characters in a file

    vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. "Programming in C: A practical approach", Ajay Mittal, Pearson
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. "C   Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

Course Code	COMMUNICATIVE ENGLISH LAB		L	T	P	C
23A11202A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
➢ To train in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. **(K2)**

CO2: Apply communication skills through various language learning activities. **(K3)**

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **(K4)**

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. **(K5)**

CO5: Take part effectively in job interviews. **(K5)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	2	-	2	-	-	-	1	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	2	-	-

TOPICS:

1. Vowels and Consonants

Learning Outcomes: At the end of this session, students should be able to

● Distinguish different speech sounds while listening and speaking with a view to effectively comprehend texts of various difficulty levels. (L4)

2. Neutralization and Accent Rules

Learning Outcomes: At the end of this session, students should be able to

● Identify syllabification, stress, rhythm and intonation for effective inference of comprehended texts. (L3)
● Apply accent neutralized speech approach to communicate with fluency. (L3)
● Develop various transactional models of communication while listening to native speakers of English. (L3)

3. Communication skills and JAM

Learning Outcomes: At the end of this session, students should be able to

- Take part in short structured talks. (L4)
- Make use of effective communication skills in varied contexts. (L4)

4. Role Play or Conventional Practice

Learning Outcomes: At the end of this session, students should be able to

- Develop conversational skills both in academic and professional contexts. (L3)

5. E-mail Writing

Learning Outcomes: At the end of this session, students should be able to

- Construct structured and well-organized emails for different professional purposes. (L3)

6. Resume Writing, Cover Letter

Learning Outcomes: At the end of this session, students should be able to

- Build effective resumes along with cover letters. (L3)

7. Group Discussions – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Understand the key skills and behavioural requirements to facilitate the group discussion. (L2)
- Take part in group discussions effectively. (L4)

8. Debates – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Take part in brain storming sessions. (L4)
- Compare and contrast different viewpoints to arrive at a consensus. (L5)

9. PPT Presentations/Poster Presentations

Learning Outcomes: At the end of this session, students should be able to

- Create effective power point and poster presentations. (L6)

10. Interview Skills

Learning Outcomes: At the end of this session, students should be able to

- Develop required skills to participate in interviews. (L3)
- Analyze the dynamics of interviews to increase the chances of employment. (L4)

REFERENCE BOOKS:
1. "Technical Communication", Meenakshi Raman, Sangeeta Sharma, Oxford Press, 2018.
2. "English Conversation Practice", Taylor Grant, Tata McGraw-Hill Education India, 2016.
3. "Cambridge Academic English (B2)", Martin Hewings. CUP, 2012.

4. "A Course in Phonetics and Spoken English", J. Sethi & P.V. Dhamija, 2nd Edition, Kindle, 2013.

ONLINE LEARNING RESOURCES:
SPOKEN ENGLISH:
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & ACCENT:
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Course Code	IT WORKSHOP		L	T	P	C
23A05304A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:
- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning.
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:
After completion of the course, the student will be able to

   CO1: Perform Hardware troubleshooting. **(K2)**

   CO2: Understand Hardware components and inter dependencies. **(K2)**

   CO3: Safeguard computer systems from viruses/worms. **(K3)**

   CO4: Document/ Presentation preparation. **(K3)**

   CO5: Perform calculations using spreadsheets. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	1	2	-	-	-	-	-	-	-	1	-
CO3	1	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	1	2	-	-	-	-	-	-	-	-	2
CO5	1	3	2	2	2	-	-	-	-	-	-	-	-	2

PC Hardware & Software Installation:
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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:

Task 1: 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 power point 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.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCE BOOKS:
1. "Comdex Information Technology course tool kit", Vikas Gupta, WILEY Dream tech, 2003
2. "The Complete Computer upgrade and repair book", Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd Edition
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2012, 2nd Edition
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", David Anfinson and Ken Quamme, CISCO Press, Pearson Education, 3rd Edition
7. "IT Essentials PC Hardware and Software Labs and Study Guide", Patrick Regan, CISCO Press, Pearson Education, 3rd Edition

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to all branches)		L	T	P	C
23A11109A			0	0	1	0.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To make the students maintain their mental and physical wellness by balancing emotions in their life

➢ To enhance the essential traits required for the development of the personality.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health. **(K2)**

CO2: Demonstrate an understanding of health-related fitness components. **(K3)**

CO3: Compare and contrast various activities that help enhance their health. **(K4)**

CO4: Assess current personal fitness levels. **(K2)**

CO5: Develop Positive Personality. **(K5)**

UNIT – I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity, Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

- Organizing health awareness programmes in community
- Preparation of health profile
- Preparation of chart for balance diet for all age groups

UNIT – II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

- Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

- Participation in one major game and one individual sport viz., Athletics, Volleyball,

Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
- Practicing general and specific warm up, aerobics
- Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:
1. "Health and Wellness", Gordon Edlin, Eric Golanty. 14th Edition, Jones & Bartlett Learning, 2022
2. "The Heart of Yoga: Developing a Personal Practice", T. K. V. Desikachar
3. "Yoga Sutras of Patanjali", Archie J. Bahm, Jain Publishing Company, 1993
4. "SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere", Wiseman, John Lofty, 3rd Edition, William Morrow Paperbacks, 2014
5. "The Sports Rules Book/ Human Kinetics with Thomas Hanlon", 3rd Edition, Human Kinetics, Inc.2014

GENERAL GUIDELINES:
1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:
- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS (Common to all branches)		L	T	P	C
23A11102A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
➢ To enlighten the learners in the concept of differential equations and multivariablecalculus.
➢ To furnish the learners with basic concepts and techniques at plus two level to lead theminto advanced level by handling various real-world applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Apply first order and first degree differential equations to model and solve problems in various scientific and engineering disciplines, including electrical circuits. **(K3)**

CO2: Solve the differential equations related to various engineering fields**. (K3)**

CO3: Identify solution methods for partial differential equations that model physical processes. **(K3)**

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. **(K2)**

CO5: Estimate the work done against a field, circulation and flux using vector calculus. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	-	-	-	-	-	-	2	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	1	-
CO5	2	3	2	2	-	-	-	-	-	-	-	1	1	-

UNIT – I (9 Hrs)
Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Learning Outcomes: At the end of this unit, students should be able to

• Learn the effective mathematical tools for solutions of first order differential equations(L2)
• Apply mathematical tools to model physical processes such as Newton's law of cooling, electrical circuits (L3).

UNIT – II (9 Hrs)
Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit

problems and Simple Harmonic motion.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L4)
- Formulate and solve the higher order differential equation by analyzing physical situations (L6)

UNIT – III (9 Hrs)

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Learning Outcomes: At the end of this unit, students should be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT – IV (9 Hrs)

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

Learning Outcomes: At the end of this unit, students should be able to

- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT – V (9 Hrs)

Vector integration: Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Learning Outcomes: At the end of this unit, students should be able to

- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th

Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. "Higher Engineering Mathematics", B. V. Ramana, McGraw Hill Education, 2017

Course Code	ENGINEERING PHYSICS		L	T	P	C
23A11103A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:

- ➢ To identify the importance of the physical optics i.e., interference, diffraction and polarization related to its engineering applications
- ➢ To present the basic concepts needed to understand the crystal structure of materials, X-ray diffraction
- ➢ To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices
- ➢ To enlighten the concepts of Quantum mechanics and to provide fundamentals of the de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory.
- ➢ Evolution of band theory to distinguish materials and explain the properties of semiconductors

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the intensity variation of light due to interference, diffraction & polarization. **(K3)**

CO2: Familiarize with the basics of crystals and their structures**. (K2)**

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials. **(K3)**

CO4: Explain the basic concepts of quantum mechanics and the band theory of solids. **(K2)**

CO5: Identify the type of semiconductor using Hall effect **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Wave Optics:

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double

refraction - Nicol's Prism -Half wave and Quarter wave plates.

Learning Outcomes: At the end of this unit, students should be able to
- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify scientific & engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary light and polarized light (L2)

UNIT – II (9 Hrs)
Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

Learning Outcomes: At the end of this unit, students should be able to
- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by using Laue method & powder method (L4)

UNIT – III (9 Hrs)
Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Learning Outcomes: At the end of this unit, students should be able to
- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius- Mosotti relation indielectrics (L2)
- Classify magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)

UNIT – IV (9 Hrs)

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concepts of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Understand the concept of density of states (L2)

UNIT – V (8 Hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and applications.

Learning Outcomes: At the end of this unit, students should be able to

- Classify the energy bands of semiconductors (L2)
- Understand the differences between intrinsic and extrinsic semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)

TEXTBOOKS:

1. "A Text book of Engineering Physics", M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition, 2019.
2. "Engineering Physics", D. K. Bhattacharya and Poonam Tandon, Oxford press, 2015

REFERENCE BOOKS:

1. "Engineering Physics", B. K. Pandey and S. Chaturvedi, Cengage Learning, 2021.
2. "Engineering Physics", Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. "Engineering Physics", Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010
4. "Engineering Physics", M. R. Srinivasan, New Age international publishers, 2009

ONLINE LEARNING RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Course Code	CHEMISTRY	L	T	P	C
23A11104A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)	**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		II	

COURSE OBJECTIVES:

➢ To familiarize chemistry and applications.
➢ To train the students on the principles and applications of electro chemistry and polymers.
➢ To introduce instrumental methods and applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the salient features of different theories along with their applications. **(K2)**

CO2: Discuss about the model engineering materials. **(K3)**

CO3: Apply the knowledge of various electrodes for the development of new batteries. **(K3)**

CO4: Identify the different polymers and their uses in various fields of engineering. **(K3)**

CO5: Analyze the knowledge of different analytical techniques used engineering and also development of new techniques. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Structure and Bonding Models: Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo - and hetero nuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes: At the end of this unit, students should be able to

● Illustrate the molecular orbital energy level diagram of different molecular species (L2)
● Discuss the basic concept of molecular orbital theory (L3)
● Explain the calculation of bond order of O2 and CO molecules (L2)

UNIT – II (9 Hrs)

Modern Engineering Materials: Semiconductors: Introduction, basic concept, applications

Super conductor: Introduction, basic concept, applications.

Super capacitors: Introduction, Basic Concept, Classification, Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphine nanoparticles.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the band theory of solids for conductors, semiconductors and insulators (L2)
- Demonstrate the application of Fullerenes, Carbon nanotubes and Graphene nanoparticles (L2)

UNIT – III (9 Hrs)

Electro Chemistry and Applications: Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors: Potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc- air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell – working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Learning Outcomes: At the end of this unit, students should be able to

- Apply the Nernst equation for calculating electrode and cell potentials(L3)
- Differentiate between potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)

UNIT – IV (9 Hrs)

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Bakelite, Nylon-6,6, Carbon fibers.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – Polyacetylene, polyaniline, – mechanism of conduction and applicatio Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

Learning Outcomes: At the end of this unit, students should be able to

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylons (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N and their applications (L2)

UNIT – V (8 Hrs)

Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic principle, Classification- HPLC: Principle, Instrumentation and Applications.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the different types of spectral series in electromagnetic spectrum (L2)
- Understand the principles and applications of different analytical instruments (L2)

TEXTBOOKS:

1. "Engineering Chemistry", Jain and Jain, Dhanpat Rai publications, 17th Edition, 2018
2. "Atkins' Physical Chemistry", Peter Atkins, Julio de Paula and James Keeler, Oxford University Press, 10th Edition, 2010
3. "Concise Inorganic Chemistry", J. D. Lee, Wiley Publications, 5th Edition, Feb 2008

REFERENCE BOOKS:

1. "Principles of Instrumental Analysis", Skoog and West, 6th Edition, Thomson, 2007.
2. "Textbook of Polymer Science", Fred W. Billmayer Jr, 3rd Edition

Course Code	**BASIC CIVIL AND MECHANICAL ENGINEERING** (Common to all branches)		**L**	**T**	**P**	**C**
23A01301A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		II		

COURSE OBJECTIVES:

➢ To get familiarized with scope and importance of Civil and Mechanical Engineering in different sectors and industries.

➢ To introduce the preliminary concepts of Building Planning, Construction, Materials and related tests.

➢ To acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.

➢ To explain different engineering materials and manufacturing processes.

➢ To provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand various sub-divisions of Civil Engineering and appreciate their role in ensuring better society. **(K2)**

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. **(K3)**

CO3: Realize the importance of Transportation in nation's economy and engineering measures related to highways in terms of geometrics. **(K3)**

CO4: Understand the importance of water resources and storage structures so that social responsibilities of water conservation will be appreciated.**(K1)**

CO5: Understand the different manufacturing processes and explain the basics of thermal engineering and its applications. **(K2)**

CO6: Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	3	-	-	-	-	-	-	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT – I (8 Hrs)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel / Theatre.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the role of civil Engineers in the society and Various Disciplines of Civil Engineering. (L2)
- Develop typical layouts for different residential commercial and Industrial buildings. (L3)

UNIT – II (7 Hrs)

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements-Angular Measurements- Leveling instruments used for leveling- Introduction to Bearings Simple problems on leveling and bearings-Contour mapping.

Learning Outcomes: At the end of this unit, students should be able to

- Describe objectives of surveying and Horizontal and vertical measurements (L2)
- Measure Horizontal and vertical angles using surveying Instruments (L3)

UNIT – III (8 Hrs)

Transportation Engineering, Water Resources and Environmental Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water - Specifications and Tests- Introduction to Hydrology- Hydrograph -Rain water Harvesting - Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

Learning Outcomes: At the end of this unit, students should be able to

- Explain various types of pavements, their differences and basics of design (L2)
- Examine the quality of different sources of water and its storage (L3)

PART B: BASIC MECHANICAL ENGINEERING

UNIT – I (7 Hrs)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace,

and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

Learning Outcomes: At the end of this unit, students should be able to

- Know the importance of machine and utilization in different fields. (L1)
- Know different kinds of materials and its classification. (L1)

UNIT – II (8 Hrs)

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering - working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

Learning Outcomes: At the end of this unit, students should be able to

- Know different production technologies used in industries. (L1)
- Know working principles and elements of automobiles. (L2)

UNIT – III (7 Hrs)

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Learning Outcomes: At the end of this unit, students should be able to

- Know working principles and elements used for power generation. (L1)
- Understand the concepts of various power transmission systems. (L2)
- Learn the robotics basic terminology and its usage in different sectors. (L1)

TEXTBOOKS:
For Basic Civil Engineering:
1. "Basic Civil and the Mechanical Engineering", G. Shanmugam and M. S. Palanisamy, Tata McGraw Hill publications (India) Pvt, Ltd.
2. "Basic Civil Engineering", S.S. Bhavikatti, New Age International Publishers.
3. "Engineering Materials", Dr. S.C. Rangwala, Charotor Publishing House.
4. "Highway Engineering", S. K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications.
5. "Irrigation Engineering and Hydraulic Structures", Santosh Kumar Garg, Khanna Publishers, Delhi.
6. "Building Construction", Dr. B. C. Punmia, Lakshmi Publications, Delhi.

For Basic Mechanical Engineering:
1. "Internal Combustion Engines", V. Ganesan, Tata McGraw Hill publications (India) Pvt.

Ltd.

2. "A Tear book of Theory of Machines", S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. "An introduction to Mechanical Engineering", Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:
For Basic Civil Engineering:
1. "Surveying, Vol- I and Vol-II", S.K. Duggal, Tata McGraw Hill Publishers.
2. "Hydrology and Water Resources Engineering", Santosh Kumar Garg, Khanna Publishers, Delhi.

For Basic Mechanical Engineering:
1. "Robotics", Appuu Kuttan K K, I. K. International Publishing House Pvt. Ltd. Volume-I
2. "3D printing & Additive Manufacturing Technology", L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. "Thermal Engineering", Mahesh M Rathore, Tata McGraw Hill publications (India) Pvt. Ltd.
4. "Basic Civil and Mechanical Engineering", G. Shanmugam and M. S, Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.

Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.

Course Code	ELECTRICAL CIRCUIT ANALYSIS – I		L	T	P	C
23A02401A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To develop an understanding of the fundamental laws, elements of electrical circuits and to apply circuit analysis to DC and AC circuits.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Remembering the basic electrical elements and different fundamental laws. **(K3)**

CO2: Understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance, phasor diagrams, resonance and network theorems. **(K2)**

CO3: Apply the concepts to obtain various mathematical and graphical representations. **(K4)**

CO4: Analyze nodal and mesh networks, series and parallel circuits, steady state response, different circuit topologies (with R, L and C components). **(K3)**

CO5: Evaluation of Network theorems, electrical, magnetic and single-phase circuits. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	2	2	-	-	-	2	-	3	2
CO2	3	2	2	2	-	2	-	-	-	-	2	-	3	2
CO3	3	2	3	2	-	2	-	-	-	-	2	-	3	2
CO4	3	2	2	3	-	2	-	-	-	-	2	-	3	2
CO5	3	3	2	2	-	2	-	-	-	-	2	-	3	2

UNIT – I (9 Hrs)

Introduction to Electrical Circuits – Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchhoff's laws, Network Reduction techniques (series, parallel, series - parallel, star to delta and delta to star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources, node and mesh analysis.

Learning Outcomes: At the end of this unit, students should be able to

- Understanding the Kirchhoff's Laws in solving series, parallel, non – series – parallel configurations in DC networks (L2).
- Know about voltage source to current source and vice-versa transformation in their representation (L2)
- Understand about loop current method (L2)
- Understand about nodal analysis methods (L2)

UNIT – II (9 Hrs)

Magnetic Circuits - Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

Learning Outcomes: At the end of this unit, students should be able to
- Understand Faraday's laws (L2)
- Analyze the analysis of series and parallel magnetic circuits (L2)
- Distinguish analogy between electric and magnetic circuits (L2)

UNIT – III (9 Hrs)

Single Phase Circuits - Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, and node and mesh analysis. Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit, parallel RL circuit, parallel RC circuit.

Learning Outcomes: At the end of this unit, students should be able to
- Understand fundamental definitions of 1-ϕ AC circuits (L2)
- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-ϕ AC circuits with basic elements R, L, and C. (L2)
- Understand the basic definitions of complex impedance and complex power (L2)
- Solve 1-ϕ AC circuits with series and parallel combinations of electrical circuit elements R, L and C. (L2)

UNIT – IV (9 Hrs)

Resonance and Locus Diagrams - Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth; Locus diagram: RL, RC, RLC with R, L and C variables.

Learning Outcomes: At the end of this unit, students should be able to
- Learn about basic concepts of Locus diagrams with different parameter variations of Electrical circuit elements (L2)
- Learn about occurrence of resonance with the presence of electrical circuit elements under certain operating conditions(L2)

UNIT – V (9 Hrs)

Network Theorems (DC & AC Excitations) - Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem

Learning Outcomes: At the end of this unit, students should be able to
- Distinguish between various theorems and inter-relationship between various theorems(L2)
- Know about applications of certain theorems to DC circuit analysis (L2)
- Know about applications of certain theorems to AC network analysis (L2)
- Know about applications of certain theorems to both DC and AC network analysis (L2)

TEXTBOOKS:
1. "Engineering Circuits Analysis", Jack Kemmerly, William Hayt and Steven Durbin, Tata McGraw Hill Education, 2005, 6th Edition.
2. "Network Analysis", M. E. Van Valkenburg, Pearson Education, 2019, Revised 3rd Edition

REFERENCE BOOKS:
1. "Fundamentals of Electrical Circuits", Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, 5th Edition
2. "Electric Circuits (Schaum's outline Series)", Mahmood Nahvi, Joseph Edminister, and K. Rao, Mc Graw Hill Education, 2017, 5th Edition.
3. "Electric Circuits", David A. Bell, Oxford University Press, 2009, 7th Edition.
4. "Introductory Circuit Analysis", Robert L Boylestad, Pearson Publications, 2023, 14th Edition.
5. "Circuit Theory: Analysis and Synthesis", A. Chakrabarti, Dhanpat Rai & Co., 2018, 7th Revised Edition.

ONLINE LEARNING RESOURCES:
1. https://onlinecourses.nptel.ac.in/noc23_ee81/preview
2. https://nptel.ac.in/courses/108104139
3. https://nptel.ac.in/courses/108106172
4. https://nptel.ac.in/courses/117106108

Course Code	ENGINEERING PHYSICS LAB		L	T	P	C
23A11106A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors.

➢ To study the parameters and applications of dielectric and magnetic materials by conducting experiments

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Operate optical Instruments like travelling microscope and spectrometer. **(K2)**

CO2: Estimate the wavelengths of different colours using diffraction grating. **(K2)**

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance **(K3)**

CO4: Calculate the band gap of a given semiconductor. **(K3)**

CO5: Evaluate the acceptance angle and numerical aperture of an optical fiber. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determine the thickness of the wire using wedge shape method.
20. Determine the numerical aperture and acceptance angle of a given optical fiber.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCE BOOKS:
1. "A Textbook of Practical Physics", S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017.

ONLINE LEARNING RESOURCES:
1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Course Code	CHEMISTRY LAB		L	T	P	C
23A11107A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➤ To get familiar with the basic concepts of Chemistry.
- ➤ To verify the fundamental concepts with experiments.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Distinguish different types of titrations in the volumetric analysis **(K3)**

CO2: Determine the cell constant and conductance of solutions **(K3)**

CO3: Calculate the strength of an acid present in secondary batteries **(K3)**

CO4: Analyze the effect of absorbance of given sample solution on concentration by using colorimetry **(K3)**

CO5: Prepare advanced polymer Bakelite materials **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of Strength of an acid in Lead-Acid battery
2. Estimation of Ferrous Iron by Dichrometry
3. Potentiometry –Determination of Ferrous Iron using Standard $K_2Cr_2O_7$ solution.
4. Conductometry-Determinationofcellconstantandconductanceofsolutions.
5. Conductometric titration of strong acid vs strong base
6. Conductometric titration of weak acid vs strong base
7. P^H-metric titration of a) strong acid vs strong base b) weak acid vs strong base.
8. Verification of the Beer-Lambert's law and determination of strength of the given sample solution.
9. Determination of CFSE (10Dq) by Spectrophotometric method.
10. Preparation of Bakelite
11. Preparation of Nanomaterials by Precipitation method

12. Determination of the R_f - value of given sample by Thin Layer Chromatography (TLC).

TEXTBOOKS:

1. "A Text Book on Experiments and Calculations in Engineering Chemistry", S. Chand Publications, 9th Edition, 2003.
2. "Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2014.
3. "Experiments in Applied Chemistry", Dr. Sunita Rattan, S. K. Kataria & Sons Publishers of Engineering, 2nd Edition, 2004.

REFERENCE BOOKS:

1. Vogel's Text Book of Quantitative Chemical Analysis", Mendham Jet.al, Pearson Education, 6th Edition, 2012.

Course Code	ELECTRICAL CIRCUITS LAB		**L**	**T**	**P**	**C**
23A02402A			**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usage of different circuits with different conditions.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams. **(K2)**

CO2: Apply various theorems to compare practical results obtained with theoretical calculations. **(K4)**

CO3: Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil. **(K3)**

CO4: Analyze different circuit characteristics with the help of fundamental laws and various configurations. **(K4)**

CO5: Apply locus diagrams of RL, RC series circuits and examine series and parallel resonance. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	2	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	2	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	2	3	2
CO4	3	2	2	3	2	2	-	-	-	-	2	2	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	2	3	2

LIST OF EXPERIMENTS:

1. Verification of Kirchhoff's circuit laws.
2. Verification of node and mesh analysis.
3. Verification of network reduction techniques.
4. Determination of cold and hot resistance of an electric lamp
5. Determination of Parameters of a choke coil.
6. Determination of self, mutual inductances, and coefficient of coupling
7. Series and parallel resonance
8. Locus diagrams of R-L (L Variable) and R-C (C Variable) series circuits
9. Verification of Superposition theorem
10. Verification of Thevenin's and Norton's Theorems
11. Verification of Maximum power transfer theorem

12. Verification of Compensation theorem
13. Verification of Reciprocity and Millman's Theorems

REFERENCE BOOKS:

1. "Engineering Circuits Analysis", Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, 6th Edition.
2. "Network Analysis", M. E. Van Valkenburg, Pearson Education, 2019, Revised 3rd Edition

Course Code	ENGINEERING WORKSHOP		L	T	P	C
23A05303A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities. **(K3)**

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, welding and plumbing. **(K3)**

CO3: Apply fitting operations in various applications. **(K3)**

CO4: Apply basic electrical engineering knowledge for House Wiring Practice **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO2	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO3	3	2	2	-	3	-	1	-	2	1	-	3	2	2
CO4	3	2	2	-	3	-	1	-	2	1	-	3	2	2

LIST OF EXPERIMENTS:

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray
   b) Conical funnel
   c) Elbow pipe
   d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit

  b) Dovetail fit
  c) Semi-circular fit
  d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
  a) Parallel and series
  b) Two-way switch
  c) Godown lighting
  d) Tube light
  e) Three phase motor
  f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:

1. "Basic Workshop Technology: Manufacturing Process", Felix W.; Independently Published, 2019.
2. "Workshop Processes, Practices and Materials", Bruce J. Black, Routledge Publishers, 5th Edition, 2015.
3. "A Course in Workshop Technology Vol I. & II", B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCE BOOKS:

1. "Elements of Workshop Technology - Vol. I", S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th Edition
2. "Workshop Practice", H. S. Bawa, Tata-McGraw Hill, 2004.
3. "Wiring Estimating, Costing and Contracting", P.M. Soni & P.A. Upadhyay, Atul Prakashan, 2021-22.

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to all branches)		L	T	P	C
23A11110A			**0**	**0**	**1**	**0.5**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:

➢ To impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of discipline, character and service motto. **(K2)**

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. **(K3)**

CO3: Explore human relationships by analyzing social problems. **(K4)**

CO4: Determine to extend their help for the fellow beings and downtrodden people. **(K3)**

CO5: Develop leadership skills and civic responsibilities. **(K5)**

UNIT – I

Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II

Nature & Care

Activities:

- Best out of waste competition.
- Poster and signs making competition to spread environmental awareness.
- Recycling and environmental pollution article writing competition.
- Organising Zero-waste day.
- Digital Environmental awareness activity via various social media platforms.
- Virtual demonstration of different eco-friendly approaches for sustainable living.
- Write a summary on any book related to environmental issues.

UNIT – III
Community Service
Activities:

- Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media, authorities, experts, etc.
- Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- Conducting consumer Awareness. Explaining various legal provisions etc.
- Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. "A Text Book of National Service Scheme Vol – I", Nirmalya Kumar Sinha & Surajit Majumder, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. "Red Book - National Cadet Corps – Standing Instructions Vol I & II", Directorate General of NCC, Ministry of Defence, New Delhi.
3. "Introduction to Environmental Engineering", M. L. Davis and D. A. Cornwell, McGraw Hill, New York, 4th Edition, 2008.
4. "Introduction to Environmental Engineering and Science", G. M. Masters, K. Joseph and R. Nagendran, Pearson Education, New Delhi, 2nd Edition, 2007.
5. "Social Problems in India", Ram Ahuja, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

MECHANICAL ENGINEERING
(For the batches admitted from the academic year 2023-24)

Vision
- To provide society with center of learning that makes the youth dynamic professionals with social commitment.

Mission
- Sound knowledge with analytical ability and practical exposure.
- Professional competence and creativity
- Efficient capable professionals with ethical values
- Fit for the industry

Institutional Objectives
- To create a conducive and competitive environment for students through curricular and extra-curricular activities.
- Promote the culture of research among the faculty.
- To promote synergetic alliances with premier Institutions, Industry, CSIR laboratories and various Government organizations for Collaborative Research Projects.
- To promote economic and social enrichment of the society through Skill Development programmes, Entrepreneurship, and extension activities.
- To introduce demand-driven new UG&PG academic programmes.
- To ensure a high degree of quality in terms of providing infrastructure, research ambience, faculty and staff development.

Core Values
- *Thirst for Quality Education:* The stake holders of the institute particularly management, employees and students of the institution have a consistent thirst for quality improvement of the processes and services in the institution.
- *Lifelong Learning:* In the fast-changing technological world, acquiring a special skill at one point of time will not be enough for ever long survival. Hence to flourish in the workplace and to bring in innovations in the ways of doing, employee, student as well as alumni must be continuous learners and tech savvy.
- *Diversity and Participation:* PBRVITS promotes the involvement of faculty, staff, and students from all social, economic, ethnics, cultural and religious backgrounds to get the synergy of combining the diversified agents. The focus is on involving

students to exhibit their talent in various curricular and co-curricular activities and strengthening alumni link to share their experiences to the students.

- *Academic Integrity and Accountability:* Management induces accountability in the employees for the career of the students and the academic leadership establishes a mentoring mechanism for realization of responsibilities of students towards their parents and in turn to the society.

MECHANICAL ENGINEERING

(For the batches admitted from the academic year 2023-24)

INDUCTION PROGRAM (3 weeks duration)	
S. No	**Course Name**
1	Physical Activities – Sports, Yoga and Meditation, Plantation
2	Career Counselling
3	Orientation to all branches – career options, tools, etc.
4	Orientation on admitted Branch – corresponding labs, tools and platforms
5	Proficiency Modules and Productivity Tools
6	Assessment on basic aptitude and mathematical skills
7	Remedial training in Foundation Courses
8	Human Values and Professional Ethics
9	Communication Skills – Focus on Listening, Speaking, Reading, Writing Skills
10	Concepts of Programming

Semester I (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11101A	Linear Algebra & Calculus	3	0	0	3	30	70	100
2	BS	23A11103A	Engineering Physics	3	0	0	3	30	70	100
3	BS	23A11105A	Engineering Chemistry	3	0	0	3	30	70	100
4	ES	23A02301A	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
5	ES	23A05301A	Introduction to Programming	3	0	0	3	30	70	100
6	BS	23A11106A	Engineering Physics Lab	0	0	2	1	30	70	100
7	BS	23A11108A	Engineering Chemistry Lab	0	0	2	1	30	70	100
8	ES	23A05302A	Computer Programming Lab	0	0	3	1.5	30	70	100
9	ES	23A02302A	Electrical & Electronics Engineering Workshop	0	0	3	1.5	30	70	100
10	BS	23A11110A	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	-	-	100
**Total**							20.5			1000

Semester II (First Year)

S. No	Category	Course Code	Course Title	L	T	P	C	CIE	SEE	Total
				Hours per week			**Credits**			
1	BS	23A11102A	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
2	HSMC	23A11201A	Communicative English	2	0	0	2	30	70	100
3	ES	23A01301A	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
4	ES	23A03301A	Engineering Graphics	1	0	4	3	30	70	100
5	PC	23A03401A	Engineering Mechanics	3	0	0	3	30	70	100
6	HSMC	23A11202A	Communicative English Lab	0	0	2	1	30	70	100
7	ES	23A05303A	Engineering Workshop	0	0	3	1.5	30	70	100
8	ES	23A05304A	IT Workshop	0	0	2	1	30	70	100
9	PC	23A03402A	Engineering Mechanics Lab	0	0	3	1.5	30	70	100
10	BS	23A11109A	Health and Wellness, Yoga and Sports	-	-	1	0.5	-	-	100
Total							**19.5**			**1000**

Course Code	LINEAR ALGEBRA & CALCULUS		L	T	P	C
23A11101A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. **(K3)**

CO2: Demonstrate the ability to compute eigen values and eigen vectors for square matrices using methods such as characteristic polynomials, determinants, and numerical techniques. **(K3)**

CO3: Utilize mean value theorems to real life problems. **(K3)**

CO4: Familiarize with functions of several variables which are useful in optimization. **(K3)**

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	1	-

UNIT – I (9 Hrs)

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Learning Outcomes: At the end of this unit, students should be able to

- Solve systems of linear equations, using technology to facilitate row reduction and determine the rank (L3).

- Demonstrate an understanding of how to translate a system of simultaneous linear equations into a matrix (L2)

- Solve systems of linear equations using various methods including Gauss elimination

method and Gauss Seidel Iteration Methods (L3)

UNIT – II (9 Hrs)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors 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 forms by Orthogonal Transformation.

Learning Outcomes: At the end of this unit, students should be able to
- Demonstrate the process of finding eigenvalues and eigenvalues for square matrices. (L2)
- Describe the process of diagonalizing a matrix and its significance. (L3)
- Apply the Cayley-Hamilton Theorem to find powers of a matrix and compute the inverse of a matrix. (L3)
- Apply knowledge of the nature of a quadratic form to analyse and solve optimization process. (L3)
- Explain the process of using orthogonal transformations to reduce a quadratic form to its canonical form. (L5)

UNIT – III (9 Hrs)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Learning Outcomes: At the end of this unit, students should be able to
- Analyze the behaviour of functions by using mean value theorems (L4)
- Translate the given function as series of Taylor's and Maclaurin's with remainders (L2)

UNIT – IV (9 Hrs)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes: At the end of this unit, students should be able to
- Find partial derivatives numerically and symbolically and use them to analyze and   interpret the way a function varies. (L4)
- Acquire the Knowledge maxima and minima of functions of several variable (L3)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT – V (9 Hrs)

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Learning Outcomes: At the end of this unit, students should be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L3)
- Evaluate triple integrals in Cartesian, cylindrical and spherical polar coordinates. (L5)
- Apply triple integration techniques in evaluating volumes. (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", Michael Greenberg, Pearson publishers, 9th Edition
5. "Higher Engineering Mathematics", H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, 3rd Edition (Reprint 2021)

Course Code	ENGINEERING PHYSICS		L	T	P	C
23A11103A	(Common to all branches)		3	0	0	3
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

- ➢ To identify the importance of the physical optics i.e., interference, diffraction and polarization related to its engineering applications
- ➢ To present the basic concepts needed to understand the crystal structure of materials, X-ray diffraction
- ➢ To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices
- ➢ To enlighten the concepts of Quantum mechanics and to provide fundamentals of the de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory.
- ➢ Evolution of band theory to distinguish materials and explain the properties of semiconductors

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the intensity variation of light due to interference, diffraction & polarization. **(K3)**

CO2: Familiarize with the basics of crystals and their structures**. (K2)**

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials. **(K3)**

CO4: Explain the basic concepts of quantum mechanics and the band theory of solids. **(K2)**

CO5: Identify the type of semiconductor using Hall effect **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)
Wave Optics:

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double

refraction - Nicol's Prism -Half wave and Quarter wave plates.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify scientific & engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary light and polarized light (L2)

UNIT – II (9 Hrs)
Crystallography and X-ray diffraction
Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

Learning Outcomes: At the end of this unit, students should be able to

- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by using Laue method & powder method (L4)

UNIT – III (9 Hrs)
Dielectric and Magnetic Materials
Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius- Mosotti relation indielectrics (L2)
- Classify magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)

UNIT – IV (9 Hrs)

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concepts of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Understand the concept of density of states (L2)

UNIT – V (8 Hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and applications.

Learning Outcomes: At the end of this unit, students should be able to

- Classify the energy bands of semiconductors (L2)
- Understand the differences between intrinsic and extrinsic semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)

TEXTBOOKS:

1. "A Text book of Engineering Physics", M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition, 2019.
2. "Engineering Physics", D. K. Bhattacharya and Poonam Tandon, Oxford press, 2015

REFERENCE BOOKS:

1. "Engineering Physics", B. K. Pandey and S. Chaturvedi, Cengage Learning, 2021.
2. "Engineering Physics", Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. "Engineering Physics", Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010
4. "Engineering Physics", M. R. Srinivasan, New Age international publishers, 2009

ONLINE LEARNING RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Course Code	ENGINEERING CHEMISTRY		L	T	P	C
23A11105A	(Common to CE, ME)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To familiarize engineering chemistry and its applications
➢ To impart the concept of soft and hard waters, softening methods of hard water
➢ To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the hardness of water through its softening techniques for domestically and industrially. **(K4)**

CO2: Demonstrate the corrosion prevention methods and factors affecting corrosion. **(K3)**

CO3: Differentiate the types of Plastomers and Elastomers. **(K4)**

CO4: Explain the setting and hardening of cement. (**K2**)

CO5: Summarize the concepts of colloids, micelle and nanomaterials. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	1	1
CO2	3	-	-	-	2	-	-	-	-	-	-	-	1	1
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	1
CO4	3	1	-	-	-	-	-	-	-	-	-	-	2	2
CO5	3	2	-	-	2	-	-	-	-	-	-	-	1	1

UNIT – I (10 Hrs)

Water Technology: Soft and hard water, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.

Learning Outcomes: At the end of this unit, students should be able to

● List the differences between temporary and permanent hardness of water (L1)
● Explain the principles of reverse osmosis and electro dialysis.(L2)
● Compare quality of drinking water with BIS and WHO standards. (L2)
● Illustrate problems associated with hard water – sludge and scale.(L2)

UNIT – II (9 Hrs)
Electrochemistry and Applications:
Electrodes –electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium-ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bed worth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Learning Outcomes: At the end of this unit, students should be able to
- Apply the Nernst equation for calculating electrode and cell potentials (L3)
- Apply Pilling-Bed worth rule for corrosion and corrosion prevention (L3)
- Demonstrate the corrosion prevention methods and factors affecting corrosion (L2)
- Compare different batteries and their applications (L2)

UNIT – III (9 Hrs)
Polymers and Fuel Chemistry:
Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC Nylon 6,6 and Bakelite.

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers. Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number-alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

Learning Outcomes: At the end of this unit, students should be able to
- Explain different types of polymers and their applications (L2)
- Select suitable fuels for IC engines (L3)
- Explain calorific values, octane number, refining of petroleum (L2)

UNIT – IV (9 Hrs)
Modern Engineering materials:
Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractoriness- Classification, Properties, Factors affecting the refractory materials and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland cement, constituents, Setting and Hardening of cement.

Learning Outcomes: At the end of this unit, students should be able to

- Demonstrate the applications of fullerenes, CNT'S and Graphene nanoparticles (L2)
- Identify the factors affecting the refractory material (L3)
- Illustrate the functions and properties of lubricants (L2)

UNIT – V (8 Hrs)

Surface Chemistry and Nanomaterials:

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Learning Outcomes: At the end of this unit, students should be able to

- Summarize the applications of SEM, TEM and X-ray diffraction
- Explain the synthesis of colloids with examples (L2)
- Outline the preparation of nanomaterials and metal oxides (L2)
- Identify the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

TEXTBOOKS:

1. "Engineering Chemistry", Jain and Jain, Dhanpat Rai publications, 17th Edition, 2018
2. "A text book of Engineering Chemistry" Dr. S. S. Dara, Dr. S. S. Umare, S. Chand Publications, 12th Edition, 2010.
3. "A text book of Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2010.

REFERENCE BOOKS:

1. "Concise Inorganic Chemistry", J. D. Lee, Oxford University Press, 5th Edition, 2008
2. "Cement Chemistry", H. F. W. Taylor, 2nd Edition, Thomas Telford Publications, 1997.
3. "Introduction to Colloids and Surface Chemistry", D. J. Shaw, Butterworth-Heineman, 1992
4. "Textbook of Polymer Science", Fred W. Billmayer Jr, 3rd Edition

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to all branches)		L	T	P	C
23A02301A			3	0	0	3
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the problem solving concepts associated to AC and DC circuits. **(K2)**

CO2: Analyze the operating principles of motors, generators, MC and MI instruments. **(K4)**

CO3: Apply the mathematical tool for different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. **(K3)**

CO4: Explain the characteristics of diodes and transistors. **(K4)**

CO5: Familiarize with the number systems, codes, Boolean algebra and logic gates **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO2	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO3	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO4	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO5	3	3	1	-	1	3	2	-	-	-	-	1	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I (8 Hrs)
DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

Learning Outcomes: At the end of this unit, students should be able to

- Recall Kirchhoff's laws (L1) .
- Analyze simple electric circuits with DC excitation (L4)
- Understand fundamental definitions of 1-phase AC circuits (L2)

- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-phase elements R, L, and C. (L2)

UNIT – II (7 Hrs)
Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the principle and operation of DC Generator & Motor. (L2)
- Understand the operation of transformer and induction motor. (L2)
- Understand the construction of induction motor - DC motor (L2)
- Distinguish between MC and MI type of instruments (L3)

UNIT – III (7 Hrs)
Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the Conventional and Non-Conventional Energy Sources. (L2)
- Understand the Power Ratings of house hold appliances (L2)
- Knowing the energy consumption of different electrical appliances(L3)
- Calculating the electricity bill (L2).

PART B: BASIC ELECTRONICS ENGINEERING

UNIT – I (8 Hrs)

Semiconductor Devices: Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier

Learning Outcomes: At the end of this unit, students should be able to
- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

UNIT – II (7 Hrs)
Basic Electronic Circuits and Instrumentation
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.
Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.
Electronic Instrumentation: Block diagram of an electronic instrumentation system.
Learning Outcomes: At the end of this unit, students should be able to
- Understand the various Rectifiers and Power Supplies(L3)
- Analyze the behaviour of common emitter Amplifier with its frequency response (L3)

UNIT – III (7 Hrs)
Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).
Learning Outcomes: At the end of this unit, students should be able to
- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's Theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)

TEXTBOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Basic Electronics Engineering:
1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson

Education, 2021.

2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.

REFERENCE BOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, 4th Edition
2. "Principles of Power Systems", V. K. Mehtha, S. Chand Technical Publishers, 202
3. "Basic Electrical Engineering", T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. "Basic Electrical and Electronics Engineering", S. K. Bhattacharya, Pearson Publications, 2018, 2nd Edition.

For Basic Electronics Engineering:
1. "A Textbook of Electronic Devices and Circuits", R. S. Sedha, S. Chand & Co, 2010.
2. "Basic Electronics- Devices, Circuits and IT Fundamentals", Santiram Kal, Prentice Hall, India, 2002.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

ONLINE LEARNING RESOURCES:
For Basic Electrical Engineering:
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Course Code	INTRODUCTION TO PROGRAMMING		L	T	P	C
23A05301A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

- ➢ To introduce students to the fundamentals of computer programming.
- ➢ To provide hands-on experience with coding and debugging.
- ➢ To foster logical thinking and problem-solving skills using programming.
- ➢ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- ➢ To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. **(K2)**

CO2: Analyse a problem and develop an algorithm to solve it. **(K4)**

CO3: Implement various algorithms using the C programming language. **(K3)**

CO4: Understand more advanced features of C language. **(K2)**

CO5: Develop problem-solving skills and the ability to debug and optimize the code. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-	-	2
CO5	1	2	3	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Learning Outcomes: At the end of this unit, students should be able to

- Translate algorithms into programs. (L4)
- Solve complex problems using language independent notations. (L3)

- Use C basic concepts to write simple C programs. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Analyze the algorithms for time and space complexities. (L4)

UNIT – II (9 Hrs)

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

Learning Outcomes: At the end of this unit, students should be able to

- Implement conditional branching and iteration statements. (L2)
- Select the control structures for solving the problem statements (L4)
- Use iterative statements for writing C programs. (L3)

UNIT – III (8 Hrs)

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Learning Outcomes: At the end of this unit, students should be able to

- Use arrays to process multiple homogeneous data. (L3)
- Solve mathematical problems using C programming language. (L3)
- Apply string-handling functions. (L3)

UNIT – IV (9 Hrs)

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Learning Outcomes: At the end of this unit, students should be able to

- Structure the individual data elements to simplify the solution. (L6)
- Facilitate efficient memory utilization. (L6)
- Use pointers and structures to formulate algorithm and write programs. (L3)
- Understand the basic differences between structure and union. (L2)

UNIT – V (9 Hrs)

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope   and Lifetime of Variables, Basics of File Handling.

Learning Outcomes: At the end of this unit, students should be able to

- Understand basic terminology of modular programming. (L2)
- Writing structured programs using C Functions. (L5)
- Apply modular approach for solving the problem statements. (L3)
- Writing C programs using various storage classes to control variable access. (L5)

- Apply input and output statements to process the data in various formats. (L3)

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:
1. "Computing fundamentals and C Programming", E. Balagurusamy, McGraw-Hill Education, 2008.
2. "Programming in C", Rema Theraja, Oxford, 2016, 2nd Edition.
3. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

ONLINE LEARNING RESOURCES:
1. www.learn-c.org
2. www.programmeiz.com
3. www.github.com

Course Code	**ENGINEERING PHYSICS LAB**		**L**	**T**	**P**	**C**
23A11106A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors.

➢ To study the parameters and applications of dielectric and magnetic materials by conducting experiments

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Operate optical Instruments like travelling microscope and spectrometer. **(K2)**

CO2: Estimate the wavelengths of different colours using diffraction grating. **(K2)**

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance **(K3)**

CO4: Calculate the band gap of a given semiconductor. **(K3)**

CO5: Evaluate the acceptance angle and numerical aperture of an optical fiber. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determine the thickness of the wire using wedge shape method.
20. Determine the numerical aperture and acceptance angle of a given optical fiber.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCE BOOKS:
1. "A Textbook of Practical Physics", S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017.

ONLINE LEARNING RESOURCES:
1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Course Code	**ENGINEERING CHEMISTRY LAB**		**L**	**T**	**P**	**C**
23A11108A	(Common to CE, ME)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To get familiar with the basic concepts of Engineering Chemistry.

➢ To verify the fundamental concepts with experiments.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Develop skills in determining the effects of hardness of water. **(K3)**

CO2: Distinguish different types of titrations in the volumetric analysis. **(K4)**

CO3: Determine the cell constant and conductance of solutions. **(K5)**

CO4: Analyze the effect of temperature on viscosity by using Redwood viscometer. **(K4)**

CO5: Prepare advanced polymer Thiokol rubber materials. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	1	-
CO5	3	2	-	-	1	-	-	-	-	-	-	-	2	-

LIST OF EXPERIMENTS:

1. Determination of Strength of an acid in Lead-Acid battery

2. Determination of Total Hardness of Ground Water by EDTA Titration Method

3. Determination of Dissolved oxygen by Winkler's Method

4. Conductometry – Determination of cell constant and conductance of solutions.

5. Adsorption of acetic acid by charcoal

6. Determination of the rate of corrosion of Iron sample

7. Determination of percentage of Iron in cement sample by colorimetry.

8. Determination of percentage moister content in a Coal sample.

9. Determination of Viscosity of lubricating oil by Redwood Viscometer No-I

10. Determination of Viscosity of lubricating oil by Redwood Viscometer No-II

11. Preparation of Bakelite.

12. Preparation of Nanomaterials by Precipitation method.

TEXTBOOKS:
1. "Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2014.
2. "Experiments in Applied Chemistry", Dr. Sunita Rattan, S. K. Kataria & Sons Publishers of Engineering, 2nd Edition, 2004.

REFERENCE BOOKS:
1. Vogel's Text Book of Quantitative Chemical Analysis", Mendham Jet.al, Pearson Education, 6th Edition, 2012.

Course Code	COMPUTER PROGRAMMING LAB		L	T	P	C
23A05302A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. **(K2)**

CO2: Select the right control structure for solving the problem. **(K1)**

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. **(K3)**

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. **(K3)**

CO5: Develop C programs to handle File handling operations. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

UNIT – I

Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab 1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 2: Converting algorithms/flow charts into C Source code. Developing the algorithms/ flowcharts for the following sample programs

  i)   Sum and average of 3 numbers
  ii) Conversion of Fahrenheit to Celsius and vice versa
  iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions.

Lab 3: Simple computational problems using arithmetic expressions

  i)   Finding the square root of a given number
  ii) Finding compound interest
  iii) Area of a triangle using heron's formulae
  iv) Distance travelled by an object

UNIT – II

Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity.

Lab 4: Simple computational problems using the operator' precedence and associativity

  i)   Evaluate the following expressions
      a.   A+B*C+(D*E) + F*G
      b.   A/B*C-B+A*D/3
      c.   A+++B---A
      d.   J= (i++) + (++i)
  ii) Find the maximum of three numbers using conditional operator
  iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions.

Lab 5: Problems involving if-then-else structures

    i) Write a C program to find the max and min of four numbers using if-else.

    ii) Write a C program to generate electricity bill.

    iii) Find the roots of the quadratic equation.

    iv) Write a C program to simulate a calculator using switch case.

    v) Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops.

Lab 6: Iterative problems e.g., the sum of series

    i) Find the factorial of given number using any loop.

    ii) Find the given number is a prime or not.

    iii) Compute sine and cos series

    iv) Checking a number palindrome

    v) Construct a pyramid of numbers

UNIT – III
Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1-D Arrays: searching.

Lab 7: 1-D Array manipulation, linear search

    i) Find the min and max of a 1-D integer array.

    ii) Perform linear search on1D array.

    iii) The reverse of a 1D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will

reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

  i) Addition of two matrices
  ii) Multiplication two matrices
  iii) Sort array elements using bubble sort
  iv) Concatenate two strings without built-in functions
  v) Reverse a string using built-in and without built-in string functions

UNIT – IV

Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereference

  i) Write a C program to find the sum of a 1D array using malloc()
  ii) Write a C program to find the total, average of n students using structures
  iii) Enter n students data using calloc() and display failed students list
  iv) Read student name and marks from the command line and display the student details along with the total.
  v) Write a C program to implement realloc()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists.

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

  i) Create and display a singly linked list using self-referential structure.
  ii) Demonstrate the differences between structures and unions using a C program.
  iii) Write a C program to shift/rotate using bitfields.
  iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT – V
Week 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.
   i) Write a C function to calculate NCR value.
   ii) Write a C function to find the length of a string.
   iii) Write a C function to transpose of a matrix.
   iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls.

Lab 12: Recursive functions
   i) Write a recursive function to generate Fibonacci series.
   ii) Write a recursive function to find the lcm of two numbers.
   iii) Write a recursive function to find the factorial of a number.
   iv) Write a C Program to implement Ackermann function using recursion.
   v) Write a recursive function to find the sum of series.

Week 13:
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.
   i) Write a C program to swap two numbers using call by reference.
   ii) Demonstrate Dangling pointer problem using a C program.
   iii) Write a C program to copy one string into another using pointer.
   iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling.

Lab 14: File operations

    i) Write a C program to write and read text into a file.

    ii) Write a C program to write and read text into a binary file using fread() and fwrite()

    iii) Copy the contents of one file to another file.

    iv) Write a C program to merge two files into the third file using command-linearguments.

    v) Find no. of lines, words and characters in a file

    vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. "Programming in C: A practical approach", Ajay Mittal, Pearson
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to all branches)		L	T	P	C
23A02302A			0	0	3	1.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

 ➢ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
 ➢ To impart knowledge on the principles of digital electronics and fundamentals of electron devices and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

 CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. **(K2)**
 CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. **(K4)**
 CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. **(K3)**
 CO4: Identify & testing of various electronic components along with characteristics of various electron devices. **(K2)**
 CO5: Explain the operation of a digital circuit. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	2	-	-	-	-	2	3	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	3	3	2

PART A: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS:

 1. Verification of KCL and KVL
 2. Verification of Superposition theorem
 3. Measurement of Resistance using Wheat stone bridge
 4. Magnetization Characteristics of DC shunt Generator
 5. Measurement of Power and Power factor using Single-phase wattmeter
 6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum six experiments should be performed

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: Minimum six experiments should be performed using both Hardware and Software

REFERENCE BOOKS:

For Electrical Engineering Lab:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Electronics Engineering Lab:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to all branches)		L	T	P	C
23A11110A			0	0	1	0.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:
➢ To impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the importance of discipline, character and service motto. **(K2)**

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. **(K3)**

CO3: Explore human relationships by analyzing social problems. **(K4)**

CO4: Determine to extend their help for the fellow beings and downtrodden people. **(K3)**

CO5: Develop leadership skills and civic responsibilities. **(K5)**

UNIT – I
Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:
- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II
Nature & Care
Activities:
- Best out of waste competition.
- Poster and signs making competition to spread environmental awareness.
- Recycling and environmental pollution article writing competition.
- Organising Zero-waste day.
- Digital Environmental awareness activity via various social media platforms.
- Virtual demonstration of different eco-friendly approaches for sustainable living.
- Write a summary on any book related to environmental issues.

UNIT – III
Community Service
Activities:

- Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media, authorities, experts, etc.
- Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- Conducting consumer Awareness. Explaining various legal provisions etc.
- Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. "A Text Book of National Service Scheme Vol – I", Nirmalya Kumar Sinha & Surajit Majumder, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. "Red Book - National Cadet Corps – Standing Instructions Vol I & II", Directorate General of NCC, Ministry of Defence, New Delhi.
3. "Introduction to Environmental Engineering", M. L. Davis and D. A. Cornwell, McGraw Hill, New York, 4th Edition, 2008.
4. "Introduction to Environmental Engineering and Science", G. M. Masters, K. Joseph and R. Nagendran, Pearson Education, New Delhi, 2nd Edition, 2007.
5. "Social Problems in India", Ram Ahuja, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS (Common to all branches)		L	T	P	C
23A11102A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		II		

COURSE OBJECTIVES:
- ➢ To enlighten the learners in the concept of differential equations and multivariablecalculus.
- ➢ To furnish the learners with basic concepts and techniques at plus two level to lead theminto advanced level by handling various real-world applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Apply first order and first degree differential equations to model and solve problems in various scientific and engineering disciplines, including electrical circuits. **(K3)**

CO2: Solve the differential equations related to various engineering fields**. (K3)**

CO3: Identify solution methods for partial differential equations that model physical processes. **(K3)**

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. **(K2)**

CO5: Estimate the work done against a field, circulation and flux using vector calculus. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	-	-	-	-	-	-	2	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	1	-
CO5	2	3	2	2	-	-	-	-	-	-	-	1	1	-

UNIT – I (9 Hrs)
Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Learning Outcomes: At the end of this unit, students should be able to
- Learn the effective mathematical tools for solutions of first order differential equations(L2)
- Apply mathematical tools to model physical processes such as Newton's law of cooling, electrical circuits (L3).

UNIT – II (9 Hrs)
Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit

problems and Simple Harmonic motion.

Learning Outcomes: At the end of this unit, students should be able to
- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L4)
- Formulate and solve the higher order differential equation by analyzing physical situations (L6)

UNIT – III (9 Hrs)

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Learning Outcomes: At the end of this unit, students should be able to
- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT – IV (9 Hrs)

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

Learning Outcomes: At the end of this unit, students should be able to
- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT – V (9 Hrs)

Vector integration: Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Learning Outcomes: At the end of this unit, students should be able to
- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th

Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. "Higher Engineering Mathematics", B. V. Ramana, McGraw Hill Education, 2017

Course Code	COMMUNICATIVE ENGLISH		L	T	P	C
23A11201A	(Common to all branches)		**2**	**0**	**0**	**2**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To facilitate effective Listening, Reading, Speaking and Writing skills among the students.
➢ To enhance their comprehending abilities, oral presentations, reporting useful information.
➢ To provide knowledge of grammatical structures and vocabulary.
➢ To make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues, and also from reading content. **(K2)**

CO2: Apply grammatical structures to formulate sentences and correct word forms. **(K3)**

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. **(K4)**

CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. **(K5)**

CO5: Create a coherent paragraph, essay, and resume. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	-	2	-	2	2	-	-	3	2	-	-	-
CO5	-	-	-	-	-	1	-	1	-	3	1	1	-	-

UNIT – I (9 Hrs)

Lesson : HUMAN VALUES: Gift of Magi (Short Story)

Listening	:	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking	:	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading	:	Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing	:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar	:	Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary	:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Learning Outcomes: At the end of this unit, students should be able to
- Understand specific pieces of information through listening and reading. (L2)
- Demonstrate basic questioning and answering skills on general topics. (L2)
- Outline the main ideas and specific details from the given text.(L2)
- Apply grammatical knowledge to frame flawless sentences. (L3)
- Develop basic word knowledge. (L3)

UNIT – II (9 Hrs)
Lesson : NATURE: The Brook by Alfred Tennyson (Poem)
Listening	:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking	:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading	:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing	:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar	:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary	:	Homonyms, Homophones, Homographs.

Learning Outcomes: At the end of this unit, students should be able to
- Distinguish between main idea and supporting ideas through listening. (L4)
- Develop short structured talks. (L3)
- Identify the logical sequence of ideas in a given text. (L3)
- Organize ideas into a meaningful paragraph by using cohesive devices and also learn the right usage of articles and prepositions. (L3)
- Identify difference among homonyms, homophones and homographs.(L3)

UNIT – III (9 Hrs)
Lesson : BIOGRAPHY: Elon Musk
Listening	:	Listening for global comprehension and summarizing what is listened to.
Speaking	:	Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading	:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing	:	Summarizing, Note-making, paraphrasing
Grammar	:	Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary	:	Compound words, Collocations.

Learning Outcomes: At the end of this unit, students should be able to
- Summarize what is listened to. (L2)
- Discuss on specific topics and report what is discussed. (L6)

- Interpret specific clues and use different strategies to comprehend a text. (L5)
- Summarize and paraphrase a given text by using different methods of note-making. (L2)
- Make use of right form of the verbs, compound words and collocations. (L3)

UNIT – IV (9 Hrs)
Lesson : INSPIRATION: The Toys of Peace by Saki

Listening	:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video
Speaking	:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading	:	Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/relationships, communicate processes or display complicated data.
Writing	:	Letter Writing: Official Letters, Resumes
Grammar	:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary	:	Words often confused, Jargons.

Learning Outcomes: At the end of this unit, students should be able to
- Make Predictions while listening to video and audio texts. (L6)
- Construct a dialogue in academic contexts. (L3)
- Analyze the data from the given graphic elements and present it verbally. (L4)
- Build effective resumes and draft formal letters. (L6)
- Apply grammatical rules to transform sentences into different speech or voice. (L3)
- Identify correct word for the context and also jargons. (L3)

UNIT – V (9 Hrs)
Lesson : MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening	:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking	:	Formal oral presentations on topics from academic contexts.
Reading	:	Reading Comprehension.
Writing	:	Writing structured essays on specific topics.
Grammar	:	Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary	:	Technical Jargons.

Learning Outcomes: At the end of this unit, students should be able to
- Interpret a given text and answer the questions. (L5)
- Present a topic of academic context. (L5)
- Interpret and comprehend a given text. (L5)
- Develop structured essays on specific topics. (L3)

- Identify common errors in grammar and usage.(L3)
- Make use of technical Jargons. (L3)

TEXTBOOKS:
1. "Pathfinder: Communicative English for Undergraduate Students", 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3)
2. "Empowering with Language", Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:
1. "English for Engineers", Dubey, Sham Ji & Co., Vikas Publishers, 2020
2. "Academic writing: A Handbook for International Students", Stephen Bailey, Routledge, 2014.
3. "English Grammar in Use", Raymond Murphy, 4th Edition, Cambridge University Press, 2019.
4. "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary", Norman Lewis, Anchor, 2014.

ONLINE LEARNING RESOURCES:
GRAMMAR:
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY:
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Code	BASIC CIVIL AND MECHANICAL ENGINEERING (Common to all branches)		L	T	P	C
23A01301A			3	0	0	3
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To get familiarized with scope and importance of Civil and Mechanical Engineering in different sectors and industries.
➢ To introduce the preliminary concepts of Building Planning, Construction, Materials and related tests.
➢ To acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.
➢ To explain different engineering materials and manufacturing processes.
➢ To provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand various sub-divisions of Civil Engineering and appreciate their role in ensuring better society. **(K2)**

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. **(K3)**

CO3: Realize the importance of Transportation in nation's economy and engineering measures related to highways in terms of geometrics. **(K3)**

CO4: Understand the importance of water resources and storage structures so that social responsibilities of water conservation will be appreciated.**(K1)**

CO5: Understand the different manufacturing processes and explain the basics of thermal engineering and its applications. **(K2)**

CO6: Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	3	-	-	-	-	-	-	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT – I (8 Hrs)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel / Theatre.

Learning Outcomes: At the end of this unit, students should be able to
- Identify the role of civil Engineers in the society and Various Disciplines of Civil Engineering. (L2)
- Develop typical layouts for different residential commercial and Industrial buildings. (L3)

UNIT – II (7 Hrs)

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements-Angular Measurements- Leveling instruments used for leveling- Introduction to Bearings Simple problems on leveling and bearings-Contour mapping.

Learning Outcomes: At the end of this unit, students should be able to
- Describe objectives of surveying and Horizontal and vertical measurements (L2)
- Measure Horizontal and vertical angles using surveying Instruments (L3)

UNIT – III (8 Hrs)

Transportation Engineering, Water Resources and Environmental Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water - Specifications and Tests- Introduction to Hydrology- Hydrograph -Rain water Harvesting - Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

Learning Outcomes: At the end of this unit, students should be able to
- Explain various types of pavements, their differences and basics of design (L2)
- Examine the quality of different sources of water and its storage (L3)

PART B: BASIC MECHANICAL ENGINEERING

UNIT – I (7 Hrs)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace,

and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

Learning Outcomes: At the end of this unit, students should be able to

- Know the importance of machine and utilization in different fields. (L1)
- Know different kinds of materials and its classification. (L1)

UNIT – II (8 Hrs)

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering - working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

Learning Outcomes: At the end of this unit, students should be able to

- Know different production technologies used in industries. (L1)
- Know working principles and elements of automobiles. (L2)

UNIT – III (7 Hrs)

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Learning Outcomes: At the end of this unit, students should be able to

- Know working principles and elements used for power generation. (L1)
- Understand the concepts of various power transmission systems. (L2)
- Learn the robotics basic terminology and its usage in different sectors. (L1)

TEXTBOOKS:

For Basic Civil Engineering:

1. "Basic Civil and the Mechanical Engineering", G. Shanmugam and M. S. Palanisamy, Tata McGraw Hill publications (India) Pvt, Ltd.
2. "Basic Civil Engineering", S.S. Bhavikatti, New Age International Publishers.
3. "Engineering Materials", Dr. S.C. Rangwala, Charotor Publishing House.
4. "Highway Engineering", S. K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications.
5. "Irrigation Engineering and Hydraulic Structures", Santosh Kumar Garg, Khanna Publishers, Delhi.
6. "Building Construction", Dr. B. C. Punmia, Lakshmi Publications, Delhi.

For Basic Mechanical Engineering:

1. "Internal Combustion Engines", V. Ganesan, Tata McGraw Hill publications (India) Pvt.

Ltd.

2. "A Tear book of Theory of Machines", S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. "An introduction to Mechanical Engineering", Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:
For Basic Civil Engineering:
1. "Surveying, Vol- I and Vol-II", S.K. Duggal, Tata McGraw Hill Publishers.
2. "Hydrology and Water Resources Engineering", Santosh Kumar Garg, Khanna Publishers, Delhi.

For Basic Mechanical Engineering:
1. "Robotics", Appuu Kuttan K K, I. K. International Publishing House Pvt. Ltd. Volume-I
2. "3D printing & Additive Manufacturing Technology", L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. "Thermal Engineering", Mahesh M Rathore, Tata McGraw Hill publications (India) Pvt. Ltd.
4. "Basic Civil and Mechanical Engineering", G. Shanmugam and M. S, Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.

Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.

Course Code	ENGINEERING GRAPHICS		L	T	P	C
23A03301A	(Common to all branches)		**1**	**0**	**4**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- ➢ To impart knowledge on the projection of points, lines and plane surfaces
- ➢ To improve the visualization skills for better understanding of projection of solids
- ➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.
- ➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:
After completion of the course, the student will be able to
- **CO1:** Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. **(K2)**
- **CO2:** Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. **(K1)**
- **CO3:** Understand and draw projection of solids in various positions in first quadrant. **(K2)**
- **CO4:** Explain principles behind development of surfaces. **(K2)**
- **CO5:** Prepare isometric and perspective sections of simple solids. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO2	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	3	-	-	-	-	2	-	2	2	2

UNIT – I (12 Hrs)
Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Learning Outcomes: At the end of this unit, students should be able to
- • Understand the significance of engineering drawing (L2)

- Know the conventions used in the engineering drawing (L1)
- Identify the curves obtained in different conic sections (L2)
- Draw different cycloidal and involute curves. (L1)
- Know about the scale conversion techniques (L1)

UNIT – II (12 Hrs)

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

Learning Outcomes: At the end of this unit, students should be able to
- Know how to draw the projections of points, lines (L1)
- Find the true length of the lines. (L2)
- Understand the procedure to draw projection of planes. (L2)
- Draw the projection of plane inclined to one plane and both the planes. (L1)

UNIT – III (18 Hrs)

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solid inclined to one plane. (L1)

UNIT – IV (15 Hrs)

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw sectional views and true shape of solids. (L2)
- Represent the surface development of simple solids. (L3)

UNIT – V (18 Hrs)

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

Learning Outcomes: At the end of this unit, students should be able to

- Learn the basics convectional representation of different projections (L1)
- Draw the Orthographic projection of simple solids. (L1)
- Draw the Isometric projection of simple solids. (L1)
- Understand the different commands used in Computerized drawing (L2)

TEXTBOOKS:

1. "Engineering Drawing", N. D. Bhatt, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. "Engineering Drawing", K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. "Engineering Drawing", M. B. Shah and B. C. Rana, Pearson Education Inc, 2009.
3. "Engineering Drawing with an Introduction to AutoCAD", Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Code	ENGINEERING MECHANICS		L	T	P	C
23A03401A	(Common to CE, ME)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

- ➢ To get familiarized with different types of force systems.
- ➢ To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
- ➢ To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
- ➢ To apply the Work-Energy method to particle motion.
- ➢ To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

COURSE OUTCOMES:

After completion of the course, the student will be able to

- **CO1:** Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact. **(K3)**
- **CO2:** Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments. **(K4)**
- **CO3:** Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes. **(K4)**
- **CO4:** Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle. **(K3)**
- **CO5:** Solve the problems involving the translational and rotational motion of rigid bodies. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	3	-	-	-	-	1	2	2
CO2	2	3	3	1	1	-	-	-	-	-	-	1	2	2
CO3	3	3	2	1	1	-	-	-	-	-	-	1	3	2
CO4	3	3	3	3	1	-	-	-	-	-	-	1	1	1
CO5	3	2	3	2	2	-	-	-	-	-	-	1	1	1

UNIT – I (10 Hrs)

Introduction to Engineering Mechanics– Basic Concepts. Scope and Applications

Systems of Forces: Coplanar Concurrent Forces– Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Friction: Introduction**,** limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

Learning Outcomes: At the end of this unit, students should be able to

- Use scalar and vector analytical techniques for analyzing forces (L4)
- Calculate the resultant of system of forces. (L4)
- Analyze various types of friction. (L4)
- Apply types of motions and also understand, applications of friction. (L3)

UNIT – II (9 Hrs)

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorem, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples
Learning Outcomes: At the end of this unit, students should be able to

- Use scalar and vector analytical techniques for analyzing forces (L4)
- Calculate the resultant of system of forces. (L4)

UNIT – III (9 Hrs)

Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures.
Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems.
Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.
Learning Outcomes: At the end of this unit, students should be able to

- Understand distributed force systems, centroid center of gravity and method of finding centroids of composite figures and bodies. (L2)
- Analyze various types of problems related to Moment of Inertia (L4)

UNIT – IV (9 Hrs)

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.
Learning Outcomes: At the end of this unit, students should be able to

- Understand practical examples related to curvilinear motion. (L2)
- Relate kinematics with kinetic equations on linear displacement, velocity and acceleration. (L4)

UNIT – V (8 Hrs)

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane

motion, Work Energy method and Impulse Momentum method.

Learning Outcomes: At the end of this unit, students should be able to

- Understand Kinetics of rigid body rotation. (L2)

TEXTBOOKS:

1. **"**Engineering Mechanics", S. Timoshenko, D. H. Young, J.V. Rao, S. Pati, McGraw Hill Education, 2017, 5th Edition.
2. "Engineering Mechanics", P. C. Dumir, S. Sengupta and Srinivas V veeravalli, University press, 2020, 1st Edition.
3. "A Textbook of Engineering Mechanics", S. S. Bhavikatti, New age international Publications, 2018, 4th Edition.

REFERENCE BOOKS:

1. "Engineering Mechanics, Statics and Dynamics", Rogers and M A. Nelson., McGraw Hill Education, 2017, 1st Edition.
2. "Engineering Mechanics, Statics and Dynamics", I. H. Shames, PHI, 2002, 4th Edition.
3. "Engineering Mechanics – Volume – I: Statics, Volume-II: Dynamics", J. L. Meriam and L. G. Kraige, John Wiley, 2008, 6th Edition.
4. "Introduction to Statics and Dynamics", Basudev Battachatia, Oxford University Press, 2014, 2nd Edition
5. "Engineering Mechanics: Statics and Dynamics", R. C. Hibbeler, Pearson Education, Inc., New Delhi, 2022, 14th Edition

Course Code	COMMUNICATIVE ENGLISH LAB		L	T	P	C
23A11202A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
➢ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
➢ To train in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. **(K2)**

CO2: Apply communication skills through various language learning activities. **(K3)**

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **(K4)**

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. **(K5)**

CO5: Take part effectively in job interviews. **(K5)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	2	-	2	-	-	-	1	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	2	-	-

TOPICS:
1. Vowels and Consonants
Learning Outcomes: At the end of this session, students should be able to
● Distinguish different speech sounds while listening and speaking with a view to effectively comprehend texts of various difficulty levels. (L4)

2. Neutralization and Accent Rules
Learning Outcomes: At the end of this session, students should be able to
● Identify syllabification, stress, rhythm and intonation for effective inference of comprehended texts. (L3)
● Apply accent neutralized speech approach to communicate with fluency. (L3)
● Develop various transactional models of communication while listening to native speakers of English. (L3)

3.   Communication skills and JAM

Learning Outcomes: At the end of this session, students should be able to

- Take part in short structured talks. (L4)
- Make use of effective communication skills in varied contexts. (L4)

4.   Role Play or Conventional Practice

Learning Outcomes: At the end of this session, students should be able to

- Develop conversational skills both in academic and professional contexts. (L3)

5.   E-mail Writing

Learning Outcomes: At the end of this session, students should be able to

- Construct structured and well-organized emails for different professional purposes. (L3)

6.   Resume Writing, Cover Letter

Learning Outcomes: At the end of this session, students should be able to

- Build effective resumes along with cover letters. (L3)

7.   Group Discussions – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Understand the key skills and behavioural requirements to facilitate the group discussion. (L2)
- Take part in group discussions effectively. (L4)

8.   Debates – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Take part in brain storming sessions. (L4)
- Compare and contrast different viewpoints to arrive at a consensus. (L5)

9.   PPT Presentations/Poster Presentations

Learning Outcomes: At the end of this session, students should be able to

- Create effective power point and poster presentations. (L6)

10. Interview Skills

Learning Outcomes: At the end of this session, students should be able to

- Develop required skills to participate in interviews. (L3)
- Analyze the dynamics of interviews to increase the chances of employment. (L4)

REFERENCE BOOKS:

1. "Technical Communication", Meenakshi Raman, Sangeeta Sharma, Oxford Press, 2018.
2. "English Conversation Practice", Taylor Grant, Tata McGraw-Hill Education India, 2016.
3. "Cambridge Academic English (B2)", Martin Hewings. CUP, 2012.

4. "A Course in Phonetics and Spoken English", J. Sethi & P.V. Dhamija, 2nd Edition, Kindle, 2013.

ONLINE LEARNING RESOURCES:
SPOKEN ENGLISH:
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & ACCENT:
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Course Code	ENGINEERING WORKSHOP		L	T	P	C
23A05303A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
 ➢ To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities. **(K3)**

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, welding and plumbing. **(K3)**

CO3: Apply fitting operations in various applications. **(K3)**

CO4: Apply basic electrical engineering knowledge for House Wiring Practice **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO2	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO3	3	2	2	-	3	-	1	-	2	1	-	3	2	2
CO4	3	2	2	-	3	-	1	-	2	1	-	3	2	2

LIST OF EXPERIMENTS:
1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray
   b) Conical funnel
   c) Elbow pipe
   d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit

      b) Dovetail fit

      c) Semi-circular fit

      d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.

      a) Parallel and series

      b) Two-way switch

      c) Godown lighting

      d) Tube light

      e) Three phase motor

      f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:

1. "Basic Workshop Technology: Manufacturing Process", Felix W.; Independently Published, 2019.

2. "Workshop Processes, Practices and Materials", Bruce J. Black, Routledge Publishers, 5th Edition, 2015.

3. "A Course in Workshop Technology Vol I. & II", B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCE BOOKS:

1. "Elements of Workshop Technology - Vol. I", S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th Edition

2. "Workshop Practice", H. S. Bawa, Tata-McGraw Hill, 2004.

3. "Wiring Estimating, Costing and Contracting", P.M. Soni & P.A. Upadhyay, Atul Prakashan, 2021-22.

Course Code	IT WORKSHOP		L	T	P	C
23A05304A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning.
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Perform Hardware troubleshooting. **(K2)**

CO2: Understand Hardware components and inter dependencies. **(K2)**

CO3: Safeguard computer systems from viruses/worms. **(K3)**

CO4: Document/ Presentation preparation. **(K3)**

CO5: Perform calculations using spreadsheets. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	1	2	-	-	-	-	-	-	-	1	-
CO3	1	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	1	2	-	-	-	-	-	-	-	-	2
CO5	1	3	2	2	2	-	-	-	-	-	-	-	-	2

PC Hardware & Software Installation:
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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:
Task 1: 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 power point 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.

AI TOOLS – ChatGPT:
Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCE BOOKS:
1. "Comdex Information Technology course tool kit", Vikas Gupta, WILEY Dream tech, 2003
2. "The Complete Computer upgrade and repair book", Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd Edition
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2012, 2nd Edition
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", David Anfinson and Ken Quamme, CISCO Press, Pearson Education, 3rd Edition
7. "IT Essentials PC Hardware and Software Labs and Study Guide", Patrick Regan, CISCO Press, Pearson Education, 3rd Edition

Course Code	**ENGINEERING MECHANICS LAB**		**L**	**T**	**P**	**C**
23A03402A			**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ Verify the Law of Parallelogram and Triangle of Forces.
- ➢ Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- ➢ Analyse the system of Pulleys and Moment of Inertia of Compound Pendulum and Flywheel.

COURSE OUTCOMES:
After completion of the course, the student will be able to
- **CO1:** Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller. **(K5)**
- **CO2:** Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever. **(K3)**
- **CO3:** Determine the Centre of gravity and Moment of Inertia of different configurations. **(K3)**
- **CO4:** Verify the equilibrium conditions of a rigid body under the action of different force systems. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	1	-	-	-	1	1	-	1	2	2
CO2	3	2	2	-	1	-	-	-	1	1	-	1	2	2
CO3	3	2	2	-	1	-	-	-	1	1	-	1	2	2
CO4	3	2	2	-	1	-	-	-	1	1	-	1	2	2

LIST OF EXPERIMENTS:
1. Verification of Law of Triangle of Forces.
2. Verification of the Law of polygon for coplanar-concurrent forces acting on a particle in equilibrium and to find the value of unknown forces considering particle to be in equilibrium using universal force table.
3. Determination of coefficient of Static and Rolling Frictions
4. Determination of Centre of Gravity of different shaped Plane Lamina.
5. Verification of the conditions of equilibrium of a rigid body under the action of coplanar non-concurrent, parallel force system with the help of a simply supported beam.
6. Study of the systems of pulleys and draw the free body diagram of the system.
7. Determine the acceleration due to gravity using a compound pendulum.
8. Determine the Moment of Inertia of the compound pendulum about an axis perpendicular to the plane of oscillation and passing through its centre of mass.
9. Determine the Moment of Inertia of a Flywheel.

10. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

Note: Students have to perform all 10 Experiments

REFERENCE BOOKS:

1. "Engineering Mechanics", S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., 5th Edition, McGraw Hill Education.
2. "Engineering Mechanics: Statics and Dynamics", R. C. Hibbeler, 14th Edition, Pearson Education, Inc., New Delhi, 2022

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to all branches)		L	T	P	C
23A11109A			0	0	1	0.5
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To make the students maintain their mental and physical wellness by balancing emotions in their life
- ➢ To enhance the essential traits required for the development of the personality.

COURSE OUTCOMES:
After completion of the course, the student will be able to
- **CO1:** Understand the importance of yoga and sports for Physical fitness and sound health. **(K2)**
- **CO2:** Demonstrate an understanding of health-related fitness components. **(K3)**
- **CO3:** Compare and contrast various activities that help enhance their health. **(K4)**
- **CO4:** Assess current personal fitness levels. **(K2)**
- **CO5:** Develop Positive Personality. **(K5)**

UNIT – I
Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity, Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.
Activities:
- Organizing health awareness programmes in community
- Preparation of health profile
- Preparation of chart for balance diet for all age groups

UNIT – II
Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.
Activities:
- Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.
Activities:
- Participation in one major game and one individual sport viz., Athletics, Volleyball,

Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
- Practicing general and specific warm up, aerobics
- Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:

1. "Health and Wellness", Gordon Edlin, Eric Golanty. 14th Edition, Jones & Bartlett Learning, 2022
2. "The Heart of Yoga: Developing a Personal Practice", T. K. V. Desikachar
3. "Yoga Sutras of Patanjali", Archie J. Bahm, Jain Publishing Company, 1993
4. "SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere", Wiseman, John Lofty, 3rd Edition, William Morrow Paperbacks, 2014
5. "The Sports Rules Book/ Human Kinetics with Thomas Hanlon", 3rd Edition, Human Kinetics, Inc.2014

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

ELECTRONICS AND COMMUNICATION ENGINEERING
(For the batches admitted from the academic year 2023-24)

Vision

- To produce technically competent and research-oriented Electronics and Communication Engineers to meet the Industrial and Social requirements.

Mission

- To impart quality technical education in the field of Electronics and Communication Engineering through state-of-the art facilities and effective teaching learning process.
- To enrich the faculty and students with research and consultancy skills through Industry-Interaction and Training in Emerging areas of Electronics and Communication Engineering.
- To develop lifelong learning, leadership qualities and ethical values in learners to meet the societal and industrial needs.

Institutional Objectives

- To create a conducive and competitive environment for students through curricular and extra-curricular activities.
- Promote the culture of research among the faculty.
- To promote synergetic alliances with premier Institutions, Industry, CSIR laboratories and various Government organizations for Collaborative Research Projects.
- To promote economic and social enrichment of the society through Skill Development programmes, Entrepreneurship, and extension activities.
- To introduce demand-driven new UG&PG academic programmes.
- To ensure a high degree of quality in terms of providing infrastructure, research ambience, faculty and staff development.

Core Values

- *Thirst for Quality Education:* The stake holders of the institute particularly management, employees and students of the institution have a consistent thirst for quality improvement of the processes and services in the institution.
- *Lifelong Learning:* In the fast-changing technological world, acquiring a special skill at one point of time will not be enough for ever long survival. Hence to flourish in the workplace and to bring in innovations in the ways of doing, employee, student as well as alumni must be continuous learners and tech savvy.

- *Diversity and Participation:* PBRVITS promotes the involvement of faculty, staff, and students from all social, economic, ethnics, cultural and religious backgrounds to get the synergy of combining the diversified agents. The focus is on involving students to exhibit their talent in various curricular and co-curricular activities and strengthening alumni link to share their experiences to the students.

- *Academic Integrity and Accountability:* Management induces accountability in the employees for the career of the students and the academic leadership establishes a mentoring mechanism for realization of responsibilities of students towards their parents and in turn to the society.

ELECTRONICS AND COMMUNICATION ENGINEERING
(For the batches admitted from the academic year 2023-24)

	INDUCTION PROGRAM (3 weeks duration)
S. No	**Course Name**
1	Physical Activities – Sports, Yoga and Meditation, Plantation
2	Career Counselling
3	Orientation to all branches – career options, tools, etc.
4	Orientation on admitted Branch – corresponding labs, tools and platforms
5	Proficiency Modules and Productivity Tools
6	Assessment on basic aptitude and mathematical skills
7	Remedial training in Foundation Courses
8	Human Values and Professional Ethics
9	Communication Skills – Focus on Listening, Speaking, Reading, Writing Skills
10	Concepts of Programming

Semester I (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11101A	Linear Algebra & Calculus	3	0	0	3	30	70	100
2	HSMC	23A11201A	Communicative English	2	0	0	2	30	70	100
3	ES	23A02301A	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
4	ES	23A05301A	Introduction to Programming	3	0	0	3	30	70	100
5	ES	23A03301A	Engineering Graphics	1	0	4	3	30	70	100
6	ES	23A02302A	Electrical and Electronics Engineering Workshop	0	0	3	1.5	30	70	100
7	ES	23A05302A	Computer Programming Lab	0	0	3	1.5	30	70	100
8	HSMC	23A11202A	Communicative English Lab	0	0	2	1	30	70	100
9	ES	23A05304A	IT Workshop	0	0	2	1	30	70	100
10	BS	23A11109A	Health and Wellness, Yoga and Sports	-	-	1	0.5	-	-	100
Total							**19.5**			**1000**

Semester II (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11102A	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
2	BS	23A11103A	Engineering Physics	3	0	0	3	30	70	100
3	BS	23A11104A	Chemistry	3	0	0	3	30	70	100
4	ES	23A01301A	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
5	PC	23A04401A	Network Analysis	3	0	0	3	30	70	100
6	BS	23A11106A	Engineering Physics Lab	0	0	2	1	30	70	100
7	BS	23A11107A	Chemistry Lab	0	0	2	1	30	70	100
8	PC	23A04402A	Network Analysis & Simulation Lab	0	0	3	1.5	30	70	100
9	ES	23A05303A	Engineering Workshop	0	0	3	1.5	30	70	100
10	BS	23A11110A	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	-	-	100
Total							**20.5**			**1000**

Course Code	LINEAR ALGEBRA & CALCULUS		L	T	P	C
23A11101A	(Common to all branches)		3	0	0	3
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

> ➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. **(K3)**

CO2: Demonstrate the ability to compute eigen values and eigen vectors for square matrices using methods such as characteristic polynomials, determinants, and numerical techniques. **(K3)**

CO3: Utilize mean value theorems to real life problems. **(K3)**

CO4: Familiarize with functions of several variables which are useful in optimization. **(K3)**

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	1	-

UNIT – I (9 Hrs)

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Learning Outcomes: At the end of this unit, students should be able to

- Solve systems of linear equations, using technology to facilitate row reduction and determine the rank (L3).
- Demonstrate an understanding of how to translate a system of simultaneous linear equations into a matrix (L2)
- Solve systems of linear equations using various methods including Gauss elimination

method and Gauss Seidel Iteration Methods (L3)

UNIT – II (9 Hrs)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors 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 forms by Orthogonal Transformation.

Learning Outcomes: At the end of this unit, students should be able to

- Demonstrate the process of finding eigenvalues and eigenvalues for square matrices. (L2)
- Describe the process of diagonalizing a matrix and its significance. (L3)
- Apply the Cayley-Hamilton Theorem to find powers of a matrix and compute the inverse of a matrix. (L3)
- Apply knowledge of the nature of a quadratic form to analyse and solve optimization process. (L3)
- Explain the process of using orthogonal transformations to reduce a quadratic form to its canonical form. (L5)

UNIT – III (9 Hrs)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Learning Outcomes: At the end of this unit, students should be able to

- Analyze the behaviour of functions by using mean value theorems (L4)
- Translate the given function as series of Taylor's and Maclaurin's with remainders (L2)

UNIT – IV (9 Hrs)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes: At the end of this unit, students should be able to

- Find partial derivatives numerically and symbolically and use them to analyze and   interpret the way a function varies. (L4)
- Acquire the Knowledge maxima and minima of functions of several variable (L3)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT – V (9 Hrs)

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Learning Outcomes: At the end of this unit, students should be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L3)
- Evaluate triple integrals in Cartesian, cylindrical and spherical polar coordinates. (L5)
- Apply triple integration techniques in evaluating volumes. (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", Michael Greenberg, Pearson publishers, 9th Edition
5. "Higher Engineering Mathematics", H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, 3rd Edition (Reprint 2021)

Course Code	COMMUNICATIVE ENGLISH		L	T	P	C
23A11201A	(Common to all branches)		**2**	**0**	**0**	**2**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To facilitate effective Listening, Reading, Speaking and Writing skills among the students.
➢ To enhance their comprehending abilities, oral presentations, reporting useful information.
➢ To provide knowledge of grammatical structures and vocabulary.
➢ To make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues, and also from reading content. **(K2)**
CO2: Apply grammatical structures to formulate sentences and correct word forms. **(K3)**
CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. **(K4)**
CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. **(K5)**
CO5: Create a coherent paragraph, essay, and resume. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	-	2	-	2	2	-	-	3	2	-	-	-
CO5	-	-	-	-	-	1	-	1	-	3	1	1	-	-

UNIT – I (9 Hrs)
Lesson : HUMAN VALUES: Gift of Magi (Short Story)

Listening	:	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking	:	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading	:	Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing	:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar	:	Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary	:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Learning Outcomes: At the end of this unit, students should be able to
- Understand specific pieces of information through listening and reading. (L2)
- Demonstrate basic questioning and answering skills on general topics. (L2)
- Outline the main ideas and specific details from the given text.(L2)
- Apply grammatical knowledge to frame flawless sentences. (L3)
- Develop basic word knowledge. (L3)

UNIT – II (9 Hrs)
Lesson : NATURE: The Brook by Alfred Tennyson (Poem)

Listening : Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

Speaking : Discussion in pairs/small groups on specific topics followed by short structure talks.

Reading : Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing : Structure of a paragraph - Paragraph writing (specific topics)

Grammar : Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary : Homonyms, Homophones, Homographs.

Learning Outcomes: At the end of this unit, students should be able to
- Distinguish between main idea and supporting ideas through listening. (L4)
- Develop short structured talks. (L3)
- Identify the logical sequence of ideas in a given text. (L3)
- Organize ideas into a meaningful paragraph by using cohesive devices and also learn the right usage of articles and prepositions. (L3)
- Identify difference among homonyms, homophones and homographs.(L3)

UNIT – III (9 Hrs)
Lesson : BIOGRAPHY: Elon Musk

Listening : Listening for global comprehension and summarizing what is listened to.

Speaking : Discussing specific topics in pairs or small groups and reporting what is discussed.

Reading : Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing : Summarizing, Note-making, paraphrasing

Grammar : Verbs - tenses; subject-verb agreement; Compound words, Collocations.

Vocabulary : Compound words, Collocations.

Learning Outcomes: At the end of this unit, students should be able to
- Summarize what is listened to. (L2)
- Discuss on specific topics and report what is discussed. (L6)

- Interpret specific clues and use different strategies to comprehend a text. (L5)
- Summarize and paraphrase a given text by using different methods of note-making. (L2)
- Make use of right form of the verbs, compound words and collocations. (L3)

UNIT – IV (9 Hrs)
Lesson : INSPIRATION: The Toys of Peace by Saki

Listening	:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video
Speaking	:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading	:	Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/relationships, communicate processes or display complicated data.
Writing	:	Letter Writing: Official Letters, Resumes
Grammar	:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary	:	Words often confused, Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Make Predictions while listening to video and audio texts. (L6)
- Construct a dialogue in academic contexts. (L3)
- Analyze the data from the given graphic elements and present it verbally. (L4)
- Build effective resumes and draft formal letters. (L6)
- Apply grammatical rules to transform sentences into different speech or voice. (L3)
- Identify correct word for the context and also jargons. (L3)

UNIT – V (9 Hrs)
Lesson : MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening	:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking	:	Formal oral presentations on topics from academic contexts.
Reading	:	Reading Comprehension.
Writing	:	Writing structured essays on specific topics.
Grammar	:	Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary	:	Technical Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Interpret a given text and answer the questions. (L5)
- Present a topic of academic context. (L5)
- Interpret and comprehend a given text. (L5)
- Develop structured essays on specific topics. (L3)

- Identify common errors in grammar and usage.(L3)
- Make use of technical Jargons. (L3)

TEXTBOOKS:

1. "Pathfinder: Communicative English for Undergraduate Students", 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3)
2. "Empowering with Language", Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:

1. "English for Engineers", Dubey, Sham Ji & Co., Vikas Publishers, 2020
2. "Academic writing: A Handbook for International Students", Stephen Bailey, Routledge, 2014.
3. "English Grammar in Use", Raymond Murphy, 4th Edition, Cambridge University Press, 2019.
4. "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary", Norman Lewis, Anchor, 2014.

ONLINE LEARNING RESOURCES:
GRAMMAR:

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY:

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to all branches)		L	T	P	C
23A02301A			3	0	0	3
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the problem solving concepts associated to AC and DC circuits. **(K2)**

CO2: Analyze the operating principles of motors, generators, MC and MI instruments. **(K4)**

CO3: Apply the mathematical tool for different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. **(K3)**

CO4: Explain the characteristics of diodes and transistors. **(K4)**

CO5: Familiarize with the number systems, codes, Boolean algebra and logic gates **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO2	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO3	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO4	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO5	3	3	1	-	1	3	2	-	-	-	-	1	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I (8 Hrs)
DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

Learning Outcomes: At the end of this unit, students should be able to

- Recall Kirchhoff's laws (L1) .
- Analyze simple electric circuits with DC excitation (L4)
- Understand fundamental definitions of 1-phase AC circuits (L2)

- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-phase elements R, L, and C. (L2)

UNIT – II (7 Hrs)
Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the principle and operation of DC Generator & Motor. (L2)
- Understand the operation of transformer and induction motor. (L2)
- Understand the construction of induction motor - DC motor (L2)
- Distinguish between MC and MI type of instruments (L3)

UNIT – III (7 Hrs)
Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the Conventional and Non-Conventional Energy Sources. (L2)
- Understand the Power Ratings of house hold appliances (L2)
- Knowing the energy consumption of different electrical appliances(L3)
- Calculating the electricity bill (L2).

PART B: BASIC ELECTRONICS ENGINEERING

UNIT – I (8 Hrs)

Semiconductor Devices: Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier

Learning Outcomes: At the end of this unit, students should be able to
- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

UNIT – II (7 Hrs)
Basic Electronic Circuits and Instrumentation
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.

Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.

Electronic Instrumentation: Block diagram of an electronic instrumentation system.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the various Rectifiers and Power Supplies(L3)
- Analyze the behaviour of common emitter Amplifier with its frequency response (L3)

UNIT – III (7 Hrs)
Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Learning Outcomes: At the end of this unit, students should be able to
- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's Theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)

TEXTBOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Basic Electronics Engineering:
1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson

Education, 2021.

2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.

REFERENCE BOOKS:
For Basic Electrical Engineering:

1. "Basic Electrical Engineering", D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, 4th Edition
2. "Principles of Power Systems", V. K. Mehtha, S. Chand Technical Publishers, 202
3. "Basic Electrical Engineering", T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. "Basic Electrical and Electronics Engineering", S. K. Bhattacharya, Pearson Publications, 2018, 2nd Edition.

For Basic Electronics Engineering:

1. "A Textbook of Electronic Devices and Circuits", R. S. Sedha, S. Chand & Co, 2010.
2. "Basic Electronics- Devices, Circuits and IT Fundamentals", Santiram Kal, Prentice Hall, India, 2002.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

ONLINE LEARNING RESOURCES:
For Basic Electrical Engineering:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Course Code	INTRODUCTION TO PROGRAMMING		L	T	P	C
23A05301A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

- ➢ To introduce students to the fundamentals of computer programming.
- ➢ To provide hands-on experience with coding and debugging.
- ➢ To foster logical thinking and problem-solving skills using programming.
- ➢ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- ➢ To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. **(K2)**

CO2: Analyse a problem and develop an algorithm to solve it. (**K4**)

CO3: Implement various algorithms using the C programming language. **(K3)**

CO4: Understand more advanced features of C language. **(K2)**

CO5: Develop problem-solving skills and the ability to debug and optimize the code. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-	-	2
CO5	1	2	3	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Learning Outcomes: At the end of this unit, students should be able to

- Translate algorithms into programs. (L4)
- Solve complex problems using language independent notations. (L3)

- Use C basic concepts to write simple C programs. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Analyze the algorithms for time and space complexities. (L4)

UNIT – II (9 Hrs)

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

Learning Outcomes: At the end of this unit, students should be able to
- Implement conditional branching and iteration statements. (L2)
- Select the control structures for solving the problem statements (L4)
- Use iterative statements for writing C programs. (L3)

UNIT – III (8 Hrs)

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Learning Outcomes: At the end of this unit, students should be able to
- Use arrays to process multiple homogeneous data. (L3)
- Solve mathematical problems using C programming language. (L3)
- Apply string-handling functions. (L3)

UNIT – IV (9 Hrs)

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Learning Outcomes: At the end of this unit, students should be able to
- Structure the individual data elements to simplify the solution. (L6)
- Facilitate efficient memory utilization. (L6)
- Use pointers and structures to formulate algorithm and write programs. (L3)
- Understand the basic differences between structure and union. (L2)

UNIT – V (9 Hrs)

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope   and Lifetime of Variables, Basics of File Handling.

Learning Outcomes: At the end of this unit, students should be able to
- Understand basic terminology of modular programming. (L2)
- Writing structured programs using C Functions. (L5)
- Apply modular approach for solving the problem statements. (L3)
- Writing C programs using various storage classes to control variable access. (L5)

- Apply input and output statements to process the data in various formats. (L3)

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:
1. "Computing fundamentals and C Programming", E. Balagurusamy, McGraw-Hill Education, 2008.
2. "Programming in C", Rema Theraja, Oxford, 2016, 2nd Edition.
3. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

ONLINE LEARNING RESOURCES:
1. www.learn-c.org
2. www.programmeiz.com
3. www.github.com

Course Code	ENGINEERING GRAPHICS		L	T	P	C
23A03301A	(Common to all branches)		**1**	**0**	**4**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

- ➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing
- ➢ To impart knowledge on the projection of points, lines and plane surfaces
- ➢ To improve the visualization skills for better understanding of projection of solids
- ➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.
- ➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. **(K2)**

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. **(K1)**

CO3: Understand and draw projection of solids in various positions in first quadrant. **(K2)**

CO4: Explain principles behind development of surfaces. **(K2)**

CO5: Prepare isometric and perspective sections of simple solids. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO2	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	3	-	-	-	-	2	-	2	2	2

UNIT – I (12 Hrs)

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Learning Outcomes: At the end of this unit, students should be able to

- • Understand the significance of engineering drawing (L2)

- Know the conventions used in the engineering drawing (L1)
- Identify the curves obtained in different conic sections (L2)
- Draw different cycloidal and involute curves. (L1)
- Know about the scale conversion techniques (L1)

UNIT – II (12 Hrs)

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

Learning Outcomes: At the end of this unit, students should be able to
- Know how to draw the projections of points, lines (L1)
- Find the true length of the lines. (L2)
- Understand the procedure to draw projection of planes. (L2)
- Draw the projection of plane inclined to one plane and both the planes. (L1)

UNIT – III (18 Hrs)

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solid inclined to one plane. (L1)

UNIT – IV (15 Hrs)

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw sectional views and true shape of solids. (L2)
- Represent the surface development of simple solids. (L3)

UNIT – V (18 Hrs)

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

Learning Outcomes: At the end of this unit, students should be able to

- Learn the basics convectional representation of different projections (L1)
- Draw the Orthographic projection of simple solids. (L1)
- Draw the Isometric projection of simple solids. (L1)
- Understand the different commands used in Computerized drawing (L2)

TEXTBOOKS:

1. "Engineering Drawing", N. D. Bhatt, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. "Engineering Drawing", K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. "Engineering Drawing", M. B. Shah and B. C. Rana, Pearson Education Inc, 2009.
3. "Engineering Drawing with an Introduction to AutoCAD", Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to all branches)		L	T	P	C
23A02302A			**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:
- ➢ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
- ➢ To impart knowledge on the principles of digital electronics and fundamentals of electron devices and its applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. **(K2)**

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. **(K4)**

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. **(K3)**

CO4: Identify & testing of various electronic components along with characteristics of various electron devices. **(K2)**

CO5: Explain the operation of a digital circuit. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	2	-	-	-	-	2	3	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	3	3	2

PART A: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS:
1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum six experiments should be performed

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: Minimum six experiments should be performed using both Hardware and Software

REFERENCE BOOKS:

For Electrical Engineering Lab:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Electronics Engineering Lab:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

Course Code	COMPUTER PROGRAMMING LAB		L	T	P	C
23A05302A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. **(K2)**

CO2: Select the right control structure for solving the problem. **(K1)**

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. **(K3)**

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. **(K3)**

CO5: Develop C programs to handle File handling operations. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

UNIT – I

Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab 1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 2: Converting algorithms/flow charts into C Source code. Developing the algorithms/ flowcharts for the following sample programs
   i) Sum and average of 3 numbers
   ii) Conversion of Fahrenheit to Celsius and vice versa
   iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions.

Lab 3: Simple computational problems using arithmetic expressions
   i) Finding the square root of a given number
   ii) Finding compound interest
   iii) Area of a triangle using heron's formulae
   iv) Distance travelled by an object

UNIT – II

Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity.

Lab 4: Simple computational problems using the operator' precedence and associativity
   i) Evaluate the following expressions
       a. A+B*C+(D*E) + F*G
       b. A/B*C-B+A*D/3
       c. A+++B---A
       d. J= (i++) + (++i)
   ii) Find the maximum of three numbers using conditional operator
   iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions.

Lab 5: Problems involving if-then-else structures

    i) Write a C program to find the max and min of four numbers using if-else.

    ii) Write a C program to generate electricity bill.

    iii) Find the roots of the quadratic equation.

    iv) Write a C program to simulate a calculator using switch case.

    v) Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops.

Lab 6: Iterative problems e.g., the sum of series

    i) Find the factorial of given number using any loop.

    ii) Find the given number is a prime or not.

    iii) Compute sine and cos series

    iv) Checking a number palindrome

    v) Construct a pyramid of numbers

UNIT – III
Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1-D Arrays: searching.

Lab 7: 1-D Array manipulation, linear search

    i) Find the min and max of a 1-D integer array.

    ii) Perform linear search on1D array.

    iii) The reverse of a 1D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will

reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

    i) Addition of two matrices

    ii) Multiplication two matrices

    iii) Sort array elements using bubble sort

    iv) Concatenate two strings without built-in functions

    v) Reverse a string using built-in and without built-in string functions

UNIT – IV

Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereference

    i) Write a C program to find the sum of a 1D array using malloc()

    ii) Write a C program to find the total, average of n students using structures

    iii) Enter n students data using calloc() and display failed students list

    iv) Read student name and marks from the command line and display the student details along with the total.

    v) Write a C program to implement realloc()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists.

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

    i) Create and display a singly linked list using self-referential structure.

    ii) Demonstrate the differences between structures and unions using a C program.

    iii) Write a C program to shift/rotate using bitfields.

    iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT – V
Week 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.
  i) Write a C function to calculate NCR value.
  ii) Write a C function to find the length of a string.
  iii) Write a C function to transpose of a matrix.
  iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls.

Lab 12: Recursive functions
  i) Write a recursive function to generate Fibonacci series.
  ii) Write a recursive function to find the lcm of two numbers.
  iii) Write a recursive function to find the factorial of a number.
  iv) Write a C Program to implement Ackermann function using recursion.
  v) Write a recursive function to find the sum of series.

Week 13:
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.
  i) Write a C program to swap two numbers using call by reference.
  ii) Demonstrate Dangling pointer problem using a C program.
  iii) Write a C program to copy one string into another using pointer.
  iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling.

Lab 14: File operations

    i) Write a C program to write and read text into a file.

    ii) Write a C program to write and read text into a binary file using fread() and fwrite()

    iii) Copy the contents of one file to another file.

    iv) Write a C program to merge two files into the third file using command-linearguments.

    v) Find no. of lines, words and characters in a file

    vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. "Programming in C: A practical approach", Ajay Mittal, Pearson
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. "C   Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

Course Code	COMMUNICATIVE ENGLISH LAB		L	T	P	C
23A11202A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:
- ➢ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
- ➢ To train in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. **(K2)**

CO2: Apply communication skills through various language learning activities. **(K3)**

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **(K4)**

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. **(K5)**

CO5: Take part effectively in job interviews. **(K5)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	2	-	2	-	-	-	1	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	2	-	-

TOPICS:

1. Vowels and Consonants
Learning Outcomes: At the end of this session, students should be able to
- Distinguish different speech sounds while listening and speaking with a view to effectively comprehend texts of various difficulty levels. (L4)

2. Neutralization and Accent Rules
Learning Outcomes: At the end of this session, students should be able to
- Identify syllabification, stress, rhythm and intonation for effective inference of comprehended texts. (L3)
- Apply accent neutralized speech approach to communicate with fluency. (L3)
- Develop various transactional models of communication while listening to native speakers of English. (L3)

3. Communication skills and JAM
Learning Outcomes: At the end of this session, students should be able to
- Take part in short structured talks. (L4)
- Make use of effective communication skills in varied contexts. (L4)

4. Role Play or Conventional Practice
Learning Outcomes: At the end of this session, students should be able to
- Develop conversational skills both in academic and professional contexts. (L3)

5. E-mail Writing
Learning Outcomes: At the end of this session, students should be able to
- Construct structured and well-organized emails for different professional purposes. (L3)

6. Resume Writing, Cover Letter
Learning Outcomes: At the end of this session, students should be able to
- Build effective resumes along with cover letters. (L3)

7. Group Discussions – Methods and Practices
Learning Outcomes: At the end of this session, students should be able to
- Understand the key skills and behavioural requirements to facilitate the group discussion. (L2)
- Take part in group discussions effectively. (L4)

8. Debates – Methods and Practices
Learning Outcomes: At the end of this session, students should be able to
- Take part in brain storming sessions. (L4)
- Compare and contrast different viewpoints to arrive at a consensus. (L5)

9. PPT Presentations/Poster Presentations
Learning Outcomes: At the end of this session, students should be able to
- Create effective power point and poster presentations. (L6)

10. Interview Skills
Learning Outcomes: At the end of this session, students should be able to
- Develop required skills to participate in interviews. (L3)
- Analyze the dynamics of interviews to increase the chances of employment. (L4)

REFERENCE BOOKS:
1. "Technical Communication", Meenakshi Raman, Sangeeta Sharma, Oxford Press, 2018.
2. "English Conversation Practice", Taylor Grant, Tata McGraw-Hill Education India, 2016.
3. "Cambridge Academic English (B2)", Martin Hewings. CUP, 2012.

4. "A Course in Phonetics and Spoken English", J. Sethi & P.V. Dhamija, 2nd Edition, Kindle, 2013.

ONLINE LEARNING RESOURCES:
SPOKEN ENGLISH:
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & ACCENT:
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Course Code	IT WORKSHOP		L	T	P	C
23A05304A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning.
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Perform Hardware troubleshooting. **(K2)**

CO2: Understand Hardware components and inter dependencies. **(K2)**

CO3: Safeguard computer systems from viruses/worms. **(K3)**

CO4: Document/ Presentation preparation. **(K3)**

CO5: Perform calculations using spreadsheets. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	1	2	-	-	-	-	-	-	-	1	-
CO3	1	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	1	2	-	-	-	-	-	-	-	-	2
CO5	1	3	2	2	2	-	-	-	-	-	-	-	-	2

PC Hardware & Software Installation:

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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:
Task 1: 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 power point 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.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCE BOOKS:
1. "Comdex Information Technology course tool kit", Vikas Gupta, WILEY Dream tech, 2003
2. "The Complete Computer upgrade and repair book", Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd Edition
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2012, 2nd Edition
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", David Anfinson and Ken Quamme, CISCO Press, Pearson Education, 3rd Edition
7. "IT Essentials PC Hardware and Software Labs and Study Guide", Patrick Regan, CISCO Press, Pearson Education, 3rd Edition

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS		L	T	P	C
23A11109A	(Common to all branches)		0	0	1	0.5
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:
- ➢ To make the students maintain their mental and physical wellness by balancing emotions in their life
- ➢ To enhance the essential traits required for the development of the personality.

COURSE OUTCOMES:
After completion of the course, the student will be able to
- **CO1:** Understand the importance of yoga and sports for Physical fitness and sound health. **(K2)**
- **CO2:** Demonstrate an understanding of health-related fitness components. **(K3)**
- **CO3:** Compare and contrast various activities that help enhance their health. **(K4)**
- **CO4:** Assess current personal fitness levels. **(K2)**
- **CO5:** Develop Positive Personality. **(K5)**

UNIT – I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity, Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:
- Organizing health awareness programmes in community
- Preparation of health profile
- Preparation of chart for balance diet for all age groups

UNIT – II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:
- Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:
- Participation in one major game and one individual sport viz., Athletics, Volleyball,

Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
- Practicing general and specific warm up, aerobics
- Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:

1. "Health and Wellness", Gordon Edlin, Eric Golanty. 14th Edition, Jones & Bartlett Learning, 2022
2. "The Heart of Yoga: Developing a Personal Practice", T. K. V. Desikachar
3. "Yoga Sutras of Patanjali", Archie J. Bahm, Jain Publishing Company, 1993
4. "SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere", Wiseman, John Lofty, 3rd Edition, William Morrow Paperbacks, 2014
5. "The Sports Rules Book/ Human Kinetics with Thomas Hanlon", 3rd Edition, Human Kinetics, Inc.2014

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS		L	T	P	C
23A11102A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		II		

COURSE OBJECTIVES:

➢ To enlighten the learners in the concept of differential equations and multivariablecalculus.
➢ To furnish the learners with basic concepts and techniques at plus two level to lead theminto advanced level by handling various real-world applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Apply first order and first degree differential equations to model and solve problems in various scientific and engineering disciplines, including electrical circuits. **(K3)**

CO2: Solve the differential equations related to various engineering fields**. (K3)**

CO3: Identify solution methods for partial differential equations that model physical processes. **(K3)**

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. **(K2)**

CO5: Estimate the work done against a field, circulation and flux using vector calculus. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	-	-	-	-	-	-	2	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	1	-
CO5	2	3	2	2	-	-	-	-	-	-	-	1	1	-

UNIT – I (9 Hrs)

Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Learning Outcomes: At the end of this unit, students should be able to

• Learn the effective mathematical tools for solutions of first order differential equations(L2)
• Apply mathematical tools to model physical processes such as Newton's law of cooling, electrical circuits (L3).

UNIT – II (9 Hrs)

Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit

problems and Simple Harmonic motion.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L4)
- Formulate and solve the higher order differential equation by analyzing physical situations (L6)

UNIT – III (9 Hrs)

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Learning Outcomes: At the end of this unit, students should be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT – IV (9 Hrs)

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

Learning Outcomes: At the end of this unit, students should be able to

- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT – V (9 Hrs)

Vector integration: Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Learning Outcomes: At the end of this unit, students should be able to

- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th

Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. "Higher Engineering Mathematics", B. V. Ramana, McGraw Hill Education, 2017

Course Code	**ENGINEERING PHYSICS**		**L**	**T**	**P**	**C**
23A11103A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:

- ➢ To identify the importance of the physical optics i.e., interference, diffraction and polarization related to its engineering applications
- ➢ To present the basic concepts needed to understand the crystal structure of materials, X-ray diffraction
- ➢ To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices
- ➢ To enlighten the concepts of Quantum mechanics and to provide fundamentals of the de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory.
- ➢ Evolution of band theory to distinguish materials and explain the properties of semiconductors

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the intensity variation of light due to interference, diffraction & polarization. **(K3)**

CO2: Familiarize with the basics of crystals and their structures**. (K2)**

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials. **(K3)**

CO4: Explain the basic concepts of quantum mechanics and the band theory of solids. **(K2)**

CO5: Identify the type of semiconductor using Hall effect **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Wave Optics:

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double

refraction - Nicol's Prism -Half wave and Quarter wave plates.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify scientific & engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary light and polarized light (L2)

UNIT – II (9 Hrs)
Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

Learning Outcomes: At the end of this unit, students should be able to

- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by using Laue method & powder method (L4)

UNIT – III (9 Hrs)
Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius- Mosotti relation indielectrics (L2)
- Classify magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)

UNIT – IV (9 Hrs)

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concepts of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Understand the concept of density of states (L2)

UNIT – V (8 Hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and applications.

Learning Outcomes: At the end of this unit, students should be able to

- Classify the energy bands of semiconductors (L2)
- Understand the differences between intrinsic and extrinsic semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)

TEXTBOOKS:

1. "A Text book of Engineering Physics", M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition, 2019.
2. "Engineering Physics", D. K. Bhattacharya and Poonam Tandon, Oxford press, 2015

REFERENCE BOOKS:

1. "Engineering Physics", B. K. Pandey and S. Chaturvedi, Cengage Learning, 2021.
2. "Engineering Physics", Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. "Engineering Physics", Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010
4. "Engineering Physics", M. R. Srinivasan, New Age international publishers, 2009

ONLINE LEARNING RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Course Code	CHEMISTRY	L	T	P	C
23A11104A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)	**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		II	

COURSE OBJECTIVES:

- ➢ To familiarize chemistry and applications.
- ➢ To train the students on the principles and applications of electro chemistry and polymers.
- ➢ To introduce instrumental methods and applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the salient features of different theories along with their applications. **(K2)**

CO2: Discuss about the model engineering materials. **(K3)**

CO3: Apply the knowledge of various electrodes for the development of new batteries. **(K3)**

CO4: Identify the different polymers and their uses in various fields of engineering. **(K3)**

CO5: Analyze the knowledge of different analytical techniques used engineering and also development of new techniques. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Structure and Bonding Models: Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo - and hetero nuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes: At the end of this unit, students should be able to

- Illustrate the molecular orbital energy level diagram of different molecular species (L2)
- Discuss the basic concept of molecular orbital theory (L3)
- Explain the calculation of bond order of O2 and CO molecules (L2)

UNIT – II (9 Hrs)

Modern Engineering Materials: Semiconductors: Introduction, basic concept, applications

Super conductor: Introduction, basic concept, applications.

Super capacitors: Introduction, Basic Concept, Classification, Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphine nanoparticles.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the band theory of solids for conductors, semiconductors and insulators (L2)
- Demonstrate the application of Fullerenes, Carbon nanotubes and Graphene nanoparticles (L2)

UNIT – III (9 Hrs)

Electro Chemistry and Applications: Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors: Potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc- air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell – working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Learning Outcomes: At the end of this unit, students should be able to

- Apply the Nernst equation for calculating electrode and cell potentials(L3)
- Differentiate between potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)

UNIT – IV (9 Hrs)

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Bakelite, Nylon-6,6, Carbon fibers.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – Polyacetylene, polyaniline, – mechanism of conduction and applicatio Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

Learning Outcomes: At the end of this unit, students should be able to

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylons (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N and their applications (L2)

UNIT – V (8 Hrs)

Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic principle, Classification- HPLC: Principle, Instrumentation and Applications.

Learning Outcomes: At the end of this unit, students should be able to
- Explain the different types of spectral series in electromagnetic spectrum (L2)
- Understand the principles and applications of different analytical instruments (L2)

TEXTBOOKS:
1. "Engineering Chemistry", Jain and Jain, Dhanpat Rai publications, 17th Edition, 2018
2. "Atkins' Physical Chemistry", Peter Atkins, Julio de Paula and James Keeler, Oxford University Press, 10th Edition, 2010
3. "Concise Inorganic Chemistry", J. D. Lee, Wiley Publications, 5th Edition, Feb 2008

REFERENCE BOOKS:
1. "Principles of Instrumental Analysis", Skoog and West, 6th Edition, Thomson, 2007.
2. "Textbook of Polymer Science", Fred W. Billmayer Jr, 3rd Edition

Course Code	BASIC CIVIL AND MECHANICAL ENGINEERING (Common to all branches)		L	T	P	C
23A01301A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- To get familiarized with scope and importance of Civil and Mechanical Engineering in different sectors and industries.
- To introduce the preliminary concepts of Building Planning, Construction, Materials and related tests.
- To acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.
- To explain different engineering materials and manufacturing processes.
- To provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to
- **CO1:** Understand various sub-divisions of Civil Engineering and appreciate their role in ensuring better society. **(K2)**
- **CO2:** Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. **(K3)**
- **CO3:** Realize the importance of Transportation in nation's economy and engineering measures related to highways in terms of geometrics. **(K3)**
- **CO4:** Understand the importance of water resources and storage structures so that social responsibilities of water conservation will be appreciated.**(K1)**
- **CO5:** Understand the different manufacturing processes and explain the basics of thermal engineering and its applications. **(K2)**
- **CO6:** Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	3	-	-	-	-	-	-	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT – I (8 Hrs)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel / Theatre.

Learning Outcomes: At the end of this unit, students should be able to
- Identify the role of civil Engineers in the society and Various Disciplines of Civil Engineering. (L2)
- Develop typical layouts for different residential commercial and Industrial buildings. (L3)

UNIT – II (7 Hrs)

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements-Angular Measurements- Leveling instruments used for leveling- Introduction to Bearings Simple problems on leveling and bearings-Contour mapping.

Learning Outcomes: At the end of this unit, students should be able to
- Describe objectives of surveying and Horizontal and vertical measurements (L2)
- Measure Horizontal and vertical angles using surveying Instruments (L3)

UNIT – III (8 Hrs)

Transportation Engineering, Water Resources and Environmental Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water - Specifications and Tests- Introduction to Hydrology- Hydrograph -Rain water Harvesting - Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

Learning Outcomes: At the end of this unit, students should be able to
- Explain various types of pavements, their differences and basics of design (L2)
- Examine the quality of different sources of water and its storage (L3)

PART B: BASIC MECHANICAL ENGINEERING

UNIT – I (7 Hrs)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace,

and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.
Learning Outcomes: At the end of this unit, students should be able to

- Know the importance of machine and utilization in different fields. (L1)
- Know different kinds of materials and its classification. (L1)

UNIT – II (8 Hrs)

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering - working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

Learning Outcomes: At the end of this unit, students should be able to

- Know different production technologies used in industries. (L1)
- Know working principles and elements of automobiles. (L2)

UNIT – III (7 Hrs)

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Learning Outcomes: At the end of this unit, students should be able to

- Know working principles and elements used for power generation. (L1)
- Understand the concepts of various power transmission systems. (L2)
- Learn the robotics basic terminology and its usage in different sectors. (L1)

TEXTBOOKS:
For Basic Civil Engineering:

1. "Basic Civil and the Mechanical Engineering", G. Shanmugam and M. S. Palanisamy, Tata McGraw Hill publications (India) Pvt, Ltd.
2. "Basic Civil Engineering", S.S. Bhavikatti, New Age International Publishers.
3. "Engineering Materials", Dr. S.C. Rangwala, Charotor Publishing House.
4. "Highway Engineering", S. K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications.
5. "Irrigation Engineering and Hydraulic Structures", Santosh Kumar Garg, Khanna Publishers, Delhi.
6. "Building Construction", Dr. B. C. Punmia, Lakshmi Publications, Delhi.

For Basic Mechanical Engineering:

1. "Internal Combustion Engines", V. Ganesan, Tata McGraw Hill publications (India) Pvt.

Ltd.

2. "A Tear book of Theory of Machines", S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. "An introduction to Mechanical Engineering", Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:
For Basic Civil Engineering:
1. "Surveying, Vol- I and Vol-II", S.K. Duggal, Tata McGraw Hill Publishers.
2. "Hydrology and Water Resources Engineering", Santosh Kumar Garg, Khanna Publishers, Delhi.

For Basic Mechanical Engineering:
1. "Robotics", Appuu Kuttan K K, I. K. International Publishing House Pvt. Ltd. Volume-I
2. "3D printing & Additive Manufacturing Technology", L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. "Thermal Engineering", Mahesh M Rathore, Tata McGraw Hill publications (India) Pvt. Ltd.
4. "Basic Civil and Mechanical Engineering", G. Shanmugam and M. S, Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.

Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.

Course Code	NETWORK ANALYSIS		L	T	P	C
23A04401A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
➢ To impart knowledge on applying appropriate theorem for electrical circuit analysis
➢ To explain transient behavior of circuits in time and frequency domains
➢ To teach concepts of resonance
➢ To introduce open circuit, short circuit, transmission, hybrid parameters and their relationship.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basic electrical circuits with nodal and mesh analysis.**(K2)**

CO2: Analyze the circuit using network simplification theorems. **(K4)**

CO3: Find Transient response and Steady state response of a network. **(K3)**

CO4: Analyze electrical networks in the Laplace domain. **(K4)**

CO5: Compute the parameters of a two-port network. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	2	-	-	-	-	2	-	3	2
CO2	3	2	2	2	-	2	-	-	-	-	2	-	3	2
CO3	3	2	3	2	-	2	-	-	-	-	2	-	3	2
CO4	3	2	2	3	-	2	-	-	-	-	2	-	3	2
CO5	3	3	2	2	-	2	-	-	-	-	2	-	3	2

UNIT – I (9 Hrs)

Types of circuit components, types of sources and source transformations, mesh analysis and nodal analysis, problem solving with resistances only including dependent sources also. Principle of duality with examples

Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegen's - problem solving using dependent sources also.

Learning Outcomes: At the end of this unit, students should be able to

● Know about voltage source to current source and vice-versa transformation (L2)
● Understand about loop current method (L2)
● Understand about nodal analysis methods (L2)
● Analyze the applications of certain theorems to DC circuit analysis (L3)

UNIT – II (9 Hrs)

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem-solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots.

Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, Heaviside's expansions, problem solving using Laplace transform.

Learning Outcomes: At the end of this unit, students should be able to

- Distinguish between classical method and Laplace transform approach in analyzing transient phenomenon in DC excitations (L3)
- Distinguish between classical method and Laplace transform approach in analyzing transient phenomenon in sinusoidal excitations (L4)

UNIT – III (9 Hrs)

Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-LC circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving using Laplace transforms also.

Learning Outcomes: At the end of this unit, students should be able to

- Understand fundamental definitions of 1-ϕ AC circuits (L2)
- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-ϕ AC circuits with basic elements R, L, and C. (L2)
- Understand the basic definitions of complex impedance and complex power (L2)

UNIT – IV (9 Hrs)

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in both branches, anti-resonance at all frequencies.

Coupled Circuits: Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.

Learning Outcomes: At the end of this unit, students should be able to

- Learn about occurrence of resonance with the presence of electrical circuit elements under certain operating conditions(L2)
- Understand Faraday's laws (L2)
- Analyze the analysis of series and parallel magnetic circuits (L2)

- Distinguish analogy between electric and magnetic circuits (L2)

UNIT – V (9 Hrs)

Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using dependent sources also. Image and iterative impedances. Image and iterative transfer constants. Insertion loss. Attenuators and pads. Lattice network and its parameters. Impedance matching networks.

Learning Outcomes: At the end of this unit, students should be able to
- Understand and estimate the network parameters of T & π configurations of DC circuits or resistive elements (L2)
- Distinguish between impedance and admittance parameters (L3)
- Distinguish between hybrid and transmission parameters (L3)
- Analyze the conversion process of all parameters (L4)

TEXTBOOKS:
1. "Network Analysis", ME Van Valkenberg, Prentice Hall of India, Revised 3rd Edition, 2019.
2. "Engineering Circuit Analysis", William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition, 2020.
3. "Network lines and Fields", John. D. Ryder, 2nd Edition, PHI

REFERENCE BOOKS:
1. "Networks and Systems", D. Roy Choudhury, New Age International Publications, 2013.
2. "Electric Circuits, Schaum's Outline Series", Joseph Edminister and Mahmood Nahvi, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017
3. "Fundamentals of Electric Circuits", Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill Education.

Course Code	ENGINEERING PHYSICS LAB		L	T	P	C
23A11106A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors.

➢ To study the parameters and applications of dielectric and magnetic materials by conducting experiments

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Operate optical Instruments like travelling microscope and spectrometer. **(K2)**

CO2: Estimate the wavelengths of different colours using diffraction grating. **(K2)**

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance **(K3)**

CO4: Calculate the band gap of a given semiconductor. **(K3)**

CO5: Evaluate the acceptance angle and numerical aperture of an optical fiber. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determine the thickness of the wire using wedge shape method.
20. Determine the numerical aperture and acceptance angle of a given optical fiber.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCE BOOKS:
1. "A Textbook of Practical Physics", S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017.

ONLINE LEARNING RESOURCES:
1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Course Code	CHEMISTRY LAB		L	T	P	C
23A11107A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:
➢ To get familiar with the basic concepts of Chemistry.
➢ To verify the fundamental concepts with experiments.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Distinguish different types of titrations in the volumetric analysis **(K3)**

CO2: Determine the cell constant and conductance of solutions **(K3)**

CO3: Calculate the strength of an acid present in secondary batteries **(K3)**

CO4: Analyze the effect of absorbance of given sample solution on concentration by using colorimetry **(K3)**

CO5: Prepare advanced polymer Bakelite materials **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

LIST OF EXPERIMENTS:
1. Determination of Strength of an acid in Lead-Acid battery
2. Estimation of Ferrous Iron by Dichrometry
3. Potentiometry –Determination of Ferrous Iron using Standard $K_2Cr_2O_7$ solution.
4. Conductometry-Determinationofcellconstantandconductanceofsolutions.
5. Conductometric titration of strong acid vs strong base
6. Conductometric titration of weak acid vs strong base
7. P^H-metric titration of a) strong acid vs strong base b) weak acid vs strong base.
8. Verification of the Beer-Lambert's law and determination of strength of the given sample solution.
9. Determination of CFSE (10Dq) by Spectrophotometric method.
10. Preparation of Bakelite
11. Preparation of Nanomaterials by Precipitation method

12. Determination of the R_f - value of given sample by Thin Layer Chromatography (TLC).

TEXTBOOKS:

1. "A Text Book on Experiments and Calculations in Engineering Chemistry", S. Chand Publications, 9th Edition, 2003.
2. "Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2014.
3. "Experiments in Applied Chemistry", Dr. Sunita Rattan, S. K. Kataria & Sons Publishers of Engineering, 2nd Edition, 2004.

REFERENCE BOOKS:

1. Vogel's Text Book of Quantitative Chemical Analysis", Mendham Jet.al, Pearson Education, 6th Edition, 2012.

Course Code	NETWORK ANALYSIS AND SIMULATION	L	T	P	C
23A04402A	LABORATORY	0	0	3	1.5
Pre-requisite	NIL	Semester		II	

COURSE OBJECTIVES:

➢ To gain hands on experience in verifying Kirchhoff's laws and network theorems
➢ To analyze transient behavior of circuits
➢ To study resonance characteristics
➢ To determine 2-port network parameters

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Verify Kirchhoff's laws and network theorems. **(K3)**

CO2: Measure time constants of RL & RC circuits. **(K3)**

CO3: Analyze behavior of RLC circuit for different cases. **(K4)**

CO4: Design resonant circuit for given specifications. **(K5)**

CO5: Characterize and model the network in terms of all network parameters. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	2	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	2	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	2	3	2
CO4	3	2	2	3	2	2	-	-	-	-	2	2	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	2	3	2

LIST OF EXPERIMENTS:

1. Study of components of a circuit and Verification of KCL and KVL.
2. Verification of mesh and nodal analysis for AC circuits
3. Verification of Superposition, Thevenin's & Norton theorems for AC circuits
4. Verification of maximum power transfer theorem for AC circuits
5. Verification of Tellegen's theorem for two networks of the same topology.
6. Study of DC transients in RL, RC and RLC circuits
7. To study frequency response of various 1_{st} order RL & RC networks
8. To study the transient and steady state response of a 2_{nd} order circuit by varying its various parameters and studying their effects on responses
9. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
10. Determination of open circuit (Z) and short circuit (Y) parameters
11. Determination of hybrid (H) and transmission (ABCD) parameters

12. To measure two port parameters of a twin-T network and study its frequency response.

Hardware Requirements:

Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components

Software Requirements:

Multisim/Pspice/Equivalent simulation software tool, Computer Systems with required specifications

Note: The experiments need to be simulated using software and the same need to be verified using the hardware.

REFERENCE BOOKS:

1. "Network Analysis", M. E. Van Valkenburg, Pearson Education, 2019, Revised 3rd Edition.
2. "Engineering Circuits Analysis", William Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition, 2020

Course Code	ENGINEERING WORKSHOP		L	T	P	C
23A05303A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

> ➢ To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities. **(K3)**

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, welding and plumbing. **(K3)**

CO3: Apply fitting operations in various applications. **(K3)**

CO4: Apply basic electrical engineering knowledge for House Wiring Practice **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO2	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO3	3	2	2	-	3	-	1	-	2	1	-	3	2	2
CO4	3	2	2	-	3	-	1	-	2	1	-	3	2	2

LIST OF EXPERIMENTS:

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   - a) Half – Lap joint
   - b) Mortise and Tenon joint
   - c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   - a) Tapered tray
   - b) Conical funnel
   - c) Elbow pipe
   - d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   - a) V-fit

b) Dovetail fit
c) Semi-circular fit
d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
    a) Parallel and series
    b) Two-way switch
    c) Godown lighting
    d) Tube light
    e) Three phase motor
    f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:
1. "Basic Workshop Technology: Manufacturing Process", Felix W.; Independently Published, 2019.
2. "Workshop Processes, Practices and Materials", Bruce J. Black, Routledge Publishers, 5th Edition, 2015.
3. "A Course in Workshop Technology Vol I. & II", B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCE BOOKS:
1. "Elements of Workshop Technology - Vol. I", S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th Edition
2. "Workshop Practice", H. S. Bawa, Tata-McGraw Hill, 2004.
3. "Wiring Estimating, Costing and Contracting", P.M. Soni & P.A. Upadhyay, Atul Prakashan, 2021-22.

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to all branches)		L	T	P	C
23A11110A			**0**	**0**	**1**	**0.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

- ➢ To impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of discipline, character and service motto. **(K2)**

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. **(K3)**

CO3: Explore human relationships by analyzing social problems. **(K4)**

CO4: Determine to extend their help for the fellow beings and downtrodden people. **(K3)**

CO5: Develop leadership skills and civic responsibilities. **(K5)**

UNIT – I

Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II

Nature & Care

Activities:

- Best out of waste competition.
- Poster and signs making competition to spread environmental awareness.
- Recycling and environmental pollution article writing competition.
- Organising Zero-waste day.
- Digital Environmental awareness activity via various social media platforms.
- Virtual demonstration of different eco-friendly approaches for sustainable living.
- Write a summary on any book related to environmental issues.

UNIT – III
Community Service
Activities:

- Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media, authorities, experts, etc.
- Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- Conducting consumer Awareness. Explaining various legal provisions etc.
- Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. "A Text Book of National Service Scheme Vol – I", Nirmalya Kumar Sinha & Surajit Majumder, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. "Red Book - National Cadet Corps – Standing Instructions Vol I & II", Directorate General of NCC, Ministry of Defence, New Delhi.
3. "Introduction to Environmental Engineering", M. L. Davis and D. A. Cornwell, McGraw Hill, New York, 4th Edition, 2008.
4. "Introduction to Environmental Engineering and Science", G. M. Masters, K. Joseph and R. Nagendran, Pearson Education, New Delhi, 2nd Edition, 2007.
5. "Social Problems in India", Ram Ahuja, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

COMPUTER SCIENCE AND ENGINEERING
(For the batches admitted from the academic year 2023-24)

Vision

- To be a recognized Centre in the field of Computer Science and Engineering by imparting quality education and also equipping the students with latest technologies, soft skills and ethical values to face the challenges in industry & society.

Mission

- To provide quality education by imparting state of the art facility in Computer Science and Engineering.
- Enrich the students with innovative and problem-solving skills by establishing continuous Industry Institute interaction.
- To prepare the learners possessing social commitment and ethical values to face the dynamic challenges of industry and society.

Institutional Objectives

- To create a conducive and competitive environment for students through curricular and extra-curricular activities.
- Promote the culture of research among the faculty.
- To promote synergetic alliances with premier Institutions, Industry, CSIR laboratories and various Government organizations for Collaborative Research Projects.
- To promote economic and social enrichment of the society through Skill Development programmes, Entrepreneurship and extension activities.
- To introduce demand-driven new UG&PG academic programmes.
- To ensure a high degree of quality in terms of providing infrastructure, research ambience, faculty and staff development.

Core Values

- *Thirst for Quality Education:* The stake holders of the institute particularly management, employees and students of the institution have a consistent thirst for quality improvement of the processes and services in the institution.
- *Lifelong Learning:* In the fast-changing technological world, acquiring a special skill at one point of time will not be enough for ever long survival. Hence to flourish in the work place and to bring in innovations in the ways of doing, employee, student as well as alumni must be continuous learners and tech savvy.

- *Diversity and Participation:* PBRVITS promotes the involvement of faculty, staff and students from all social, economic, ethnics, cultural and religious backgrounds to get the synergy of combining the diversified agents. The focus is on involving students to exhibit their talent in various curricular and co-curricular activities and strengthening alumni link to share their experiences to the students.
- *Academic Integrity and Accountability:* Management induces accountability in the employees for the career of the students and the academic leadership establishes a mentoring mechanism for realization of responsibilities of students towards their parents and in turn to the society.

COMPUTER SCIENCE AND ENGINEERING

(For the batches admitted from the academic year 2023-24)

S. No	INDUCTION PROGRAM (3 weeks duration)
	Course Name
1	Physical Activities – Sports, Yoga and Meditation, Plantation
2	Career Counselling
3	Orientation to all branches – career options, tools, etc.
4	Orientation on admitted Branch – corresponding labs, tools and platforms
5	Proficiency Modules and Productivity Tools
6	Assessment on basic aptitude and mathematical skills
7	Remedial training in Foundation Courses
8	Human Values and Professional Ethics
9	Communication Skills – Focus on Listening, Speaking, Reading, Writing Skills
10	Concepts of Programming

Semester I (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11101A	Linear Algebra & Calculus	3	0	0	3	30	70	100
2	BS	23A11103A	Engineering Physics	3	0	0	3	30	70	100
3	BS	23A11104A	Chemistry	3	0	0	3	30	70	100
4	ES	23A01301A	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
5	ES	23A05301A	Introduction to Programming	3	0	0	3	30	70	100
6	BS	23A11105A	Engineering Physics Lab	0	0	2	1	30	70	100
7	BS	23A11106A	Chemistry Lab	0	0	2	1	30	70	100
8	ES	23A05302A	Computer Programming Lab	0	0	3	1.5	30	70	100
9	ES	23A05303A	Engineering Workshop	0	0	3	1.5	30	70	100
10	BS	23A11110A	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	-	-	100
Total							**20.5**			**1000**

Semester II (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11102A	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
2	HSMC	23A11201A	Communicative English	2	0	0	2	30	70	100
3	ES	23A03301A	Engineering Graphics	1	0	4	3	30	70	100
4	ES	23A02301A	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
5	PC	23A05401A	Data Structures	3	0	0	3	30	70	100
6	HSMC	23A11202A	Communicative English Lab	0	0	2	1	30	70	100
7	ES	23A02302A	Electrical & Electronics Engineering Workshop	0	0	3	1.5	30	70	100
8	PC	23A05402A	Data Structures Lab	0	0	3	1.5	30	70	100
9	ES	23A05304A	IT Workshop	0	0	2	1	30	70	100
10	BS	23A11109A	Health and Wellness, Yoga and Sports	-	-	1	0.5	-	-	100
Total							**19.5**			**1000**

Course Code	**LINEAR ALGEBRA & CALCULUS**		**L**	**T**	**P**	**C**
23A11101A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:
> ➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. **(K3)**

CO2: Demonstrate the ability to compute eigen values and eigen vectors for square matrices using methods such as characteristic polynomials, determinants, and numerical techniques. **(K3)**

CO3: Utilize mean value theorems to real life problems. **(K3)**

CO4: Familiarize with functions of several variables which are useful in optimization. **(K3)**

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	1	-

UNIT – I (9 Hrs)
Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Learning Outcomes: At the end of this unit, students should be able to

- Solve systems of linear equations, using technology to facilitate row reduction and determine the rank (L3).
- Demonstrate an understanding of how to translate a system of simultaneous linear equations into a matrix (L2)
- Solve systems of linear equations using various methods including Gauss elimination

method and Gauss Seidel Iteration Methods (L3)

UNIT – II (9 Hrs)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors 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 forms by Orthogonal Transformation.

Learning Outcomes: At the end of this unit, students should be able to
- Demonstrate the process of finding eigenvalues and eigenvalues for square matrices. (L2)
- Describe the process of diagonalizing a matrix and its significance. (L3)
- Apply the Cayley-Hamilton Theorem to find powers of a matrix and compute the inverse of a matrix. (L3)
- Apply knowledge of the nature of a quadratic form to analyse and solve optimization process. (L3)
- Explain the process of using orthogonal transformations to reduce a quadratic form to its canonical form. (L5)

UNIT – III (9 Hrs)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Learning Outcomes: At the end of this unit, students should be able to
- Analyze the behaviour of functions by using mean value theorems (L4)
- Translate the given function as series of Taylor's and Maclaurin's with remainders (L2)

UNIT – IV (9 Hrs)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes: At the end of this unit, students should be able to
- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L4)
- Acquire the Knowledge maxima and minima of functions of several variable (L3)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT – V (9 Hrs)

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Learning Outcomes: At the end of this unit, students should be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L3)
- Evaluate triple integrals in Cartesian, cylindrical and spherical polar coordinates. (L5)
- Apply triple integration techniques in evaluating volumes. (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", Michael Greenberg, Pearson publishers, 9th Edition
5. "Higher Engineering Mathematics", H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, 3rd Edition (Reprint 2021)

Course Code	ENGINEERING PHYSICS		L	T	P	C
23A11103A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To identify the importance of the physical optics i.e., interference, diffraction and polarization related to its engineering applications

➢ To present the basic concepts needed to understand the crystal structure of materials, X-ray diffraction

➢ To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices

➢ To enlighten the concepts of Quantum mechanics and to provide fundamentals of the de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory.

➢ Evolution of band theory to distinguish materials and explain the properties of semiconductors

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the intensity variation of light due to interference, diffraction & polarization. **(K3)**

CO2: Familiarize with the basics of crystals and their structures**. (K2)**

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials. **(K3)**

CO4: Explain the basic concepts of quantum mechanics and the band theory of solids. **(K2)**

CO5: Identify the type of semiconductor using Hall effect **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Wave Optics:

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double

refraction - Nicol's Prism -Half wave and Quarter wave plates.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify scientific & engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary light and polarized light (L2)

UNIT – II (9 Hrs)
Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

Learning Outcomes: At the end of this unit, students should be able to

- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by using Laue method & powder method (L4)

UNIT – III (9 Hrs)
Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius- Mosotti relation indielectrics (L2)
- Classify magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)

UNIT – IV (9 Hrs)

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concepts of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Understand the concept of density of states (L2)

UNIT – V (8 Hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and applications.

Learning Outcomes: At the end of this unit, students should be able to

- Classify the energy bands of semiconductors (L2)
- Understand the differences between intrinsic and extrinsic semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)

TEXTBOOKS:

1. "A Text book of Engineering Physics", M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition, 2019.
2. "Engineering Physics", D. K. Bhattacharya and Poonam Tandon, Oxford press, 2015

REFERENCE BOOKS:

1. "Engineering Physics", B. K. Pandey and S. Chaturvedi, Cengage Learning, 2021.
2. "Engineering Physics", Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. "Engineering Physics", Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010
4. "Engineering Physics", M. R. Srinivasan, New Age international publishers, 2009

ONLINE LEARNING RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Course Code	CHEMISTRY	L	T	P	C
23A11104A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)	**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		I	

COURSE OBJECTIVES:

- ➢ To familiarize chemistry and applications.
- ➢ To train the students on the principles and applications of electro chemistry and polymers.
- ➢ To introduce instrumental methods and applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the salient features of different theories along with their applications. **(K2)**

CO2: Discuss about the model engineering materials. **(K3)**

CO3: Apply the knowledge of various electrodes for the development of new batteries. **(K3)**

CO4: Identify the different polymers and their uses in various fields of engineering. **(K3)**

CO5: Analyze the knowledge of different analytical techniques used engineering and also development of new techniques. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Structure and Bonding Models: Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo - and hetero nuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes: At the end of this unit, students should be able to

- Illustrate the molecular orbital energy level diagram of different molecular species (L2)
- Discuss the basic concept of molecular orbital theory (L3)
- Explain the calculation of bond order of O_2 and CO molecules (L2)

UNIT – II (9 Hrs)

Modern Engineering Materials: Semiconductors: Introduction, basic concept, applications

Super conductor: Introduction, basic concept, applications.

Super capacitors: Introduction, Basic Concept, Classification, Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphine nanoparticles.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the band theory of solids for conductors, semiconductors and insulators (L2)
- Demonstrate the application of Fullerenes, Carbon nanotubes and Graphene nanoparticles (L2)

UNIT – III (9 Hrs)

Electro Chemistry and Applications: Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors: Potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc- air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell – working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Learning Outcomes: At the end of this unit, students should be able to

- Apply the Nernst equation for calculating electrode and cell potentials(L3)
- Differentiate between potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)

UNIT – IV (9 Hrs)

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Bakelite, Nylon-6,6, Carbon fibers.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – Polyacetylene, polyaniline, – mechanism of conduction and applicatio Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

Learning Outcomes: At the end of this unit, students should be able to

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylons (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N and their applications (L2)

UNIT – V (8 Hrs)

Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic principle, Classification- HPLC: Principle, Instrumentation and Applications.

Learning Outcomes: At the end of this unit, students should be able to
- Explain the different types of spectral series in electromagnetic spectrum (L2)
- Understand the principles and applications of different analytical instruments (L2)

TEXTBOOKS:
1. "Engineering Chemistry", Jain and Jain, Dhanpat Rai publications, 17th Edition, 2018
2. "Atkins' Physical Chemistry", Peter Atkins, Julio de Paula and James Keeler, Oxford University Press, 10th Edition, 2010
3. "Concise Inorganic Chemistry", J. D. Lee, Wiley Publications, 5th Edition, Feb 2008

REFERENCE BOOKS:
1. "Principles of Instrumental Analysis", Skoog and West, 6th Edition, Thomson, 2007.
2. "Textbook of Polymer Science", Fred W. Billmayer Jr, 3rd Edition

Course Code	BASIC CIVIL AND MECHANICAL ENGINEERING (Common to all branches)		L	T	P	C
23A01301A			3	0	0	3
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To get familiarized with scope and importance of Civil and Mechanical Engineering in different sectors and industries.
➢ To introduce the preliminary concepts of Building Planning, Construction, Materials and related tests.
➢ To acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.
➢ To explain different engineering materials and manufacturing processes.
➢ To provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand various sub-divisions of Civil Engineering and appreciate their role in ensuring better society. **(K2)**

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. **(K3)**

CO3: Realize the importance of Transportation in nation's economy and engineering measures related to highways in terms of geometrics. **(K3)**

CO4: Understand the importance of water resources and storage structures so that social responsibilities of water conservation will be appreciated.**(K1)**

CO5: Understand the different manufacturing processes and explain the basics of thermal engineering and its applications. **(K2)**

CO6: Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	3	-	-	-	-	-	-	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT – I (8 Hrs)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel / Theatre.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the role of civil Engineers in the society and Various Disciplines of Civil Engineering. (L2)
- Develop typical layouts for different residential commercial and Industrial buildings. (L3)

UNIT – II (7 Hrs)

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements-Angular Measurements- Leveling instruments used for leveling- Introduction to Bearings Simple problems on leveling and bearings-Contour mapping.

Learning Outcomes: At the end of this unit, students should be able to

- Describe objectives of surveying and Horizontal and vertical measurements (L2)
- Measure Horizontal and vertical angles using surveying Instruments (L3)

UNIT – III (8 Hrs)

Transportation Engineering, Water Resources and Environmental Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water - Specifications and Tests- Introduction to Hydrology- Hydrograph -Rain water Harvesting - Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

Learning Outcomes: At the end of this unit, students should be able to

- Explain various types of pavements, their differences and basics of design (L2)
- Examine the quality of different sources of water and its storage (L3)

PART B: BASIC MECHANICAL ENGINEERING

UNIT – I (7 Hrs)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace,

and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.
Learning Outcomes: At the end of this unit, students should be able to
- Know the importance of machine and utilization in different fields. (L1)
- Know different kinds of materials and its classification. (L1)

UNIT – II (8 Hrs)

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering - working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.
Learning Outcomes: At the end of this unit, students should be able to
- Know different production technologies used in industries. (L1)
- Know working principles and elements of automobiles. (L2)

UNIT – III (7 Hrs)

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.
Learning Outcomes: At the end of this unit, students should be able to
- Know working principles and elements used for power generation. (L1)
- Understand the concepts of various power transmission systems. (L2)
- Learn the robotics basic terminology and its usage in different sectors. (L1)

TEXTBOOKS:
For Basic Civil Engineering:
1. "Basic Civil and the Mechanical Engineering", G. Shanmugam and M. S. Palanisamy, Tata McGraw Hill publications (India) Pvt, Ltd.
2. "Basic Civil Engineering", S.S. Bhavikatti, New Age International Publishers.
3. "Engineering Materials", Dr. S.C. Rangwala, Charotor Publishing House.
4. "Highway Engineering", S. K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications.
5. "Irrigation Engineering and Hydraulic Structures", Santosh Kumar Garg, Khanna Publishers, Delhi.
6. "Building Construction", Dr. B. C. Punmia, Lakshmi Publications, Delhi.

For Basic Mechanical Engineering:
1. "Internal Combustion Engines", V. Ganesan, Tata McGraw Hill publications (India) Pvt.

Ltd.

2. "A Tear book of Theory of Machines", S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.

3. "An introduction to Mechanical Engineering", Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:
For Basic Civil Engineering:
1. "Surveying, Vol- I and Vol-II", S.K. Duggal, Tata McGraw Hill Publishers.
2. "Hydrology and Water Resources Engineering", Santosh Kumar Garg, Khanna Publishers, Delhi.

For Basic Mechanical Engineering:
1. "Robotics", Appuu Kuttan K K, I. K. International Publishing House Pvt. Ltd. Volume-I
2. "3D printing & Additive Manufacturing Technology", L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. "Thermal Engineering", Mahesh M Rathore, Tata McGraw Hill publications (India) Pvt. Ltd.
4. "Basic Civil and Mechanical Engineering", G. Shanmugam and M. S, Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.

Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.

Course Code	INTRODUCTION TO PROGRAMMING		L	T	P	C
23A05301A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➤ To introduce students to the fundamentals of computer programming.

➤ To provide hands-on experience with coding and debugging.

➤ To foster logical thinking and problem-solving skills using programming.

➤ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.

➤ To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. **(K2)**

CO2: Analyse a problem and develop an algorithm to solve it. **(K4)**

CO3: Implement various algorithms using the C programming language. **(K3)**

CO4: Understand more advanced features of C language. **(K2)**

CO5: Develop problem-solving skills and the ability to debug and optimize the code. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-	-	2
CO5	1	2	3	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Learning Outcomes: At the end of this unit, students should be able to

● Translate algorithms into programs. (L4)

● Solve complex problems using language independent notations. (L3)

- Use C basic concepts to write simple C programs. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Analyze the algorithms for time and space complexities. (L4)

UNIT – II (9 Hrs)

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

Learning Outcomes: At the end of this unit, students should be able to
- Implement conditional branching and iteration statements. (L2)
- Select the control structures for solving the problem statements (L4)
- Use iterative statements for writing C programs. (L3)

UNIT – III (8 Hrs)

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Learning Outcomes: At the end of this unit, students should be able to
- Use arrays to process multiple homogeneous data. (L3)
- Solve mathematical problems using C programming language. (L3)
- Apply string-handling functions. (L3)

UNIT – IV (9 Hrs)

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Learning Outcomes: At the end of this unit, students should be able to
- Structure the individual data elements to simplify the solution. (L6)
- Facilitate efficient memory utilization. (L6)
- Use pointers and structures to formulate algorithm and write programs. (L3)
- Understand the basic differences between structure and union. (L2)

UNIT – V (9 Hrs)

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling.

Learning Outcomes: At the end of this unit, students should be able to
- Understand basic terminology of modular programming. (L2)
- Writing structured programs using C Functions. (L5)
- Apply modular approach for solving the problem statements. (L3)
- Writing C programs using various storage classes to control variable access. (L5)

- Apply input and output statements to process the data in various formats. (L3)

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:
1. "Computing fundamentals and C Programming", E. Balagurusamy, McGraw-Hill Education, 2008.
2. "Programming in C", Rema Theraja, Oxford, 2016, 2nd Edition.
3. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

ONLINE LEARNING RESOURCES:
1. www.learn-c.org
2. www.programmeiz.com
3. www.github.com

Course Code	ENGINEERING PHYSICS LAB		L	T	P	C
23A11106A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors.

➢ To study the parameters and applications of dielectric and magnetic materials by conducting experiments

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Operate optical Instruments like travelling microscope and spectrometer. **(K2)**

CO2: Estimate the wavelengths of different colours using diffraction grating. **(K2)**

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance **(K3)**

CO4: Calculate the band gap of a given semiconductor. **(K3)**

CO5: Evaluate the acceptance angle and numerical aperture of an optical fiber. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determine the thickness of the wire using wedge shape method.
20. Determine the numerical aperture and acceptance angle of a given optical fiber.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCE BOOKS:
1. "A Textbook of Practical Physics", S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017.

ONLINE LEARNING RESOURCES:
1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Course Code	CHEMISTRY LAB		L	T	P	C
23A11107A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)		0	0	2	1
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To get familiar with the basic concepts of Chemistry.

➢ To verify the fundamental concepts with experiments.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Distinguish different types of titrations in the volumetric analysis **(K3)**

CO2: Determine the cell constant and conductance of solutions **(K3)**

CO3: Calculate the strength of an acid present in secondary batteries **(K3)**

CO4: Analyze the effect of absorbance of given sample solution on concentration by using colorimetry **(K3)**

CO5: Prepare advanced polymer Bakelite materials **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of Strength of an acid in Lead-Acid battery

2. Estimation of Ferrous Iron by Dichrometry

3. Potentiometry –Determination of Ferrous Iron using Standard $K_2Cr_2O_7$ solution.

4. Conductometry-Determinationofcellconstantandconductanceofsolutions.

5. Conductometric titration of strong acid vs strong base

6. Conductometric titration of weak acid vs strong base

7. P^H-metric titration of a) strong acid vs strong base b) weak acid vs strong base.

8. Verification of the Beer-Lambert's law and determination of strength of the given sample solution.

9. Determination of CFSE (10Dq) by Spectrophotometric method.

10. Preparation of Bakelite

11. Preparation of Nanomaterials by Precipitation method

12. Determination of the R_f - value of given sample by Thin Layer Chromatography (TLC).

TEXTBOOKS:

1. "A Text Book on Experiments and Calculations in Engineering Chemistry", S. Chand Publications, 9th Edition, 2003.
2. "Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2014.
3. "Experiments in Applied Chemistry", Dr. Sunita Rattan, S. K. Kataria & Sons Publishers of Engineering, 2nd Edition, 2004.

REFERENCE BOOKS:

1. Vogel's Text Book of Quantitative Chemical Analysis", Mendham Jet.al, Pearson Education, 6th Edition, 2012.

Course Code	COMPUTER PROGRAMMING LAB		L	T	P	C
23A05302A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

> ➢ The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. **(K2)**

CO2: Select the right control structure for solving the problem. **(K1)**

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. **(K3)**

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. **(K3)**

CO5: Develop C programs to handle File handling operations. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

UNIT – I

Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab 1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 2: Converting algorithms/flow charts into C Source code. Developing the algorithms/ flowcharts for the following sample programs

    i) Sum and average of 3 numbers

    ii) Conversion of Fahrenheit to Celsius and vice versa

    iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions.

Lab 3: Simple computational problems using arithmetic expressions

    i) Finding the square root of a given number

    ii) Finding compound interest

    iii) Area of a triangle using heron's formulae

    iv) Distance travelled by an object

UNIT – II
Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity.

Lab 4: Simple computational problems using the operator' precedence and associativity

    i) Evaluate the following expressions

        a. A+B*C+(D*E) + F*G

        b. A/B*C-B+A*D/3

        c. A+++B---A

        d. J= (i++) + (++i)

    ii) Find the maximum of three numbers using conditional operator

    iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5:   Branching and logical expressions.

Lab 5:   Problems involving if-then-else structures

    i) Write a C program to find the max and min of four numbers using if-else.

    ii) Write a C program to generate electricity bill.

    iii) Find the roots of the quadratic equation.

    iv) Write a C program to simulate a calculator using switch case.

    v) Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use

Suggested Experiments/Activities:

Tutorial 6:   Loops, while and for loops.

Lab 6:   Iterative problems e.g., the sum of series

    i) Find the factorial of given number using any loop.

    ii) Find the given number is a prime or not.

    iii) Compute sine and cos series

    iv) Checking a number palindrome

    v) Construct a pyramid of numbers

UNIT – III
Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1-D Arrays: searching.

Lab 7: 1-D Array manipulation, linear search

    i) Find the min and max of a 1-D integer array.

    ii) Perform linear search on1D array.

    iii) The reverse of a 1D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will

reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

    i) Addition of two matrices

    ii) Multiplication two matrices

    iii) Sort array elements using bubble sort

    iv) Concatenate two strings without built-in functions

    v) Reverse a string using built-in and without built-in string functions

UNIT – IV

Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereference

    i) Write a C program to find the sum of a 1D array using malloc()

    ii) Write a C program to find the total, average of n students using structures

    iii) Enter n students data using calloc() and display failed students list

    iv) Read student name and marks from the command line and display the student details along with the total.

    v) Write a C program to implement realloc()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists.

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

    i) Create and display a singly linked list using self-referential structure.

    ii) Demonstrate the differences between structures and unions using a C program.

    iii) Write a C program to shift/rotate using bitfields.

    iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT – V
Week 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.
   i) Write a C function to calculate NCR value.
   ii) Write a C function to find the length of a string.
   iii) Write a C function to transpose of a matrix.
   iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:
Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls.

Lab 12: Recursive functions
   i) Write a recursive function to generate Fibonacci series.
   ii) Write a recursive function to find the lcm of two numbers.
   iii) Write a recursive function to find the factorial of a number.
   iv) Write a C Program to implement Ackermann function using recursion.
   v) Write a recursive function to find the sum of series.

Week 13:
Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.
   i) Write a C program to swap two numbers using call by reference.
   ii) Demonstrate Dangling pointer problem using a C program.
   iii) Write a C program to copy one string into another using pointer.
   iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling.

Lab 14: File operations

   i)   Write a C program to write and read text into a file.
   ii) Write a C program to write and read text into a binary file using fread() and fwrite()
   iii) Copy the contents of one file to another file.
   iv) Write a C program to merge two files into the third file using command-linearguments.
   v)   Find no. of lines, words and characters in a file
   vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

   1. "Programming in C: A practical approach", Ajay Mittal, Pearson
   2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:

   1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
   2. "C   Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

Course Code	ENGINEERING WORKSHOP		L	T	P	C
23A05303A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

> ➢ To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities. **(K3)**

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, welding and plumbing. **(K3)**

CO3: Apply fitting operations in various applications. **(K3)**

CO4: Apply basic electrical engineering knowledge for House Wiring Practice **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO2	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO3	3	2	2	-	3	-	1	-	2	1	-	3	2	2
CO4	3	2	2	-	3	-	1	-	2	1	-	3	2	2

LIST OF EXPERIMENTS:

1. **Demonstration**: Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray
   b) Conical funnel
   c) Elbow pipe
   d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit

b) Dovetail fit

c) Semi-circular fit

d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.

   a) Parallel and series

   b) Two-way switch

   c) Godown lighting

   d) Tube light

   e) Three phase motor

   f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:

1. "Basic Workshop Technology: Manufacturing Process", Felix W.; Independently Published, 2019.

2. "Workshop Processes, Practices and Materials", Bruce J. Black, Routledge Publishers, 5th Edition, 2015.

3. "A Course in Workshop Technology Vol I. & II", B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCE BOOKS:

1. "Elements of Workshop Technology - Vol. I", S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th Edition

2. "Workshop Practice", H. S. Bawa, Tata-McGraw Hill, 2004.

3. "Wiring Estimating, Costing and Contracting", P.M. Soni & P.A. Upadhyay, Atul Prakashan, 2021-22.

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to all branches)		L	T	P	C
23A11110A			0	0	1	0.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of discipline, character and service motto. **(K2)**

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. **(K3)**

CO3: Explore human relationships by analyzing social problems. **(K4)**

CO4: Determine to extend their help for the fellow beings and downtrodden people. **(K3)**

CO5: Develop leadership skills and civic responsibilities. **(K5)**

UNIT – I

Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II

Nature & Care

Activities:

- Best out of waste competition.
- Poster and signs making competition to spread environmental awareness.
- Recycling and environmental pollution article writing competition.
- Organising Zero-waste day.
- Digital Environmental awareness activity via various social media platforms.
- Virtual demonstration of different eco-friendly approaches for sustainable living.
- Write a summary on any book related to environmental issues.

UNIT – III
Community Service
Activities:

- Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media, authorities, experts, etc.
- Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- Conducting consumer Awareness. Explaining various legal provisions etc.
- Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. "A Text Book of National Service Scheme Vol – I", Nirmalya Kumar Sinha & Surajit Majumder, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. "Red Book - National Cadet Corps – Standing Instructions Vol I & II", Directorate General of NCC, Ministry of Defence, New Delhi.
3. "Introduction to Environmental Engineering", M. L. Davis and D. A. Cornwell, McGraw Hill, New York, 4th Edition, 2008.
4. "Introduction to Environmental Engineering and Science", G. M. Masters, K. Joseph and R. Nagendran, Pearson Education, New Delhi, 2nd Edition, 2007.
5. "Social Problems in India", Ram Ahuja, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS (Common to all branches)		L	T	P	C
23A11102A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To enlighten the learners in the concept of differential equations and multivariablecalculus.
- ➢ To furnish the learners with basic concepts and techniques at plus two level to lead theminto advanced level by handling various real-world applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Apply first order and first degree differential equations to model and solve problems in various scientific and engineering disciplines, including electrical circuits. **(K3)**

CO2: Solve the differential equations related to various engineering fields**. (K3)**

CO3: Identify solution methods for partial differential equations that model physical processes. **(K3)**

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. **(K2)**

CO5: Estimate the work done against a field, circulation and flux using vector calculus. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	-	-	-	-	-	-	2	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	1	-
CO5	2	3	2	2	-	-	-	-	-	-	-	1	1	-

UNIT – I (9 Hrs)
Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Learning Outcomes: At the end of this unit, students should be able to
- • Learn the effective mathematical tools for solutions of first order differential equations(L2)
- • Apply mathematical tools to model physical processes such as Newton's law of cooling, electrical circuits (L3).

UNIT – II (9 Hrs)
Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit

problems and Simple Harmonic motion.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L4)
- Formulate and solve the higher order differential equation by analyzing physical situations (L6)

UNIT – III (9 Hrs)

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Learning Outcomes: At the end of this unit, students should be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT – IV (9 Hrs)

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes: At the end of this unit, students should be able to

- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT – V (9 Hrs)

Vector integration: Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Learning Outcomes: At the end of this unit, students should be able to

- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th

Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. "Higher Engineering Mathematics", B. V. Ramana, McGraw Hill Education, 2017

Course Code	COMMUNICATIVE ENGLISH		L	T	P	C
23A11201A	(Common to all branches)		**2**	**0**	**0**	**2**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To facilitate effective Listening, Reading, Speaking and Writing skills among the students.
➢ To enhance their comprehending abilities, oral presentations, reporting useful information.
➢ To provide knowledge of grammatical structures and vocabulary.
➢ To make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues, and also from reading content. **(K2)**

CO2: Apply grammatical structures to formulate sentences and correct word forms. **(K3)**

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. **(K4)**

CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. **(K5)**

CO5: Create a coherent paragraph, essay, and resume. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	-	2	-	2	2	-	-	3	2	-	-	-
CO5	-	-	-	-	-	1	-	1	-	3	1	1	-	-

UNIT – I (9 Hrs)

Lesson : HUMAN VALUES: Gift of Magi (Short Story)

Listening	: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking	: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading	: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing	: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar	: Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary	: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Learning Outcomes: At the end of this unit, students should be able to
- Understand specific pieces of information through listening and reading. (L2)
- Demonstrate basic questioning and answering skills on general topics. (L2)
- Outline the main ideas and specific details from the given text.(L2)
- Apply grammatical knowledge to frame flawless sentences. (L3)
- Develop basic word knowledge. (L3)

UNIT – II (9 Hrs)
Lesson : NATURE: The Brook by Alfred Tennyson (Poem)

Listening	:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking	:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading	:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing	:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar	:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary	:	Homonyms, Homophones, Homographs.

Learning Outcomes: At the end of this unit, students should be able to
- Distinguish between main idea and supporting ideas through listening. (L4)
- Develop short structured talks. (L3)
- Identify the logical sequence of ideas in a given text. (L3)
- Organize ideas into a meaningful paragraph by using cohesive devices and also learn the right usage of articles and prepositions. (L3)
- Identify difference among homonyms, homophones and homographs.(L3)

UNIT – III (9 Hrs)
Lesson : BIOGRAPHY: Elon Musk

Listening	:	Listening for global comprehension and summarizing what is listened to.
Speaking	:	Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading	:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing	:	Summarizing, Note-making, paraphrasing
Grammar	:	Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary	:	Compound words, Collocations.

Learning Outcomes: At the end of this unit, students should be able to
- Summarize what is listened to. (L2)
- Discuss on specific topics and report what is discussed. (L6)

- Interpret specific clues and use different strategies to comprehend a text. (L5)
- Summarize and paraphrase a given text by using different methods of note-making. (L2)
- Make use of right form of the verbs, compound words and collocations. (L3)

UNIT – IV (9 Hrs)
Lesson : INSPIRATION: The Toys of Peace by Saki

Listening : Making predictions while listening to conversations/ transactional dialogues without video; listening with video

Speaking : Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading : Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/relationships, communicate processes or display complicated data.

Writing : Letter Writing: Official Letters, Resumes

Grammar : Reporting verbs, Direct & Indirect speech, Active & Passive Voice.

Vocabulary : Words often confused, Jargons.

Learning Outcomes: At the end of this unit, students should be able to
- Make Predictions while listening to video and audio texts. (L6)
- Construct a dialogue in academic contexts. (L3)
- Analyze the data from the given graphic elements and present it verbally. (L4)
- Build effective resumes and draft formal letters. (L6)
- Apply grammatical rules to transform sentences into different speech or voice. (L3)
- Identify correct word for the context and also jargons. (L3)

UNIT – V (9 Hrs)
Lesson : MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening : Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking : Formal oral presentations on topics from academic contexts.

Reading : Reading Comprehension.

Writing : Writing structured essays on specific topics.

Grammar : Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).

Vocabulary : Technical Jargons.

Learning Outcomes: At the end of this unit, students should be able to
- Interpret a given text and answer the questions. (L5)
- Present a topic of academic context. (L5)
- Interpret and comprehend a given text. (L5)
- Develop structured essays on specific topics. (L3)

- Identify common errors in grammar and usage.(L3)
- Make use of technical Jargons. (L3)

TEXTBOOKS:
1. "Pathfinder: Communicative English for Undergraduate Students", 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3)
2. "Empowering with Language", Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:
1. "English for Engineers", Dubey, Sham Ji & Co., Vikas Publishers, 2020
2. "Academic writing: A Handbook for International Students", Stephen Bailey, Routledge, 2014.
3. "English Grammar in Use", Raymond Murphy, 4th Edition, Cambridge University Press, 2019.
4. "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary", Norman Lewis, Anchor, 2014.

ONLINE LEARNING RESOURCES:
GRAMMAR:
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY:
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Code	ENGINEERING GRAPHICS		L	T	P	C
23A03301A	(Common to all branches)		**1**	**0**	**4**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing

➢ To impart knowledge on the projection of points, lines and plane surfaces

➢ To improve the visualization skills for better understanding of projection of solids

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. **(K2)**

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. **(K1)**

CO3: Understand and draw projection of solids in various positions in first quadrant. **(K2)**

CO4: Explain principles behind development of surfaces. **(K2)**

CO5: Prepare isometric and perspective sections of simple solids. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO2	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	3	-	-	-	-	2	-	2	2	2

UNIT – I (12 Hrs)

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Learning Outcomes: At the end of this unit, students should be able to

● Understand the significance of engineering drawing (L2)

- Know the conventions used in the engineering drawing (L1)
- Identify the curves obtained in different conic sections (L2)
- Draw different cycloidal and involute curves. (L1)
- Know about the scale conversion techniques (L1)

UNIT – II (12 Hrs)

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

Learning Outcomes: At the end of this unit, students should be able to
- Know how to draw the projections of points, lines (L1)
- Find the true length of the lines. (L2)
- Understand the procedure to draw projection of planes. (L2)
- Draw the projection of plane inclined to one plane and both the planes. (L1)

UNIT – III (18 Hrs)

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solid inclined to one plane. (L1)

UNIT – IV (15 Hrs)

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw sectional views and true shape of solids. (L2)
- Represent the surface development of simple solids. (L3)

UNIT – V (18 Hrs)

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

Learning Outcomes: At the end of this unit, students should be able to

- Learn the basics convectional representation of different projections (L1)
- Draw the Orthographic projection of simple solids. (L1)
- Draw the Isometric projection of simple solids. (L1)
- Understand the different commands used in Computerized drawing (L2)

TEXTBOOKS:

1. "Engineering Drawing", N. D. Bhatt, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. "Engineering Drawing", K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. "Engineering Drawing", M. B. Shah and B. C. Rana, Pearson Education Inc, 2009.
3. "Engineering Drawing with an Introduction to AutoCAD", Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Code	BASIC ELECTRICAL & ELECTRONICS	L	T	P	C
23A02301A	**ENGINEERING** (Common to all branches)	**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II		

COURSE OBJECTIVES:

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the problem solving concepts associated to AC and DC circuits. **(K2)**

CO2: Analyze the operating principles of motors, generators, MC and MI instruments. **(K4)**

CO3: Apply the mathematical tool for different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. **(K3)**

CO4: Explain the characteristics of diodes and transistors. **(K4)**

CO5: Familiarize with the number systems, codes, Boolean algebra and logic gates **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO2	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO3	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO4	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO5	3	3	1	-	1	3	2	-	-	-	-	1	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I (8 Hrs)
DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

Learning Outcomes: At the end of this unit, students should be able to

- Recall Kirchhoff's laws (L1) .
- Analyze simple electric circuits with DC excitation (L4)
- Understand fundamental definitions of 1-phase AC circuits (L2)

- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-phase elements R, L, and C. (L2)

UNIT – II (7 Hrs)
Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the principle and operation of DC Generator & Motor. (L2)
- Understand the operation of transformer and induction motor. (L2)
- Understand the construction of induction motor - DC motor (L2)
- Distinguish between MC and MI type of instruments (L3)

UNIT – III (7 Hrs)
Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and   demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the Conventional and Non-Conventional Energy Sources. (L2)
- Understand the Power Ratings of house hold appliances (L2)
- Knowing the energy consumption of different electrical appliances(L3)
- Calculating the electricity bill (L2).

PART B: BASIC ELECTRONICS ENGINEERING

UNIT – I (8 Hrs)

Semiconductor Devices: Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier

Learning Outcomes: At the end of this unit, students should be able to

- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

UNIT – II (7 Hrs)
Basic Electronic Circuits and Instrumentation
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.
Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.
Electronic Instrumentation: Block diagram of an electronic instrumentation system.
Learning Outcomes: At the end of this unit, students should be able to

- Understand the various Rectifiers and Power Supplies(L3)
- Analyze the behaviour of common emitter Amplifier with its frequency response (L3)

UNIT – III (7 Hrs)
Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).
Learning Outcomes: At the end of this unit, students should be able to

- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's Theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)

TEXTBOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Basic Electronics Engineering:
4. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson

Education, 2021.

5. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.

REFERENCE BOOKS:
For Basic Electrical Engineering:

1. "Basic Electrical Engineering", D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, 4th Edition

2. "Principles of Power Systems", V. K. Mehtha, S. Chand Technical Publishers, 202

3. "Basic Electrical Engineering", T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017

4. "Basic Electrical and Electronics Engineering", S. K. Bhattacharya, Pearson Publications, 2018, 2nd Edition.

For Basic Electronics Engineering:

1. "A Textbook of Electronic Devices and Circuits", R. S. Sedha, S. Chand & Co, 2010.

2. "Basic Electronics- Devices, Circuits and IT Fundamentals", Santiram Kal, Prentice Hall, India, 2002.

3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

ONLINE LEARNING RESOURCES:
For Basic Electrical Engineering:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Course Code	DATA STRUCTURES		L	T	P	C
23A05401A	(Common to CSE, CSE – AI, AIML, CSE – IOT)		**3**	**0**	**0**	**3**
Pre-requisite	Introduction to Programming	Semester			II	

COURSE OBJECTIVES:

➢ To provide the knowledge of basic data structures and their implementations.
➢ To understand importance of data structures in context of writing efficient programs.
➢ To develop skills to apply appropriate data structures in problem solving.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. **(K2)**

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. **(K6)**

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. **(K3)**

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges. **(K3)**

CO5: Devise solutions to small-scale programs involving Tree data structure and recognize scenarios where hashing is advantageous and design hash-based solutions for specific problems. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	-	-	-	-	1	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	1	-
CO3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort.

Learning Outcomes: At the end of this unit, students should be able to

● Analyze various problem statements to estimate time and space complexities. (L4)
● Apply programming to solve searching and sorting problems. (L3)
● Design the different sorting techniques. (L3)

UNIT – II (9 Hrs)

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists

Learning Outcomes: At the end of this unit, students should be able to

- Analyze various operations on singly linked list. (L4)
- Interpret operations of doubly linked lists. (L2)
- Apply various operations on Circular linked lists. (L6)
- Design various applications of linked lists. (L3)

UNIT – III (9 Hrs)

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

Learning Outcomes: At the end of this unit, students should be able to

- Describe the operations of Stack. (L2)
- Describe various notations of arithmetic expressions. (L5)
- Evaluate arithmetic expressions using stack. (L5)
- Develop the applications using stack data structure (L3)

UNIT – IV (9 Hrs)

Queues: Introduction to queues: properties and operations, implementing queues using arrays an lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications

Learning Outcomes: At the end of this unit, students should be able to

- Develop various operations on Queues. (L6)
- Develop the applications using Queue data structure (L3)
- Apply queue data structure to solve breadth-first search, scheduling etc. (L6)

UNIT – V (8 Hrs)

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Learning Outcomes: At the end of this unit, students should be able to

- Develop the representation of Trees. (L3)
- Identify the various Binary Search Tree traversals. (L3)
- Select the appropriate hashing technique for a given application. (L5)
- Design a hashing technique. (L6)

TEXTBOOKS:
1. "Data Structures and algorithm analysis in C", Mark Allen Weiss, Pearson, 2nd Edition.
2. "Fundamentals of data structures in C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008.

REFERENCE BOOKS:
1. "Algorithms and Data Structures: The Basic Toolbox", Kurt Mehlhorn and Peter Sanders.
2. "C Data Structures and Algorithms", Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft.
3. "Problem Solving with Algorithms and Data Structures", Brad Miller and David Ranum.
4. "Introduction to Algorithms", Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.
5. "Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms", Robert Sedgewick.

ONLINE LEARNING RESOURCES:
1. https://www.simplilearn.com/tutorials/c-tutorial/data-structures-in-c
2. https://www.javatpoint.com/data-structure-tutorial
3. https://www.w3schools.com/c/c_intro.php
4. https://www.tutorialspoint.com/cprogramming/index.htm

Course Code	COMMUNICATIVE ENGLISH LAB		L	T	P	C
23A11202A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➤ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
- ➤ To train in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. **(K2)**

CO2: Apply communication skills through various language learning activities. **(K3)**

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **(K4)**

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. **(K5)**

CO5: Take part effectively in job interviews. **(K5)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	2	-	2	-	-	-	1	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	2	-	-

TOPICS:
1. Vowels and Consonants
Learning Outcomes: At the end of this session, students should be able to
- Distinguish different speech sounds while listening and speaking with a view to effectively comprehend texts of various difficulty levels. (L4)

2. Neutralization and Accent Rules
Learning Outcomes: At the end of this session, students should be able to
- Identify syllabification, stress, rhythm and intonation for effective inference of comprehended texts. (L3)
- Apply accent neutralized speech approach to communicate with fluency. (L3)
- Develop various transactional models of communication while listening to native speakers of English. (L3)

3. Communication skills and JAM
Learning Outcomes: At the end of this session, students should be able to
- Take part in short structured talks. (L4)
- Make use of effective communication skills in varied contexts. (L4)

4. Role Play or Conventional Practice
Learning Outcomes: At the end of this session, students should be able to
- Develop conversational skills both in academic and professional contexts. (L3)

5. E-mail Writing
Learning Outcomes: At the end of this session, students should be able to
- Construct structured and well-organized emails for different professional purposes. (L3)

6. Resume Writing, Cover Letter
Learning Outcomes: At the end of this session, students should be able to
- Build effective resumes along with cover letters. (L3)

7. Group Discussions – Methods and Practices
Learning Outcomes: At the end of this session, students should be able to
- Understand the key skills and behavioural requirements to facilitate the group discussion. (L2)
- Take part in group discussions effectively. (L4)

8. Debates – Methods and Practices
Learning Outcomes: At the end of this session, students should be able to
- Take part in brain storming sessions. (L4)
- Compare and contrast different viewpoints to arrive at a consensus. (L5)

9. PPT Presentations/Poster Presentations
Learning Outcomes: At the end of this session, students should be able to
- Create effective power point and poster presentations. (L6)

10. Interview Skills
Learning Outcomes: At the end of this session, students should be able to
- Develop required skills to participate in interviews. (L3)
- Analyze the dynamics of interviews to increase the chances of employment. (L4)

REFERENCE BOOKS:
1. "Technical Communication", Meenakshi Raman, Sangeeta Sharma, Oxford Press, 2018.
2. "English Conversation Practice", Taylor Grant, Tata McGraw-Hill Education India, 2016.
3. "Cambridge Academic English (B2)", Martin Hewings. CUP, 2012.

4. "A Course in Phonetics and Spoken English", J. Sethi & P.V. Dhamija, 2nd Edition, Kindle, 2013.

ONLINE LEARNING RESOURCES:
SPOKEN ENGLISH:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & ACCENT:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Course Code	ELECTRICAL & ELECTRONICS	L	T	P	C
23A02302A	**ENGINEERING WORKSHOP** (Common to all branches)	**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester		II	

COURSE OBJECTIVES:
- ➤ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
- ➤ To impart knowledge on the principles of digital electronics and fundamentals of electron devices and its applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. **(K2)**

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. **(K4)**

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. **(K3)**

CO4: Identify & testing of various electronic components along with characteristics of various electron devices. **(K2)**

CO5: Explain the operation of a digital circuit. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	2	-	-	-	-	2	3	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	3	3	2

PART A: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS:
1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum six experiments should be performed

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: Minimum six experiments should be performed using both Hardware and Software

REFERENCE BOOKS:

For Electrical Engineering Lab:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Electronics Engineering Lab:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

Course Code	DATA STRUCTURES LAB	L	T	P	C
23A05402A	(Common to CSE, CSE – AI, AIML, CSE – IOT)	**0**	**0**	**3**	**1.5**
Pre-requisite	Computer Programming Lab	Semester	II		

COURSE OBJECTIVES:

➢ The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. **(K2)**

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. **(K6)**

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. **(K3)**

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges. **(K3)**

CO5: Recognize hashing advantages and design hash-based solutions for specific problems. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

LIST OF EXPERIMENTS:

Exercise 1: Array Manipulation

i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques – Linear & Binary Search
iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications
    i) Create a program to detect and remove duplicates from a linked list.
    ii) Implement a linked list to represent polynomials and perform addition.
    iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation
    i) Implement a doubly linked list and perform various operations to understand its properties and applications.
    ii) Implement a circular linked list and perform insertion, deletion, and traversal

Exercise 5: Stack Operations
    i) Implement a stack using arrays and linked lists.
    ii) Write a program to evaluate a postfix expression using a stack.
    iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations
    i) Implement a queue using arrays and linked lists.
    ii) Develop a program to simulate a simple printer queue system.
    iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications
    i) Use a stack to evaluate an infix expression and convert it to postfix.
    ii) Create a program to determine whether a given string is a palindrome or not.
    iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree
    i) Implementing a BST using Linked List.
    ii) Traversing of BST.

Exercise 9: Hashing
    i) Implement a hash table with collision resolution techniques.
    ii) Write a program to implement a simple cache using hashing.

TEXTBOOKS:
1. "Data Structures and algorithm analysis in C", Mark Allen Weiss, Pearson, 2nd Edition.
2. "Fundamentals of data structures in C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008.

REFERENCE BOOKS:

1. "Algorithms and Data Structures: The Basic Toolbox", Kurt Mehlhorn and Peter Sanders.
2. "C Data Structures and Algorithms", Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft.
3. "Problem Solving with Algorithms and Data Structures", Brad Miller and David Ranum.
4. "Introduction to Algorithms", Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.
5. "Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms", Robert Sedgewick.

Course Code	IT WORKSHOP		L	T	P	C
23A05304A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning.
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Perform Hardware troubleshooting. **(K2)**

CO2: Understand Hardware components and inter dependencies. **(K2)**

CO3: Safeguard computer systems from viruses/worms. **(K3)**

CO4: Document/ Presentation preparation. **(K3)**

CO5: Perform calculations using spreadsheets. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	1	2	-	-	-	-	-	-	-	1	-
CO3	1	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	1	2	-	-	-	-	-	-	-	-	2
CO5	1	3	2	2	2	-	-	-	-	-	-	-	-	2

PC Hardware & Software Installation:

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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:
Task 1: 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 power point 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.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCE BOOKS:
1. "Comdex Information Technology course tool kit", Vikas Gupta, WILEY Dream tech, 2003
2. "The Complete Computer upgrade and repair book", Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd Edition
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2012, 2nd Edition
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", David Anfinson and Ken Quamme, CISCO Press, Pearson Education, 3rd Edition
7. "IT Essentials PC Hardware and Software Labs and Study Guide", Patrick Regan, CISCO Press, Pearson Education, 3rd Edition

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to all branches)		L	T	P	C
23A11109A			0	0	1	0.5
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To make the students maintain their mental and physical wellness by balancing emotions in their life
➢ To enhance the essential traits required for the development of the personality.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health. **(K2)**

CO2: Demonstrate an understanding of health-related fitness components. **(K3)**

CO3: Compare and contrast various activities that help enhance their health. **(K4)**

CO4: Assess current personal fitness levels. **(K2)**

CO5: Develop Positive Personality. **(K5)**

UNIT – I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity, Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

- Organizing health awareness programmes in community
- Preparation of health profile
- Preparation of chart for balance diet for all age groups

UNIT – II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

- Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

- Participation in one major game and one individual sport viz., Athletics, Volleyball,

Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.

- Practicing general and specific warm up, aerobics
- Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:

1. "Health and Wellness", Gordon Edlin, Eric Golanty. 14th Edition, Jones & Bartlett Learning, 2022
2. "The Heart of Yoga: Developing a Personal Practice", T. K. V. Desikachar
3. "Yoga Sutras of Patanjali", Archie J. Bahm, Jain Publishing Company, 1993
4. "SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere", Wiseman, John Lofty, 3rd Edition, William Morrow Paperbacks, 2014
5. "The Sports Rules Book/ Human Kinetics with Thomas Hanlon", 3rd Edition, Human Kinetics, Inc.2014

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

CSE - ARTIFICIAL INTELLIGENCE &
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(For the batches admitted from the academic year 2023-24)

Vision

- To be a recognized Centre in the field of Computer Science and Engineering by imparting quality education and also equipping the students with latest technologies, soft skills and ethical values to face the challenges in industry & society.

Mission

- To provide quality education by imparting state of the art facility in Computer Science and Engineering.
- Enrich the students with innovative and problem-solving skills by establishing continuous Industry Institute interaction.
- To prepare the learners possessing social commitment and ethical values to face the dynamic challenges of industry and society.

Institutional Objectives

- To create a conducive and competitive environment for students through curricular and extra-curricular activities.
- Promote the culture of research among the faculty.
- To promote synergetic alliances with premier Institutions, Industry, CSIR laboratories and various Government organizations for Collaborative Research Projects.
- To promote economic and social enrichment of the society through Skill Development programmes, Entrepreneurship and extension activities.
- To introduce demand-driven new UG&PG academic programmes.
- To ensure a high degree of quality in terms of providing infrastructure, research ambience, faculty and staff development.

Core Values

- *Thirst for Quality Education:* The stake holders of the institute particularly management, employees and students of the institution have a consistent thirst for quality improvement of the processes and services in the institution.
- *Lifelong Learning:* In the fast-changing technological world, acquiring a special skill at one point of time will not be enough for ever long survival. Hence to

flourish in the work place and to bring in innovations in the ways of doing, employee, student as well as alumni must be continuous learners and tech savvy.

- *Diversity and Participation:* PBRVITS promotes the involvement of faculty, staff and students from all social, economic, ethnics, cultural and religious backgrounds to get the synergy of combining the diversified agents. The focus is on involving students to exhibit their talent in various curricular and co-curricular activities and strengthening alumni link to share their experiences to the students.

- *Academic Integrity and Accountability:* Management induces accountability in the employees for the career of the students and the academic leadership establishes a mentoring mechanism for realization of responsibilities of students towards their parents and in turn to the society.

CSE - ARTIFICIAL INTELLIGENCE &
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING
(For the batches admitted from the academic year 2023-24)

**INDUCTION PROGRAM (3 weeks duration)**
S. No	**Course Name**
1	Physical Activities – Sports, Yoga and Meditation, Plantation
2	Career Counselling
3	Orientation to all branches – career options, tools, etc.
4	Orientation on admitted Branch – corresponding labs, tools and platforms
5	Proficiency Modules and Productivity Tools
6	Assessment on basic aptitude and mathematical skills
7	Remedial training in Foundation Courses
8	Human Values and Professional Ethics
9	Communication Skills – Focus on Listening, Speaking, Reading, Writing Skills
10	Concepts of Programming

Semester I (First Year)

S. No	Category	Course Code	Course Title	L	T	P	C	CIE	SEE	Total
1	BS	23A11101A	Linear Algebra & Calculus	3	0	0	3	30	70	100
2	BS	23A11103A	Engineering Physics	3	0	0	3	30	70	100
3	BS	23A11104A	Chemistry	3	0	0	3	30	70	100
4	ES	23A01301A	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
5	ES	23A05301A	Introduction to Programming	3	0	0	3	30	70	100
6	BS	23A11105A	Engineering Physics Lab	0	0	2	1	30	70	100
7	BS	23A11106A	Chemistry Lab	0	0	2	1	30	70	100
8	ES	23A05302A	Computer Programming Lab	0	0	3	1.5	30	70	100
9	ES	23A05303A	Engineering Workshop	0	0	3	1.5	30	70	100
10	BS	23A11110A	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	-	-	100
\multicolumn{7}{c}{**Total**}					20.5			1000

Semester II (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11102A	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
2	HSMC	23A11201A	Communicative English	2	0	0	2	30	70	100
3	ES	23A03301A	Engineering Graphics	1	0	4	3	30	70	100
4	ES	23A02301A	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
5	PC	23A05401A	Data Structures	3	0	0	3	30	70	100
6	HSMC	23A11202A	Communicative English Lab	0	0	2	1	30	70	100
7	ES	23A02302A	Electrical & Electronics Engineering Workshop	0	0	3	1.5	30	70	100
8	PC	23A05402A	Data Structures Lab	0	0	3	1.5	30	70	100
9	ES	23A05304A	IT Workshop	0	0	2	1	30	70	100
10	BS	23A11109A	Health and Wellness, Yoga and Sports	-	-	1	0.5	-	-	100
Total							**19.5**			**1000**

Course Code	LINEAR ALGEBRA & CALCULUS		L	T	P	C
23A11101A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

> ➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. **(K3)**

CO2: Demonstrate the ability to compute eigen values and eigen vectors for square matrices using methods such as characteristic polynomials, determinants, and numerical techniques. **(K3)**

CO3: Utilize mean value theorems to real life problems. **(K3)**

CO4: Familiarize with functions of several variables which are useful in optimization. **(K3)**

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	1	-

UNIT – I (9 Hrs)

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Learning Outcomes: At the end of this unit, students should be able to

- Solve systems of linear equations, using technology to facilitate row reduction and determine the rank (L3).
- Demonstrate an understanding of how to translate a system of simultaneous linear equations into a matrix (L2)
- Solve systems of linear equations using various methods including Gauss elimination

method and Gauss Seidel Iteration Methods (L3)

UNIT – II (9 Hrs)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors 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 forms by Orthogonal Transformation.

Learning Outcomes: At the end of this unit, students should be able to

- Demonstrate the process of finding eigenvalues and eigenvalues for square matrices. (L2)
- Describe the process of diagonalizing a matrix and its significance. (L3)
- Apply the Cayley-Hamilton Theorem to find powers of a matrix and compute the inverse of a matrix. (L3)
- Apply knowledge of the nature of a quadratic form to analyse and solve optimization process. (L3)
- Explain the process of using orthogonal transformations to reduce a quadratic form to its canonical form. (L5)

UNIT – III (9 Hrs)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Learning Outcomes: At the end of this unit, students should be able to

- Analyze the behaviour of functions by using mean value theorems (L4)
- Translate the given function as series of Taylor's and Maclaurin's with remainders (L2)

UNIT – IV (9 Hrs)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes: At the end of this unit, students should be able to

- Find partial derivatives numerically and symbolically and use them to analyze and   interpret the way a function varies. (L4)
- Acquire the Knowledge maxima and minima of functions of several variable (L3)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT – V (9 Hrs)

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Learning Outcomes: At the end of this unit, students should be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L3)
- Evaluate triple integrals in Cartesian, cylindrical and spherical polar coordinates. (L5)
- Apply triple integration techniques in evaluating volumes. (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", Michael Greenberg, Pearson publishers, 9th Edition
5. "Higher Engineering Mathematics", H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, 3rd Edition (Reprint 2021)

Course Code	ENGINEERING PHYSICS		L	T	P	C
23A11103A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To identify the importance of the physical optics i.e., interference, diffraction and polarization related to its engineering applications

➢ To present the basic concepts needed to understand the crystal structure of materials, X-ray diffraction

➢ To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices

➢ To enlighten the concepts of Quantum mechanics and to provide fundamentals of the de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory.

➢ Evolution of band theory to distinguish materials and explain the properties of semiconductors

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the intensity variation of light due to interference, diffraction & polarization. **(K3)**

CO2: Familiarize with the basics of crystals and their structures**. (K2)**

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials. **(K3)**

CO4: Explain the basic concepts of quantum mechanics and the band theory of solids. **(K2)**

CO5: Identify the type of semiconductor using Hall effect **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Wave Optics:

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double

refraction - Nicol's Prism -Half wave and Quarter wave plates.

Learning Outcomes: At the end of this unit, students should be able to
- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify scientific & engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary light and polarized light (L2)

UNIT – II (9 Hrs)
Crystallography and X-ray diffraction
Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

Learning Outcomes: At the end of this unit, students should be able to
- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by using Laue method & powder method (L4)

UNIT – III (9 Hrs)
Dielectric and Magnetic Materials
Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Learning Outcomes: At the end of this unit, students should be able to
- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius- Mosotti relation indielectrics (L2)
- Classify magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)

UNIT – IV (9 Hrs)

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concepts of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Understand the concept of density of states (L2)

UNIT – V (8 Hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and applications.

Learning Outcomes: At the end of this unit, students should be able to

- Classify the energy bands of semiconductors (L2)
- Understand the differences between intrinsic and extrinsic semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)

TEXTBOOKS:

1. "A Text book of Engineering Physics", M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition, 2019.
2. "Engineering Physics", D. K. Bhattacharya and Poonam Tandon, Oxford press, 2015

REFERENCE BOOKS:

1. "Engineering Physics", B. K. Pandey and S. Chaturvedi, Cengage Learning, 2021.
2. "Engineering Physics", Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. "Engineering Physics", Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010
4. "Engineering Physics", M. R. Srinivasan, New Age international publishers, 2009

ONLINE LEARNING RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Course Code	CHEMISTRY		L	T	P	C
23A11104A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:
- ➢ To familiarize chemistry and applications.
- ➢ To train the students on the principles and applications of electro chemistry and polymers.
- ➢ To introduce instrumental methods and applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to
- **CO1:** Explain the salient features of different theories along with their applications. **(K2)**
- **CO2:** Discuss about the model engineering materials. **(K3)**
- **CO3:** Apply the knowledge of various electrodes for the development of new batteries. **(K3)**
- **CO4:** Identify the different polymers and their uses in various fields of engineering. **(K3)**
- **CO5:** Analyze the knowledge of different analytical techniques used engineering and also development of new techniques. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Structure and Bonding Models: Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo - and hetero nuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes: At the end of this unit, students should be able to
- Illustrate the molecular orbital energy level diagram of different molecular species (L2)
- Discuss the basic concept of molecular orbital theory (L3)
- Explain the calculation of bond order of O2 and CO molecules (L2)

UNIT – II (9 Hrs)
Modern Engineering Materials: Semiconductors: Introduction, basic concept, applications

Super conductor: Introduction, basic concept, applications.

Super capacitors: Introduction, Basic Concept, Classification, Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphine nanoparticles.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the band theory of solids for conductors, semiconductors and insulators (L2)
- Demonstrate the application of Fullerenes, Carbon nanotubes and Graphene nanoparticles (L2)

UNIT – III (9 Hrs)

Electro Chemistry and Applications: Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors: Potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc- air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell – working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Learning Outcomes: At the end of this unit, students should be able to

- Apply the Nernst equation for calculating electrode and cell potentials(L3)
- Differentiate between potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)

UNIT – IV (9 Hrs)

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Bakelite, Nylon-6,6, Carbon fibers.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – Polyacetylene, polyaniline, – mechanism of conduction and applicatio Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

Learning Outcomes: At the end of this unit, students should be able to

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylons (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N and their applications (L2)

UNIT – V (8 Hrs)

Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic principle, Classification- HPLC: Principle, Instrumentation and Applications.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the different types of spectral series in electromagnetic spectrum (L2)
- Understand the principles and applications of different analytical instruments (L2)

TEXTBOOKS:

1. "Engineering Chemistry", Jain and Jain, Dhanpat Rai publications, 17th Edition, 2018
2. "Atkins' Physical Chemistry", Peter Atkins, Julio de Paula and James Keeler, Oxford University Press, 10th Edition, 2010
3. "Concise Inorganic Chemistry", J. D. Lee, Wiley Publications, 5th Edition, Feb 2008

REFERENCE BOOKS:

1. "Principles of Instrumental Analysis", Skoog and West, 6th Edition, Thomson, 2007.
2. "Textbook of Polymer Science", Fred W. Billmayer Jr, 3rd Edition

Course Code	**BASIC CIVIL AND MECHANICAL**		**L**	**T**	**P**	**C**
23A01301A	**ENGINEERING** (Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

➢ To get familiarized with scope and importance of Civil and Mechanical Engineering in different sectors and industries.

➢ To introduce the preliminary concepts of Building Planning, Construction, Materials and related tests.

➢ To acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.

➢ To explain different engineering materials and manufacturing processes.

➢ To provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand various sub-divisions of Civil Engineering and appreciate their role in ensuring better society. **(K2)**

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. **(K3)**

CO3: Realize the importance of Transportation in nation's economy and engineering measures related to highways in terms of geometrics. **(K3)**

CO4: Understand the importance of water resources and storage structures so that social responsibilities of water conservation will be appreciated.**(K1)**

CO5: Understand the different manufacturing processes and explain the basics of thermal engineering and its applications. **(K2)**

CO6: Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	3	-	-	-	-	-	-	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT – I (8 Hrs)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel / Theatre.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the role of civil Engineers in the society and Various Disciplines of Civil Engineering. (L2)
- Develop typical layouts for different residential commercial and Industrial buildings. (L3)

UNIT – II (7 Hrs)

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements-Angular Measurements- Leveling instruments used for leveling- Introduction to Bearings Simple problems on leveling and bearings-Contour mapping.

Learning Outcomes: At the end of this unit, students should be able to

- Describe objectives of surveying and Horizontal and vertical measurements (L2)
- Measure Horizontal and vertical angles using surveying Instruments (L3)

UNIT – III (8 Hrs)

Transportation Engineering, Water Resources and Environmental Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water - Specifications and Tests- Introduction to Hydrology- Hydrograph -Rain water Harvesting - Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

Learning Outcomes: At the end of this unit, students should be able to

- Explain various types of pavements, their differences and basics of design (L2)
- Examine the quality of different sources of water and its storage (L3)

PART B: BASIC MECHANICAL ENGINEERING

UNIT – I (7 Hrs)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace,

and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

Learning Outcomes: At the end of this unit, students should be able to

- Know the importance of machine and utilization in different fields. (L1)
- Know different kinds of materials and its classification. (L1)

UNIT – II (8 Hrs)

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering - working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

Learning Outcomes: At the end of this unit, students should be able to

- Know different production technologies used in industries. (L1)
- Know working principles and elements of automobiles. (L2)

UNIT – III (7 Hrs)

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Learning Outcomes: At the end of this unit, students should be able to

- Know working principles and elements used for power generation. (L1)
- Understand the concepts of various power transmission systems. (L2)
- Learn the robotics basic terminology and its usage in different sectors. (L1)

TEXTBOOKS:
For Basic Civil Engineering:

1. "Basic Civil and the Mechanical Engineering", G. Shanmugam and M. S. Palanisamy, Tata McGraw Hill publications (India) Pvt, Ltd.
2. "Basic Civil Engineering", S.S. Bhavikatti, New Age International Publishers.
3. "Engineering Materials", Dr. S.C. Rangwala, Charotor Publishing House.
4. "Highway Engineering", S. K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications.
5. "Irrigation Engineering and Hydraulic Structures", Santosh Kumar Garg, Khanna Publishers, Delhi.
6. "Building Construction", Dr. B. C. Punmia, Lakshmi Publications, Delhi.

For Basic Mechanical Engineering:

1. "Internal Combustion Engines", V. Ganesan, Tata McGraw Hill publications (India) Pvt.

Ltd.

2. "A Tear book of Theory of Machines", S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. "An introduction to Mechanical Engineering", Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:
For Basic Civil Engineering:
1. "Surveying, Vol- I and Vol-II", S.K. Duggal, Tata McGraw Hill Publishers.
2. "Hydrology and Water Resources Engineering", Santosh Kumar Garg, Khanna Publishers, Delhi.

For Basic Mechanical Engineering:
1. "Robotics", Appuu Kuttan K K, I. K. International Publishing House Pvt. Ltd. Volume-I
2. "3D printing & Additive Manufacturing Technology", L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. "Thermal Engineering", Mahesh M Rathore, Tata McGraw Hill publications (India) Pvt. Ltd.
4. "Basic Civil and Mechanical Engineering", G. Shanmugam and M. S, Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.

Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.

Course Code	INTRODUCTION TO PROGRAMMING		L	T	P	C
23A05301A	(Common to all branches)		3	0	0	3
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To introduce students to the fundamentals of computer programming.

➢ To provide hands-on experience with coding and debugging.

➢ To foster logical thinking and problem-solving skills using programming.

➢ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.

➢ To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. **(K2)**

CO2: Analyse a problem and develop an algorithm to solve it. (**K4**)

CO3: Implement various algorithms using the C programming language. **(K3)**

CO4: Understand more advanced features of C language. **(K2)**

CO5: Develop problem-solving skills and the ability to debug and optimize the code. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-	-	2
CO5	1	2	3	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Learning Outcomes: At the end of this unit, students should be able to

● Translate algorithms into programs. (L4)

● Solve complex problems using language independent notations. (L3)

- Use C basic concepts to write simple C programs. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Analyze the algorithms for time and space complexities. (L4)

UNIT – II (9 Hrs)

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

Learning Outcomes: At the end of this unit, students should be able to
- Implement conditional branching and iteration statements. (L2)
- Select the control structures for solving the problem statements (L4)
- Use iterative statements for writing C programs. (L3)

UNIT – III (8 Hrs)

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Learning Outcomes: At the end of this unit, students should be able to
- Use arrays to process multiple homogeneous data. (L3)
- Solve mathematical problems using C programming language. (L3)
- Apply string-handling functions. (L3)

UNIT – IV (9 Hrs)

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Learning Outcomes: At the end of this unit, students should be able to
- Structure the individual data elements to simplify the solution. (L6)
- Facilitate efficient memory utilization. (L6)
- Use pointers and structures to formulate algorithm and write programs. (L3)
- Understand the basic differences between structure and union. (L2)

UNIT – V (9 Hrs)

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope   and Lifetime of Variables, Basics of File Handling.

Learning Outcomes: At the end of this unit, students should be able to
- Understand basic terminology of modular programming. (L2)
- Writing structured programs using C Functions. (L5)
- Apply modular approach for solving the problem statements. (L3)
- Writing C programs using various storage classes to control variable access. (L5)

- Apply input and output statements to process the data in various formats. (L3)

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:
1. "Computing fundamentals and C Programming", E. Balagurusamy, McGraw-Hill Education, 2008.
2. "Programming in C", Rema Theraja, Oxford, 2016, 2nd Edition.
3. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

ONLINE LEARNING RESOURCES:
1. www.learn-c.org
2. www.programmeiz.com
3. www.github.com

Course Code	ENGINEERING PHYSICS LAB		L	T	P	C
23A11106A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors.

➢ To study the parameters and applications of dielectric and magnetic materials by conducting experiments

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Operate optical Instruments like travelling microscope and spectrometer. **(K2)**

CO2: Estimate the wavelengths of different colours using diffraction grating. **(K2)**

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance **(K3)**

CO4: Calculate the band gap of a given semiconductor. **(K3)**

CO5: Evaluate the acceptance angle and numerical aperture of an optical fiber. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determine the thickness of the wire using wedge shape method.
20. Determine the numerical aperture and acceptance angle of a given optical fiber.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCE BOOKS:
1. "A Textbook of Practical Physics", S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017.

ONLINE LEARNING RESOURCES:
1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Course Code	CHEMISTRY LAB		L	T	P	C
23A11107A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester			I	

COURSE OBJECTIVES:

- ➢ To get familiar with the basic concepts of Chemistry.
- ➢ To verify the fundamental concepts with experiments.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Distinguish different types of titrations in the volumetric analysis **(K3)**

CO2: Determine the cell constant and conductance of solutions **(K3)**

CO3: Calculate the strength of an acid present in secondary batteries **(K3)**

CO4: Analyze the effect of absorbance of given sample solution on concentration by using colorimetry **(K3)**

CO5: Prepare advanced polymer Bakelite materials **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of Strength of an acid in Lead-Acid battery
2. Estimation of Ferrous Iron by Dichrometry
3. Potentiometry –Determination of Ferrous Iron using Standard $K_2Cr_2O_7$ solution.
4. Conductometry-Determinationofcellconstantandconductanceofsolutions.
5. Conductometric titration of strong acid vs strong base
6. Conductometric titration of weak acid vs strong base
7. P^H-metric titration of a) strong acid vs strong base b) weak acid vs strong base.
8. Verification of the Beer-Lambert's law and determination of strength of the given sample solution.
9. Determination of CFSE (10Dq) by Spectrophotometric method.
10. Preparation of Bakelite
11. Preparation of Nanomaterials by Precipitation method

12. Determination of the R_f - value of given sample by Thin Layer Chromatography (TLC).

TEXTBOOKS:

1. "A Text Book on Experiments and Calculations in Engineering Chemistry", S. Chand Publications, 9th Edition, 2003.
2. "Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2014.
3. "Experiments in Applied Chemistry", Dr. Sunita Rattan, S. K. Kataria & Sons Publishers of Engineering, 2nd Edition, 2004.

REFERENCE BOOKS:

1. Vogel's Text Book of Quantitative Chemical Analysis", Mendham Jet.al, Pearson Education, 6th Edition, 2012.

Course Code	**COMPUTER PROGRAMMING LAB**		**L**	**T**	**P**	**C**
23A05302A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. **(K2)**

CO2: Select the right control structure for solving the problem. **(K1)**

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. **(K3)**

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. **(K3)**

CO5: Develop C programs to handle File handling operations. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

UNIT – I

Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab 1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 2: Converting algorithms/flow charts into C Source code. Developing the algorithms/ flowcharts for the following sample programs

    i) Sum and average of 3 numbers

    ii) Conversion of Fahrenheit to Celsius and vice versa

    iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions.

Lab 3: Simple computational problems using arithmetic expressions

    i) Finding the square root of a given number

    ii) Finding compound interest

    iii) Area of a triangle using heron's formulae

    iv) Distance travelled by an object

UNIT – II

Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity.

Lab 4: Simple computational problems using the operator' precedence and associativity

    i) Evaluate the following expressions

        a. A+B*C+(D*E) + F*G

        b. A/B*C-B+A*D/3

        c. A+++B---A

        d. J= (i++) + (++i)

    ii) Find the maximum of three numbers using conditional operator

    iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions.

Lab 5: Problems involving if-then-else structures

    i) Write a C program to find the max and min of four numbers using if-else.

    ii) Write a C program to generate electricity bill.

    iii) Find the roots of the quadratic equation.

    iv) Write a C program to simulate a calculator using switch case.

    v) Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops.

Lab 6: Iterative problems e.g., the sum of series

    i) Find the factorial of given number using any loop.

    ii) Find the given number is a prime or not.

    iii) Compute sine and cos series

    iv) Checking a number palindrome

    v) Construct a pyramid of numbers

UNIT – III
Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1-D Arrays: searching.

Lab 7: 1-D Array manipulation, linear search

    i) Find the min and max of a 1-D integer array.

    ii) Perform linear search on1D array.

    iii) The reverse of a 1D integer array

    iv) Find 2's complement of the given binary number.

    v) Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will

reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

    i) Addition of two matrices

    ii) Multiplication two matrices

    iii) Sort array elements using bubble sort

    iv) Concatenate two strings without built-in functions

    v) Reverse a string using built-in and without built-in string functions

UNIT – IV

Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereference

    i) Write a C program to find the sum of a 1D array using malloc()

    ii) Write a C program to find the total, average of n students using structures

    iii) Enter n students data using calloc() and display failed students list

    iv) Read student name and marks from the command line and display the student details along with the total.

    v) Write a C program to implement realloc()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists.

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

    i) Create and display a singly linked list using self-referential structure.

    ii) Demonstrate the differences between structures and unions using a C program.

    iii) Write a C program to shift/rotate using bitfields.

    iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT – V
Week 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.

    i) Write a C function to calculate NCR value.

    ii) Write a C function to find the length of a string.

    iii) Write a C function to transpose of a matrix.

    iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls.

Lab 12: Recursive functions

    i) Write a recursive function to generate Fibonacci series.

    ii) Write a recursive function to find the lcm of two numbers.

    iii) Write a recursive function to find the factorial of a number.

    iv) Write a C Program to implement Ackermann function using recursion.

    v) Write a recursive function to find the sum of series.

Week 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

    i) Write a C program to swap two numbers using call by reference.

    ii) Demonstrate Dangling pointer problem using a C program.

    iii) Write a C program to copy one string into another using pointer.

    iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling.

Lab 14: File operations

 i) Write a C program to write and read text into a file.

 ii) Write a C program to write and read text into a binary file using fread() and fwrite()

 iii) Copy the contents of one file to another file.

 iv) Write a C program to merge two files into the third file using command-linearguments.

 v) Find no. of lines, words and characters in a file

 vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

 1. "Programming in C: A practical approach", Ajay Mittal, Pearson

 2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:

 1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.

 2. "C   Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

Course Code	**ENGINEERING WORKSHOP**		L	T	P	C
23A05303A	(Common to all branches)		0	0	3	1.5
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:
➢ To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities. **(K3)**

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, welding and plumbing. **(K3)**

CO3: Apply fitting operations in various applications. **(K3)**

CO4: Apply basic electrical engineering knowledge for House Wiring Practice **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO2	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO3	3	2	2	-	3	-	1	-	2	1	-	3	2	2
CO4	3	2	2	-	3	-	1	-	2	1	-	3	2	2

LIST OF EXPERIMENTS:
1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray
   b) Conical funnel
   c) Elbow pipe
   d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit

b) Dovetail fit
c) Semi-circular fit
d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series
   b) Two-way switch
   c) Godown lighting
   d) Tube light
   e) Three phase motor
   f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:
1. "Basic Workshop Technology: Manufacturing Process", Felix W.; Independently Published, 2019.
2. "Workshop Processes, Practices and Materials", Bruce J. Black, Routledge Publishers, 5th Edition, 2015.
3. "A Course in Workshop Technology Vol I. & II", B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCE BOOKS:
1. "Elements of Workshop Technology - Vol. I", S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th Edition
2. "Workshop Practice", H. S. Bawa, Tata-McGraw Hill, 2004.
3. "Wiring Estimating, Costing and Contracting", P.M. Soni & P.A. Upadhyay, Atul Prakashan, 2021-22.

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE (Common to all branches)		L	T	P	C
23A11110A			**0**	**0**	**1**	**0.5**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of discipline, character and service motto. **(K2)**

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. **(K3)**

CO3: Explore human relationships by analyzing social problems. **(K4)**

CO4: Determine to extend their help for the fellow beings and downtrodden people. **(K3)**

CO5: Develop leadership skills and civic responsibilities. **(K5)**

UNIT – I

Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II

Nature & Care
Activities:

- Best out of waste competition.
- Poster and signs making competition to spread environmental awareness.
- Recycling and environmental pollution article writing competition.
- Organising Zero-waste day.
- Digital Environmental awareness activity via various social media platforms.
- Virtual demonstration of different eco-friendly approaches for sustainable living.
- Write a summary on any book related to environmental issues.

UNIT – III
Community Service
Activities:

- Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media, authorities, experts, etc.
- Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- Conducting consumer Awareness. Explaining various legal provisions etc.
- Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. "A Text Book of National Service Scheme Vol – I", Nirmalya Kumar Sinha & Surajit Majumder, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. "Red Book - National Cadet Corps – Standing Instructions Vol I & II", Directorate General of NCC, Ministry of Defence, New Delhi.
3. "Introduction to Environmental Engineering", M. L. Davis and D. A. Cornwell, McGraw Hill, New York, 4th Edition, 2008.
4. "Introduction to Environmental Engineering and Science", G. M. Masters, K. Joseph and R. Nagendran, Pearson Education, New Delhi, 2nd Edition, 2007.
5. "Social Problems in India", Ram Ahuja, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS (Common to all branches)		L	T	P	C
23A11102A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:

➢ To enlighten the learners in the concept of differential equations and multivariablecalculus.

➢ To furnish the learners with basic concepts and techniques at plus two level to lead theminto advanced level by handling various real-world applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Apply first order and first degree differential equations to model and solve problems in various scientific and engineering disciplines, including electrical circuits. **(K3)**

CO2: Solve the differential equations related to various engineering fields**. (K3)**

CO3: Identify solution methods for partial differential equations that model physical processes. **(K3)**

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. **(K2)**

CO5: Estimate the work done against a field, circulation and flux using vector calculus. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	-	-	-	-	-	-	2	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	1	-
CO5	2	3	2	2	-	-	-	-	-	-	-	1	1	-

UNIT – I (9 Hrs)

Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Learning Outcomes: At the end of this unit, students should be able to

- Learn the effective mathematical tools for solutions of first order differential equations(L2)
- Apply mathematical tools to model physical processes such as Newton's law of cooling, electrical circuits (L3).

UNIT – II (9 Hrs)

Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit

problems and Simple Harmonic motion.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L4)
- Formulate and solve the higher order differential equation by analyzing physical situations (L6)

UNIT – III (9 Hrs)

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Learning Outcomes: At the end of this unit, students should be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT – IV (9 Hrs)

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

Learning Outcomes: At the end of this unit, students should be able to

- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT – V (9 Hrs)

Vector integration: Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Learning Outcomes: At the end of this unit, students should be able to

- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th

Edition.

REFERENCE BOOKS:
1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. "Higher Engineering Mathematics", B. V. Ramana, McGraw Hill Education, 2017

Course Code	COMMUNICATIVE ENGLISH		L	T	P	C
23A11201A	(Common to all branches)		**2**	**0**	**0**	**2**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

- ➢ To facilitate effective Listening, Reading, Speaking and Writing skills among the students.
- ➢ To enhance their comprehending abilities, oral presentations, reporting useful information.
- ➢ To provide knowledge of grammatical structures and vocabulary.
- ➢ To make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues, and also from reading content. **(K2)**

CO2: Apply grammatical structures to formulate sentences and correct word forms. **(K3)**

CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. **(K4)**

CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. **(K5)**

CO5: Create a coherent paragraph, essay, and resume. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	-	2	-	2	2	-	-	3	2	-	-	-
CO5	-	-	-	-	-	1	-	1	-	3	1	1	-	-

UNIT – I (9 Hrs)

Lesson : HUMAN VALUES: Gift of Magi (Short Story)

Listening	:	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking	:	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading	:	Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing	:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar	:	Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary	:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Learning Outcomes: At the end of this unit, students should be able to
- Understand specific pieces of information through listening and reading. (L2)
- Demonstrate basic questioning and answering skills on general topics. (L2)
- Outline the main ideas and specific details from the given text.(L2)
- Apply grammatical knowledge to frame flawless sentences. (L3)
- Develop basic word knowledge. (L3)

UNIT – II (9 Hrs)
Lesson : NATURE: The Brook by Alfred Tennyson (Poem)

Listening	:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking	:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading	:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing	:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar	:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary	:	Homonyms, Homophones, Homographs.

Learning Outcomes: At the end of this unit, students should be able to
- Distinguish between main idea and supporting ideas through listening. (L4)
- Develop short structured talks. (L3)
- Identify the logical sequence of ideas in a given text. (L3)
- Organize ideas into a meaningful paragraph by using cohesive devices and also learn the right usage of articles and prepositions. (L3)
- Identify difference among homonyms, homophones and homographs.(L3)

UNIT – III (9 Hrs)
Lesson : BIOGRAPHY: Elon Musk

Listening	:	Listening for global comprehension and summarizing what is listened to.
Speaking	:	Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading	:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing	:	Summarizing, Note-making, paraphrasing
Grammar	:	Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary	:	Compound words, Collocations.

Learning Outcomes: At the end of this unit, students should be able to
- Summarize what is listened to. (L2)
- Discuss on specific topics and report what is discussed. (L6)

- Interpret specific clues and use different strategies to comprehend a text. (L5)
- Summarize and paraphrase a given text by using different methods of note-making. (L2)
- Make use of right form of the verbs, compound words and collocations. (L3)

UNIT – IV (9 Hrs)
Lesson : INSPIRATION: The Toys of Peace by Saki

Listening	:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video
Speaking	:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading	:	Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/relationships, communicate processes or display complicated data.
Writing	:	Letter Writing: Official Letters, Resumes
Grammar	:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary	:	Words often confused, Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Make Predictions while listening to video and audio texts. (L6)
- Construct a dialogue in academic contexts. (L3)
- Analyze the data from the given graphic elements and present it verbally. (L4)
- Build effective resumes and draft formal letters. (L6)
- Apply grammatical rules to transform sentences into different speech or voice. (L3)
- Identify correct word for the context and also jargons. (L3)

UNIT – V (9 Hrs)
Lesson : MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening	:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking	:	Formal oral presentations on topics from academic contexts.
Reading	:	Reading Comprehension.
Writing	:	Writing structured essays on specific topics.
Grammar	:	Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary	:	Technical Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Interpret a given text and answer the questions. (L5)
- Present a topic of academic context. (L5)
- Interpret and comprehend a given text. (L5)
- Develop structured essays on specific topics. (L3)

- Identify common errors in grammar and usage.(L3)
- Make use of technical Jargons. (L3)

TEXTBOOKS:
1. "Pathfinder: Communicative English for Undergraduate Students", 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3)
2. "Empowering with Language", Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:
1. "English for Engineers", Dubey, Sham Ji & Co., Vikas Publishers, 2020
2. "Academic writing: A Handbook for International Students", Stephen Bailey, Routledge, 2014.
3. "English Grammar in Use", Raymond Murphy, 4th Edition, Cambridge University Press, 2019.
4. "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary", Norman Lewis, Anchor, 2014.

ONLINE LEARNING RESOURCES:
GRAMMAR:
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY:
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Code	ENGINEERING GRAPHICS		L	T	P	C
23A03301A	(Common to all branches)		**1**	**0**	**4**	**3**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:

➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing

➢ To impart knowledge on the projection of points, lines and plane surfaces

➢ To improve the visualization skills for better understanding of projection of solids

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. **(K2)**

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. **(K1)**

CO3: Understand and draw projection of solids in various positions in first quadrant. **(K2)**

CO4: Explain principles behind development of surfaces. **(K2)**

CO5: Prepare isometric and perspective sections of simple solids. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO2	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	3	-	-	-	-	2	-	2	2	2

UNIT – I (12 Hrs)

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Learning Outcomes: At the end of this unit, students should be able to

● Understand the significance of engineering drawing (L2)

- Know the conventions used in the engineering drawing (L1)
- Identify the curves obtained in different conic sections (L2)
- Draw different cycloidal and involute curves. (L1)
- Know about the scale conversion techniques (L1)

<u>UNIT – II</u> (12 Hrs)

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

Learning Outcomes: At the end of this unit, students should be able to
- Know how to draw the projections of points, lines (L1)
- Find the true length of the lines. (L2)
- Understand the procedure to draw projection of planes. (L2)
- Draw the projection of plane inclined to one plane and both the planes. (L1)

<u>UNIT – III</u> (18 Hrs)

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solid inclined to one plane. (L1)

<u>UNIT – IV</u> (15 Hrs)

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Learning Outcomes: At the end of this unit, students should be able to
- Understand the procedure to draw sectional views and true shape of solids. (L2)
- Represent the surface development of simple solids. (L3)

UNIT – V (18 Hrs)

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

Learning Outcomes: At the end of this unit, students should be able to

- Learn the basics convectional representation of different projections (L1)
- Draw the Orthographic projection of simple solids. (L1)
- Draw the Isometric projection of simple solids. (L1)
- Understand the different commands used in Computerized drawing (L2)

TEXTBOOKS:

1. "Engineering Drawing", N. D. Bhatt, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. "Engineering Drawing", K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. "Engineering Drawing", M. B. Shah and B. C. Rana, Pearson Education Inc, 2009.
3. "Engineering Drawing with an Introduction to AutoCAD", Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Code	BASIC ELECTRICAL & ELECTRONICS ENGINEERING (Common to all branches)		L	T	P	C
23A02301A			3	0	0	3
Pre-requisite	NIL	Semester		II		

COURSE OBJECTIVES:

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the problem solving concepts associated to AC and DC circuits. **(K2)**

CO2: Analyze the operating principles of motors, generators, MC and MI instruments. **(K4)**

CO3: Apply the mathematical tool for different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. **(K3)**

CO4: Explain the characteristics of diodes and transistors. **(K4)**

CO5: Familiarize with the number systems, codes, Boolean algebra and logic gates **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO2	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO3	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO4	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO5	3	3	1	-	1	3	2	-	-	-	-	1	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I (8 Hrs)
DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

Learning Outcomes: At the end of this unit, students should be able to

- Recall Kirchhoff's laws (L1) .
- Analyze simple electric circuits with DC excitation (L4)
- Understand fundamental definitions of 1-phase AC circuits (L2)

- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-phase elements R, L, and C. (L2)

UNIT – II (7 Hrs)
Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the principle and operation of DC Generator & Motor. (L2)
- Understand the operation of transformer and induction motor. (L2)
- Understand the construction of induction motor - DC motor (L2)
- Distinguish between MC and MI type of instruments (L3)

UNIT – III (7 Hrs)
Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the Conventional and Non-Conventional Energy Sources. (L2)
- Understand the Power Ratings of house hold appliances (L2)
- Knowing the energy consumption of different electrical appliances(L3)
- Calculating the electricity bill (L2).

PART B: BASIC ELECTRONICS ENGINEERING

UNIT – I (8 Hrs)

Semiconductor Devices: Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier

Learning Outcomes: At the end of this unit, students should be able to
- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

UNIT – II (7 Hrs)
Basic Electronic Circuits and Instrumentation
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.
Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.
Electronic Instrumentation: Block diagram of an electronic instrumentation system.
Learning Outcomes: At the end of this unit, students should be able to
- Understand the various Rectifiers and Power Supplies(L3)
- Analyze the behaviour of common emitter Amplifier with its frequency response (L3)

UNIT – III (7 Hrs)
Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).
Learning Outcomes: At the end of this unit, students should be able to
- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's Theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)

TEXTBOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Basic Electronics Engineering:
4. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson

Education, 2021.
5. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.

REFERENCE BOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, 4th Edition
2. "Principles of Power Systems", V. K. Mehtha, S. Chand Technical Publishers, 202
3. "Basic Electrical Engineering", T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. "Basic Electrical and Electronics Engineering", S. K. Bhattacharya, Pearson Publications, 2018, 2nd Edition.

For Basic Electronics Engineering:
1. "A Textbook of Electronic Devices and Circuits", R. S. Sedha, S. Chand & Co, 2010.
2. "Basic Electronics- Devices, Circuits and IT Fundamentals", Santiram Kal, Prentice Hall, India, 2002.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

ONLINE LEARNING RESOURCES:
For Basic Electrical Engineering:
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Course Code	DATA STRUCTURES		L	T	P	C
23A05401A	(Common to CSE, CSE – AI, AIML, CSE – IOT)		**3**	**0**	**0**	**3**
Pre-requisite	Introduction to Programming	Semester			II	

COURSE OBJECTIVES:

➢ To provide the knowledge of basic data structures and their implementations.
➢ To understand importance of data structures in context of writing efficient programs.
➢ To develop skills to apply appropriate data structures in problem solving.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. **(K2)**

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. **(K6)**

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. **(K3)**

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges. **(K3)**

CO5: Devise solutions to small-scale programs involving Tree data structure and recognize scenarios where hashing is advantageous and design hash-based solutions for specific problems. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	-	-	-	-	1	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	1	-
CO3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort.

Learning Outcomes: At the end of this unit, students should be able to

● Analyze various problem statements to estimate time and space complexities. (L4)
● Apply programming to solve searching and sorting problems. (L3)
● Design the different sorting techniques. (L3)

UNIT – II (9 Hrs)

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists

Learning Outcomes: At the end of this unit, students should be able to

- Analyze various operations on singly linked list. (L4)
- Interpret operations of doubly linked lists. (L2)
- Apply various operations on Circular linked lists. (L6)
- Design various applications of linked lists. (L3)

UNIT – III (9 Hrs)

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

Learning Outcomes: At the end of this unit, students should be able to

- Describe the operations of Stack. (L2)
- Describe various notations of arithmetic expressions. (L5)
- Evaluate arithmetic expressions using stack. (L5)
- Develop the applications using stack data structure (L3)

UNIT – IV (9 Hrs)

Queues: Introduction to queues: properties and operations, implementing queues using arrays an lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications

Learning Outcomes: At the end of this unit, students should be able to

- Develop various operations on Queues. (L6)
- Develop the applications using Queue data structure (L3)
- Apply queue data structure to solve breadth-first search, scheduling etc. (L6)

UNIT – V (8 Hrs)

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Learning Outcomes: At the end of this unit, students should be able to

- Develop the representation of Trees. (L3)
- Identify the various Binary Search Tree traversals. (L3)
- Select the appropriate hashing technique for a given application. (L5)
- Design a hashing technique. (L6)

TEXTBOOKS:
1. "Data Structures and algorithm analysis in C", Mark Allen Weiss, Pearson, 2nd Edition.
2. "Fundamentals of data structures in C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008.

REFERENCE BOOKS:
1. "Algorithms and Data Structures: The Basic Toolbox", Kurt Mehlhorn and Peter Sanders.
2. "C Data Structures and Algorithms", Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft.
3. "Problem Solving with Algorithms and Data Structures", Brad Miller and David Ranum.
4. "Introduction to Algorithms", Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.
5. "Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms", Robert Sedgewick.

ONLINE LEARNING RESOURCES:
1. https://www.simplilearn.com/tutorials/c-tutorial/data-structures-in-c
2. https://www.javatpoint.com/data-structure-tutorial
3. https://www.w3schools.com/c/c_intro.php
4. https://www.tutorialspoint.com/cprogramming/index.htm

Course Code	COMMUNICATIVE ENGLISH LAB		L	T	P	C
23A11202A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:
➢ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
➢ To train in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. **(K2)**

CO2: Apply communication skills through various language learning activities. **(K3)**

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **(K4)**

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. **(K5)**

CO5: Take part effectively in job interviews. **(K5)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	2	-	2	-	-	-	1	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	2	-	-

TOPICS:
1. Vowels and Consonants
Learning Outcomes: At the end of this session, students should be able to
● Distinguish different speech sounds while listening and speaking with a view to effectively comprehend texts of various difficulty levels. (L4)

2. Neutralization and Accent Rules
Learning Outcomes: At the end of this session, students should be able to
● Identify syllabification, stress, rhythm and intonation for effective inference of comprehended texts. (L3)
● Apply accent neutralized speech approach to communicate with fluency. (L3)
● Develop various transactional models of communication while listening to native speakers of English. (L3)

3. Communication skills and JAM

Learning Outcomes: At the end of this session, students should be able to

- Take part in short structured talks. (L4)
- Make use of effective communication skills in varied contexts. (L4)

4. Role Play or Conventional Practice

Learning Outcomes: At the end of this session, students should be able to

- Develop conversational skills both in academic and professional contexts. (L3)

5. E-mail Writing

Learning Outcomes: At the end of this session, students should be able to

- Construct structured and well-organized emails for different professional purposes. (L3)

6. Resume Writing, Cover Letter

Learning Outcomes: At the end of this session, students should be able to

- Build effective resumes along with cover letters. (L3)

7. Group Discussions – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Understand the key skills and behavioural requirements to facilitate the group discussion. (L2)
- Take part in group discussions effectively. (L4)

8. Debates – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Take part in brain storming sessions. (L4)
- Compare and contrast different viewpoints to arrive at a consensus. (L5)

9. PPT Presentations/Poster Presentations

Learning Outcomes: At the end of this session, students should be able to

- Create effective power point and poster presentations. (L6)

10. Interview Skills

Learning Outcomes: At the end of this session, students should be able to

- Develop required skills to participate in interviews. (L3)
- Analyze the dynamics of interviews to increase the chances of employment. (L4)

REFERENCE BOOKS:
1. "Technical Communication", Meenakshi Raman, Sangeeta Sharma, Oxford Press, 2018.
2. "English Conversation Practice", Taylor Grant, Tata McGraw-Hill Education India, 2016.
3. "Cambridge Academic English (B2)", Martin Hewings. CUP, 2012.

4. "A Course in Phonetics and Spoken English", J. Sethi & P.V. Dhamija, 2ⁿᵈ Edition, Kindle, 2013.

ONLINE LEARNING RESOURCES:
SPOKEN ENGLISH:
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & ACCENT:
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to all branches)			L	T	P	C
23A02302A				0	0	3	1.5
Pre-requisite	NIL		Semester			II	

COURSE OBJECTIVES:

- ➤ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
- ➤ To impart knowledge on the principles of digital electronics and fundamentals of electron devices and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

- **CO1:** Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. **(K2)**
- **CO2:** Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. **(K4)**
- **CO3:** Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. **(K3)**
- **CO4:** Identify & testing of various electronic components along with characteristics of various electron devices. **(K2)**
- **CO5:** Explain the operation of a digital circuit. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	2	-	-	-	-	2	3	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	3	3	2

PART A: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum six experiments should be performed

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: Minimum six experiments should be performed using both Hardware and Software

REFERENCE BOOKS:

For Electrical Engineering Lab:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Electronics Engineering Lab:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

Course Code	DATA STRUCTURES LAB		L	T	P	C
23A05402A	(Common to CSE, CSE – AI, AIML, CSE – IOT)		**0**	**0**	**3**	**1.5**
Pre-requisite	Computer Programming Lab	Semester		II		

COURSE OBJECTIVES:

➢ The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. **(K2)**

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. **(K6)**

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. **(K3)**

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges. **(K3)**

CO5: Recognize hashing advantages and design hash-based solutions for specific problems. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

LIST OF EXPERIMENTS:

Exercise 1: Array Manipulation

i) Write a program to reverse an array.

ii) C Programs to implement the Searching Techniques – Linear & Binary Search

iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.

ii) Develop a program to reverse a linked list iteratively and recursively.

iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications
i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation
i) Implement a doubly linked list and perform various operations to understand its properties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal

Exercise 5: Stack Operations
i) Implement a stack using arrays and linked lists.
ii) Write a program to evaluate a postfix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations
i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications
i) Use a stack to evaluate an infix expression and convert it to postfix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree
i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise 9: Hashing
i) Implement a hash table with collision resolution techniques.
ii) Write a program to implement a simple cache using hashing.

TEXTBOOKS:
1. "Data Structures and algorithm analysis in C", Mark Allen Weiss, Pearson, 2nd Edition.
2. "Fundamentals of data structures in C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008.

REFERENCE BOOKS:

1. "Algorithms and Data Structures: The Basic Toolbox", Kurt Mehlhorn and Peter Sanders.
2. "C Data Structures and Algorithms", Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft.
3. "Problem Solving with Algorithms and Data Structures", Brad Miller and David Ranum.
4. "Introduction to Algorithms", Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.
5. "Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms", Robert Sedgewick.

Course Code	IT WORKSHOP		L	T	P	C
23A05304A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning.
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Perform Hardware troubleshooting. **(K2)**

CO2: Understand Hardware components and inter dependencies. **(K2)**

CO3: Safeguard computer systems from viruses/worms. **(K3)**

CO4: Document/ Presentation preparation. **(K3)**

CO5: Perform calculations using spreadsheets. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	1	2	-	-	-	-	-	-	-	1	-
CO3	1	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	1	2	-	-	-	-	-	-	-	-	2
CO5	1	3	2	2	2	-	-	-	-	-	-	-	-	2

PC Hardware & Software Installation:

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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:
Task 1: 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 power point 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.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCE BOOKS:
1. "Comdex Information Technology course tool kit", Vikas Gupta, WILEY Dream tech, 2003
2. "The Complete Computer upgrade and repair book", Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd Edition
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2012, 2nd Edition
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", David Anfinson and Ken Quamme, CISCO Press, Pearson Education, 3rd Edition
7. "IT Essentials PC Hardware and Software Labs and Study Guide", Patrick Regan, CISCO Press, Pearson Education, 3rd Edition

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to all branches)		L	T	P	C
23A11109A			**0**	**0**	**1**	**0.5**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To make the students maintain their mental and physical wellness by balancing emotions in their life
- ➢ To enhance the essential traits required for the development of the personality.

COURSE OUTCOMES:
After completion of the course, the student will be able to
- **CO1:** Understand the importance of yoga and sports for Physical fitness and sound health. **(K2)**
- **CO2:** Demonstrate an understanding of health-related fitness components. **(K3)**
- **CO3:** Compare and contrast various activities that help enhance their health. **(K4)**
- **CO4:** Assess current personal fitness levels. **(K2)**
- **CO5:** Develop Positive Personality. **(K5)**

UNIT – I
Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity, Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.
Activities:
- Organizing health awareness programmes in community
- Preparation of health profile
- Preparation of chart for balance diet for all age groups

UNIT – II
Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.
Activities:
- Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.
Activities:
- Participation in one major game and one individual sport viz., Athletics, Volleyball,

Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
- Practicing general and specific warm up, aerobics
- Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:
1. "Health and Wellness", Gordon Edlin, Eric Golanty. 14th Edition, Jones & Bartlett Learning, 2022
2. "The Heart of Yoga: Developing a Personal Practice", T. K. V. Desikachar
3. "Yoga Sutras of Patanjali", Archie J. Bahm, Jain Publishing Company, 1993
4. "SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere", Wiseman, John Lofty, 3rd Edition, William Morrow Paperbacks, 2014
5. "The Sports Rules Book/ Human Kinetics with Thomas Hanlon", 3rd Edition, Human Kinetics, Inc.2014

GENERAL GUIDELINES:
1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:
- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

CSE – INTERNET OF THINGS
(For the batches admitted from the academic year 2023-24)

Vision

- To be a recognized Centre in the field of Computer Science and Engineering by imparting quality education and also equipping the students with latest technologies, soft skills and ethical values to face the challenges in industry & society.

Mission

- To provide quality education by imparting state of the art facility in Computer Science and Engineering.
- Enrich the students with innovative and problem-solving skills by establishing continuous Industry Institute interaction.
- To prepare the learners possessing social commitment and ethical values to face the dynamic challenges of industry and society.

Institutional Objectives

- To create a conducive and competitive environment for students through curricular and extra-curricular activities.
- Promote the culture of research among the faculty.
- To promote synergetic alliances with premier Institutions, Industry, CSIR laboratories and various Government organizations for Collaborative Research Projects.
- To promote economic and social enrichment of the society through Skill Development programmes, Entrepreneurship and extension activities.
- To introduce demand-driven new UG&PG academic programmes.
- To ensure a high degree of quality in terms of providing infrastructure, research ambience, faculty and staff development.

Core Values

- *Thirst for Quality Education:* The stake holders of the institute particularly management, employees and students of the institution have a consistent thirst for quality improvement of the processes and services in the institution.
- *Lifelong Learning:* In the fast-changing technological world, acquiring a special skill at one point of time will not be enough for ever long survival. Hence to flourish in the work place and to bring in innovations in the ways of doing, employee, student as well as alumni must be continuous learners and tech savvy.

- *Diversity and Participation:* PBRVITS promotes the involvement of faculty, staff and students from all social, economic, ethnics, cultural and religious backgrounds to get the synergy of combining the diversified agents. The focus is on involving students to exhibit their talent in various curricular and co-curricular activities and strengthening alumni link to share their experiences to the students.
- *Academic Integrity and Accountability:* Management induces accountability in the employees for the career of the students and the academic leadership establishes a mentoring mechanism for realization of responsibilities of students towards their parents and in turn to the society.

CSE – INTERNET OF THINGS

(For the batches admitted from the academic year 2023-24)

INDUCTION PROGRAM (3 weeks duration)	
S. No	**Course Name**
1	Physical Activities – Sports, Yoga and Meditation, Plantation
2	Career Counselling
3	Orientation to all branches – career options, tools, etc.
4	Orientation on admitted Branch – corresponding labs, tools and platforms
5	Proficiency Modules and Productivity Tools
6	Assessment on basic aptitude and mathematical skills
7	Remedial training in Foundation Courses
8	Human Values and Professional Ethics
9	Communication Skills – Focus on Listening, Speaking, Reading, Writing Skills
10	Concepts of Programming

Semester I (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11101A	Linear Algebra & Calculus	3	0	0	3	30	70	100
2	HSMC	23A11201A	Communicative English	2	0	0	2	30	70	100
3	ES	23A02301A	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	ES	23A05301A	Introduction to Programming	3	0	0	3	30	70	100
5	ES	23A03301A	Engineering Graphics	1	0	4	3	30	70	100
6	ES	23A02302A	Electrical and Electronics Engineering Workshop	0	0	3	1.5	30	70	100
7	ES	23A05302A	Computer Programming Lab	0	0	3	1.5	30	70	100
8	HSMC	23A11202A	Communicative English Lab	0	0	2	1	30	70	100
9	ES	23A05304A	IT Workshop	0	0	2	1	30	70	100
10	BS	23A11109A	Health and Wellness, Yoga and Sports	-	-	1	0.5	-	-	100
Total							**19.5**			**1000**

Semester II (First Year)

S. No	Category	Course Code	Course Title	Hours per week			Credits	CIE	SEE	Total
				L	T	P	C			
1	BS	23A11102A	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
2	BS	23A11103A	Engineering Physics	3	0	0	3	30	70	100
3	BS	23A11104A	Chemistry	3	0	0	3	30	70	100
4	ES	23A01301A	Basic Civil and Mechanical Engineering	3	0	0	3	30	70	100
5	PC	23A05401A	Data Structures	3	0	0	3	30	70	100
6	BS	23A11106A	Engineering Physics Lab	0	0	2	1	30	70	100
7	BS	23A11107A	Chemistry Lab	0	0	2	1	30	70	100
8	PC	23A05402A	Data Structures Lab	0	0	3	1.5	30	70	100
9	ES	23A05303A	Engineering Workshop	0	0	3	1.5	30	70	100
10	BS	23A11110A	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	-	-	100
Total							**20.5**			**1000**

Course Code	LINEAR ALGEBRA & CALCULUS		L	T	P	C
23A11101A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications. **(K3)**

CO2: Demonstrate the ability to compute eigen values and eigen vectors for square matrices using methods such as characteristic polynomials, determinants, and numerical techniques. **(K3)**

CO3: Utilize mean value theorems to real life problems. **(K3)**

CO4: Familiarize with functions of several variables which are useful in optimization. **(K3)**

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	-	-	-	-	-	-	-	2	2	-
CO2	3	3	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	1	2	-	-	-	-	-	-	-	1	1	-
CO5	3	2	2	3	-	-	-	-	-	-	-	2	1	-

UNIT – I (9 Hrs)

Matrices: Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

Learning Outcomes: At the end of this unit, students should be able to

- Solve systems of linear equations, using technology to facilitate row reduction and determine the rank (L3).
- Demonstrate an understanding of how to translate a system of simultaneous linear equations into a matrix (L2)
- Solve systems of linear equations using various methods including Gauss elimination

method and Gauss Seidel Iteration Methods (L3)

UNIT – II (9 Hrs)

Eigenvalues, Eigenvectors and Orthogonal Transformation: Eigenvalues, Eigenvectors 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 forms by Orthogonal Transformation.

Learning Outcomes: At the end of this unit, students should be able to

- Demonstrate the process of finding eigenvalues and eigenvalues for square matrices. (L2)
- Describe the process of diagonalizing a matrix and its significance. (L3)
- Apply the Cayley-Hamilton Theorem to find powers of a matrix and compute the inverse of a matrix. (L3)
- Apply knowledge of the nature of a quadratic form to analyse and solve optimization process. (L3)
- Explain the process of using orthogonal transformations to reduce a quadratic form to its canonical form. (L5)

UNIT – III (9 Hrs)

Calculus: Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

Learning Outcomes: At the end of this unit, students should be able to

- Analyze the behaviour of functions by using mean value theorems (L4)
- Translate the given function as series of Taylor's and Maclaurin's with remainders (L2)

UNIT – IV (9 Hrs)

Partial differentiation and Applications (Multi variable calculus): Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes: At the end of this unit, students should be able to

- Find partial derivatives numerically and symbolically and use them to analyze and   interpret the way a function varies. (L4)
- Acquire the Knowledge maxima and minima of functions of several variable (L3)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

UNIT – V (9 Hrs)

Multiple Integrals (Multi variable Calculus): Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Learning Outcomes: At the end of this unit, students should be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L3)
- Evaluate triple integrals in Cartesian, cylindrical and spherical polar coordinates. (L5)
- Apply triple integration techniques in evaluating volumes. (L3)

TEXTBOOKS:

1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", Michael Greenberg, Pearson publishers, 9th Edition
5. "Higher Engineering Mathematics", H. K. Das, Er. Rajnish Verma, S. Chand Publications, 2014, 3rd Edition (Reprint 2021)

Course Code	COMMUNICATIVE ENGLISH		L	T	P	C
23A11201A	(Common to all branches)		**2**	**0**	**0**	**2**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To facilitate effective Listening, Reading, Speaking and Writing skills among the students.
➢ To enhance their comprehending abilities, oral presentations, reporting useful information.
➢ To provide knowledge of grammatical structures and vocabulary.
➢ To make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues, and also from reading content. **(K2)**
CO2: Apply grammatical structures to formulate sentences and correct word forms. **(K3)**
CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions. **(K4)**
CO4: Evaluate reading / listening texts and to write summaries based on global comprehension of these texts. **(K5)**
CO5: Create a coherent paragraph, essay, and resume. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	1	-	2	-	2	2	-	-	3	2	-	-	-
CO5	-	-	-	-	-	1	-	1	-	3	1	1	-	-

UNIT – I (9 Hrs)

Lesson : HUMAN VALUES: Gift of Magi (Short Story)

Listening	:	Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking	:	Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading	:	Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Writing	:	Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar	:	Parts of Speech, Basic Sentence Structures-forming questions
Vocabulary	:	Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

Learning Outcomes: At the end of this unit, students should be able to
- Understand specific pieces of information through listening and reading. (L2)
- Demonstrate basic questioning and answering skills on general topics. (L2)
- Outline the main ideas and specific details from the given text.(L2)
- Apply grammatical knowledge to frame flawless sentences. (L3)
- Develop basic word knowledge. (L3)

UNIT – II (9 Hrs)
Lesson : NATURE: The Brook by Alfred Tennyson (Poem)

Listening	:	Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking	:	Discussion in pairs/small groups on specific topics followed by short structure talks.
Reading	:	Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing	:	Structure of a paragraph - Paragraph writing (specific topics)
Grammar	:	Cohesive devices - linkers, use of articles and zero article; prepositions.
Vocabulary	:	Homonyms, Homophones, Homographs.

Learning Outcomes: At the end of this unit, students should be able to
- Distinguish between main idea and supporting ideas through listening. (L4)
- Develop short structured talks. (L3)
- Identify the logical sequence of ideas in a given text. (L3)
- Organize ideas into a meaningful paragraph by using cohesive devices and also learn the right usage of articles and prepositions. (L3)
- Identify difference among homonyms, homophones and homographs.(L3)

UNIT – III (9 Hrs)
Lesson : BIOGRAPHY: Elon Musk

Listening	:	Listening for global comprehension and summarizing what is listened to.
Speaking	:	Discussing specific topics in pairs or small groups and reporting what is discussed.
Reading	:	Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing	:	Summarizing, Note-making, paraphrasing
Grammar	:	Verbs - tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary	:	Compound words, Collocations.

Learning Outcomes: At the end of this unit, students should be able to
- Summarize what is listened to. (L2)
- Discuss on specific topics and report what is discussed. (L6)

- Interpret specific clues and use different strategies to comprehend a text. (L5)
- Summarize and paraphrase a given text by using different methods of note-making. (L2)
- Make use of right form of the verbs, compound words and collocations. (L3)

UNIT – IV (9 Hrs)
Lesson : INSPIRATION: The Toys of Peace by Saki

Listening	:	Making predictions while listening to conversations/ transactional dialogues without video; listening with video
Speaking	:	Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading	:	Studying the use of graphic elements in texts to convey information, reveal trends/ patterns/relationships, communicate processes or display complicated data.
Writing	:	Letter Writing: Official Letters, Resumes
Grammar	:	Reporting verbs, Direct & Indirect speech, Active & Passive Voice.
Vocabulary	:	Words often confused, Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Make Predictions while listening to video and audio texts. (L6)
- Construct a dialogue in academic contexts. (L3)
- Analyze the data from the given graphic elements and present it verbally. (L4)
- Build effective resumes and draft formal letters. (L6)
- Apply grammatical rules to transform sentences into different speech or voice. (L3)
- Identify correct word for the context and also jargons. (L3)

UNIT – V (9 Hrs)
Lesson : MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening	:	Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking	:	Formal oral presentations on topics from academic contexts.
Reading	:	Reading Comprehension.
Writing	:	Writing structured essays on specific topics.
Grammar	:	Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).
Vocabulary	:	Technical Jargons.

Learning Outcomes: At the end of this unit, students should be able to

- Interpret a given text and answer the questions. (L5)
- Present a topic of academic context. (L5)
- Interpret and comprehend a given text. (L5)
- Develop structured essays on specific topics. (L3)

- Identify common errors in grammar and usage.(L3)
- Make use of technical Jargons. (L3)

TEXTBOOKS:
1. "Pathfinder: Communicative English for Undergraduate Students", 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3)
2. "Empowering with Language", Cengage Publications, 2023 (Units 4 & 5)

REFERENCE BOOKS:
1. "English for Engineers", Dubey, Sham Ji & Co., Vikas Publishers, 2020
2. "Academic writing: A Handbook for International Students", Stephen Bailey, Routledge, 2014.
3. "English Grammar in Use", Raymond Murphy, 4th Edition, Cambridge University Press, 2019.
4. "Word Power Made Easy - The Complete Handbook for Building a Superior Vocabulary", Norman Lewis, Anchor, 2014.

ONLINE LEARNING RESOURCES:
GRAMMAR:
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY:
1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Course Code	BASIC ELECTRICAL & ELECTRONICS	L	T	P	C
23A02301A	ENGINEERING (Common to all branches)	**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		I	

COURSE OBJECTIVES:

➢ To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the problem solving concepts associated to AC and DC circuits. **(K2)**

CO2: Analyze the operating principles of motors, generators, MC and MI instruments. **(K4)**

CO3: Apply the mathematical tool for different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations. **(K3)**

CO4: Explain the characteristics of diodes and transistors. **(K4)**

CO5: Familiarize with the number systems, codes, Boolean algebra and logic gates **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO2	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO3	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO4	3	2	1	-	1	3	2	-	-	-	-	1	1	2
CO5	3	3	1	-	1	3	2	-	-	-	-	1	1	2

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I (8 Hrs)
DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

Learning Outcomes: At the end of this unit, students should be able to

- Recall Kirchhoff's laws (L1) .
- Analyze simple electric circuits with DC excitation (L4)
- Understand fundamental definitions of 1-phase AC circuits (L2)

- Distinguish between scalar, vector and phasor quantities (L2)
- Understand voltage, current and power relationships in 1-phase elements R, L, and C. (L2)

UNIT – II (7 Hrs)
Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the principle and operation of DC Generator & Motor. (L2)
- Understand the operation of transformer and induction motor. (L2)
- Understand the construction of induction motor - DC motor (L2)
- Distinguish between MC and MI type of instruments (L3)

UNIT – III (7 Hrs)
Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the Conventional and Non-Conventional Energy Sources. (L2)
- Understand the Power Ratings of house hold appliances (L2)
- Knowing the energy consumption of different electrical appliances(L3)
- Calculating the electricity bill (L2).

PART B: BASIC ELECTRONICS ENGINEERING

UNIT – I (8 Hrs)

Semiconductor Devices: Introduction - Evolution of electronics - Vacuum tubes to nano electronics - Characteristics of PN Junction Diode - Zener Effect - Zener Diode and its Characteristics. Bipolar Junction transistor - CB, CE, CC Configurations and Characteristics - Elementary Treatment of Small Signal CE Amplifier

Learning Outcomes: At the end of this unit, students should be able to
- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

UNIT – II (7 Hrs)
Basic Electronic Circuits and Instrumentation
Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator.
Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response.
Electronic Instrumentation: Block diagram of an electronic instrumentation system.
Learning Outcomes: At the end of this unit, students should be able to
- Understand the various Rectifiers and Power Supplies(L3)
- Analyze the behaviour of common emitter Amplifier with its frequency response (L3)

UNIT – III (7 Hrs)
Digital Electronics: Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits– Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).
Learning Outcomes: At the end of this unit, students should be able to
- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's Theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)

TEXTBOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Basic Electronics Engineering:
1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson

Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.

REFERENCE BOOKS:
For Basic Electrical Engineering:
1. "Basic Electrical Engineering", D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, 4th Edition
2. "Principles of Power Systems", V. K. Mehtha, S. Chand Technical Publishers, 202
3. "Basic Electrical Engineering", T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. "Basic Electrical and Electronics Engineering", S. K. Bhattacharya, Pearson Publications, 2018, 2nd Edition.

For Basic Electronics Engineering:
1. "A Textbook of Electronic Devices and Circuits", R. S. Sedha, S. Chand & Co, 2010.
2. "Basic Electronics- Devices, Circuits and IT Fundamentals", Santiram Kal, Prentice Hall, India, 2002.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

ONLINE LEARNING RESOURCES:
For Basic Electrical Engineering:
1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

Course Code	INTRODUCTION TO PROGRAMMING		L	T	P	C
23A05301A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

- ➢ To introduce students to the fundamentals of computer programming.
- ➢ To provide hands-on experience with coding and debugging.
- ➢ To foster logical thinking and problem-solving skills using programming.
- ➢ To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- ➢ To encourage collaborative learning and teamwork in coding projects.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking. **(K2)**

CO2: Analyse a problem and develop an algorithm to solve it. **(K4)**

CO3: Implement various algorithms using the C programming language. **(K3)**

CO4: Understand more advanced features of C language. **(K2)**

CO5: Develop problem-solving skills and the ability to debug and optimize the code. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO2	3	3	2	1	-	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	1	-
CO4	3	3	3	2	1	-	-	-	-	-	-	-	-	2
CO5	1	2	3	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Programming and Problem Solving: History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

Learning Outcomes: At the end of this unit, students should be able to

- • Translate algorithms into programs. (L4)
- • Solve complex problems using language independent notations. (L3)

- Use C basic concepts to write simple C programs. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Analyze the algorithms for time and space complexities. (L4)

UNIT – II (9 Hrs)

Control Structures: Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

Learning Outcomes: At the end of this unit, students should be able to

- Implement conditional branching and iteration statements. (L2)
- Select the control structures for solving the problem statements (L4)
- Use iterative statements for writing C programs. (L3)

UNIT – III (8 Hrs)

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

Learning Outcomes: At the end of this unit, students should be able to

- Use arrays to process multiple homogeneous data. (L3)
- Solve mathematical problems using C programming language. (L3)
- Apply string-handling functions. (L3)

UNIT – IV (9 Hrs)

Pointers & User Defined Data types: Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

Learning Outcomes: At the end of this unit, students should be able to

- Structure the individual data elements to simplify the solution. (L6)
- Facilitate efficient memory utilization. (L6)
- Use pointers and structures to formulate algorithm and write programs. (L3)
- Understand the basic differences between structure and union. (L2)

UNIT – V (9 Hrs)

Functions & File Handling: Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope   and Lifetime of Variables, Basics of File Handling.

Learning Outcomes: At the end of this unit, students should be able to

- Understand basic terminology of modular programming. (L2)
- Writing structured programs using C Functions. (L5)
- Apply modular approach for solving the problem statements. (L3)
- Writing C programs using various storage classes to control variable access. (L5)

- Apply input and output statements to process the data in various formats. (L3)

Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS:
1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988.
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:
1. "Computing fundamentals and C Programming", E. Balagurusamy, McGraw-Hill Education, 2008.
2. "Programming in C", Rema Theraja, Oxford, 2016, 2nd Edition.
3. "C Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

ONLINE LEARNING RESOURCES:
1. www.learn-c.org
2. www.programmeiz.com
3. www.github.com

Course Code	ENGINEERING GRAPHICS		L	T	P	C
23A03301A	(Common to all branches)		**1**	**0**	**4**	**3**
Pre-requisite	NIL	Semester		I		

COURSE OBJECTIVES:

➢ To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing

➢ To impart knowledge on the projection of points, lines and plane surfaces

➢ To improve the visualization skills for better understanding of projection of solids

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

➢ To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. **(K2)**

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. **(K1)**

CO3: Understand and draw projection of solids in various positions in first quadrant. **(K2)**

CO4: Explain principles behind development of surfaces. **(K2)**

CO5: Prepare isometric and perspective sections of simple solids. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO2	3	1	-	-	-	-	-	-	-	2	-	-	2	2
CO3	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO4	3	2	2	-	3	-	-	-	-	2	-	2	2	2
CO5	3	2	2	-	3	-	-	-	-	2	-	2	2	2

UNIT – I (12 Hrs)

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

Learning Outcomes: At the end of this unit, students should be able to

● Understand the significance of engineering drawing (L2)

- Know the conventions used in the engineering drawing (L1)
- Identify the curves obtained in different conic sections (L2)
- Draw different cycloidal and involute curves. (L1)
- Know about the scale conversion techniques (L1)

UNIT – II (12 Hrs)

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

Learning Outcomes: At the end of this unit, students should be able to

- Know how to draw the projections of points, lines (L1)
- Find the true length of the lines. (L2)
- Understand the procedure to draw projection of planes. (L2)
- Draw the projection of plane inclined to one plane and both the planes. (L1)

UNIT – III (18 Hrs)

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane

Learning Outcomes: At the end of this unit, students should be able to

- Understand the procedure to draw projection of solids. (L2)
- Draw the projection of solid inclined to one plane. (L1)

UNIT – IV (15 Hrs)

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

Learning Outcomes: At the end of this unit, students should be able to

- Understand the procedure to draw sectional views and true shape of solids. (L2)
- Represent the surface development of simple solids. (L3)

UNIT – V (18 Hrs)

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings ofobjects including PCB and Transformations using Auto CAD (*Not for end examination*).

Learning Outcomes: At the end of this unit, students should be able to

- Learn the basics convectional representation of different projections (L1)
- Draw the Orthographic projection of simple solids. (L1)
- Draw the Isometric projection of simple solids. (L1)
- Understand the different commands used in Computerized drawing (L2)

TEXTBOOKS:

1. "Engineering Drawing", N. D. Bhatt, Charotar Publishing House, 2016.

REFERENCE BOOKS:

1. "Engineering Drawing", K. L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. "Engineering Drawing", M. B. Shah and B. C. Rana, Pearson Education Inc, 2009.
3. "Engineering Drawing with an Introduction to AutoCAD", Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Code	ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP (Common to all branches)		L	T	P	C
23A02302A			0	0	3	1.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.
➢ To impart knowledge on the principles of digital electronics and fundamentals of electron devices and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. **(K2)**

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. **(K4)**

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. **(K3)**

CO4: Identify & testing of various electronic components along with characteristics of various electron devices. **(K2)**

CO5: Explain the operation of a digital circuit. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO2	3	2	2	2	2	2	-	-	-	-	2	3	3	2
CO3	3	2	3	2	2	2	-	-	-	-	2	3	3	2
CO4	3	2	2	3	3	2	-	-	-	-	2	3	3	2
CO5	3	3	2	2	2	2	-	-	-	-	2	3	3	2

PART A: ELECTRICAL ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger

7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum six experiments should be performed

PART B: ELECTRONICS ENGINEERING LAB

LIST OF EXPERIMENTS:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools/Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

Note: Minimum six experiments should be performed using both Hardware and Software

REFERENCE BOOKS:
For Electrical Engineering Lab:

1. "Basic Electrical Engineering", D. C. Kulshreshtha, Tata McGraw Hill, 2019, 1st Edition
2. "Power System Engineering", P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. "Fundamentals of Electrical Engineering", Rajendra Prasad, PHI publishers, 2014, 3rd Edition.

For Electronics Engineering Lab:

1. "Electronic Devices & Circuit Theory", R. L. Boylestad & Louis Nashlesky, Pearson Education, 2021.
2. "Modern Digital Electronics", R. P. Jain, Tata Mc Graw Hill, 2009, 4th Edition.
3. "Introductory Electronic Devices & Circuits – Conventional Flow Version", R. T. Paynter, Pearson Education, 2009

Course Code	COMPUTER PROGRAMMING LAB		L	T	P	C
23A05302A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:

➢ The course aims to give students hands – on experience and train them on the concepts of the C-programming language.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Read, understand, and trace the execution of programs written in C language. **(K2)**

CO2: Select the right control structure for solving the problem. **(K1)**

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers. **(K3)**

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C. **(K3)**

CO5: Develop C programs to handle File handling operations. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

UNIT – I

Week 1:

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab 1: Familiarization with programming environment

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- Writing simple programs using printf(), scanf()

Week 2:

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments/Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 2: Converting algorithms/flow charts into C Source code. Developing the algorithms/ flowcharts for the following sample programs

    i) Sum and average of 3 numbers

    ii) Conversion of Fahrenheit to Celsius and vice versa

    iii) Simple interest calculation

Week 3:

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions.

Lab 3: Simple computational problems using arithmetic expressions

    i) Finding the square root of a given number

    ii) Finding compound interest

    iii) Area of a triangle using heron's formulae

    iv) Distance travelled by an object

UNIT – II

Week 4:

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial 4: Operators and the precedence and as associativity.

Lab 4: Simple computational problems using the operator' precedence and associativity

    i) Evaluate the following expressions

        a. A+B*C+(D*E) + F*G

        b. A/B*C-B+A*D/3

        c. A+++B---A

        d. J= (i++) + (++i)

    ii) Find the maximum of three numbers using conditional operator

    iii) Take marks of 5 subjects in integers, and find the total, average in float

Week 5:

Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if- else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5:   Branching and logical expressions.

Lab 5:   Problems involving if-then-else structures

    i)   Write a C program to find the max and min of four numbers using if-else.

    ii)   Write a C program to generate electricity bill.

    iii) Find the roots of the quadratic equation.

    iv) Write a C program to simulate a calculator using switch case.

    v)   Write a C program to find the given year is a leap year or not.

Week 6:

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use

Suggested Experiments/Activities:

Tutorial 6:   Loops, while and for loops.

Lab 6:   Iterative problems e.g., the sum of series

    i)   Find the factorial of given number using any loop.

    ii)   Find the given number is a prime or not.

    iii) Compute sine and cos series

    iv) Checking a number palindrome

    v)   Construct a pyramid of numbers

UNIT – III
Week 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1-D Arrays: searching.

Lab 7: 1-D Array manipulation, linear search

    i)   Find the min and max of a 1-D integer array.

    ii)   Perform linear search on1D array.

    iii) The reverse of a 1D integer array

    iv) Find 2's complement of the given binary number.

    v)   Eliminate duplicate elements in an array.

Week 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will

reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort
   i) Addition of two matrices
   ii) Multiplication two matrices
   iii) Sort array elements using bubble sort
   iv) Concatenate two strings without built-in functions
   v) Reverse a string using built-in and without built-in string functions

UNIT – IV
Week 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation.

Lab 9: Pointers and structures, memory dereference
   i) Write a C program to find the sum of a 1D array using malloc()
   ii) Write a C program to find the total, average of n students using structures
   iii) Enter n students data using calloc() and display failed students list
   iv) Read student name and marks from the command line and display the student details along with the total.
   v) Write a C program to implement realloc()

Week 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bitfields, Self-Referential Structures, Linked lists.

Lab 10: Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields
   i) Create and display a singly linked list using self-referential structure.
   ii) Demonstrate the differences between structures and unions using a C program.
   iii) Write a C program to shift/rotate using bitfields.
   iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT – V
Week 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent.

Lab 11: Simple functions using call by value, solving differential equations using Euler's theorem.
   i)   Write a C function to calculate NCR value.
   ii) Write a C function to find the length of a string.
   iii) Write a C function to transpose of a matrix.
   iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

Week 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls.

Lab 12: Recursive functions
   i)   Write a recursive function to generate Fibonacci series.
   ii) Write a recursive function to find the lcm of two numbers.
   iii) Write a recursive function to find the factorial of a number.
   iv) Write a C Program to implement Ackermann function using recursion.
   v)   Write a recursive function to find the sum of series.

Week 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.
   i)   Write a C program to swap two numbers using call by reference.
   ii) Demonstrate Dangling pointer problem using a C program.
   iii) Write a C program to copy one string into another using pointer.
   iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

Week 14:

Objective: To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling.

Lab 14: File operations

i) Write a C program to write and read text into a file.
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file.
iv) Write a C program to merge two files into the third file using command-linearguments.
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXTBOOKS:

1. "Programming in C: A practical approach", Ajay Mittal, Pearson
2. "Schaum's Outline of Programming with C", Byron S Gottfried, McGraw-Hill Education, 1996.

REFERENCE BOOKS:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. "C   Programming", A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd Edition.

Course Code	COMMUNICATIVE ENGLISH LAB		L	T	P	C
23A11202A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:
- ➢ To expose the students to a variety of self-instructional, learner friendly modes of language learning.
- ➢ To train in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills. **(K2)**

CO2: Apply communication skills through various language learning activities. **(K3)**

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **(K4)**

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions. **(K5)**

CO5: Take part effectively in job interviews. **(K5)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	-	2	-	2	-	-	-	1	2	3	-	1	-	-
CO5	-	-	-	-	-	-	-	1	-	3	-	2	-	-

TOPICS:
1. Vowels and Consonants
Learning Outcomes: At the end of this session, students should be able to
- Distinguish different speech sounds while listening and speaking with a view to effectively comprehend texts of various difficulty levels. (L4)

2. Neutralization and Accent Rules
Learning Outcomes: At the end of this session, students should be able to
- Identify syllabification, stress, rhythm and intonation for effective inference of comprehended texts. (L3)
- Apply accent neutralized speech approach to communicate with fluency. (L3)
- Develop various transactional models of communication while listening to native speakers of English. (L3)

3. Communication skills and JAM

Learning Outcomes: At the end of this session, students should be able to

- Take part in short structured talks. (L4)
- Make use of effective communication skills in varied contexts. (L4)

4. Role Play or Conventional Practice

Learning Outcomes: At the end of this session, students should be able to

- Develop conversational skills both in academic and professional contexts. (L3)

5. E-mail Writing

Learning Outcomes: At the end of this session, students should be able to

- Construct structured and well-organized emails for different professional purposes. (L3)

6. Resume Writing, Cover Letter

Learning Outcomes: At the end of this session, students should be able to

- Build effective resumes along with cover letters. (L3)

7. Group Discussions – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Understand the key skills and behavioural requirements to facilitate the group discussion. (L2)
- Take part in group discussions effectively. (L4)

8. Debates – Methods and Practices

Learning Outcomes: At the end of this session, students should be able to

- Take part in brain storming sessions. (L4)
- Compare and contrast different viewpoints to arrive at a consensus. (L5)

9. PPT Presentations/Poster Presentations

Learning Outcomes: At the end of this session, students should be able to

- Create effective power point and poster presentations. (L6)

10. Interview Skills

Learning Outcomes: At the end of this session, students should be able to

- Develop required skills to participate in interviews. (L3)
- Analyze the dynamics of interviews to increase the chances of employment. (L4)

REFERENCE BOOKS:

1. "Technical Communication", Meenakshi Raman, Sangeeta Sharma, Oxford Press, 2018.
2. "English Conversation Practice", Taylor Grant, Tata McGraw-Hill Education India, 2016.
3. "Cambridge Academic English (B2)", Martin Hewings. CUP, 2012.

4. "A Course in Phonetics and Spoken English", J. Sethi & P.V. Dhamija, 2nd Edition, Kindle, 2013.

ONLINE LEARNING RESOURCES:
SPOKEN ENGLISH:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

VOICE & ACCENT:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Course Code	IT WORKSHOP		L	T	P	C
23A05304A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:
- ➢ To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
- ➢ To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
- ➢ To teach basic command line interface commands on Linux.
- ➢ To teach the usage of Internet for productivity and self-paced life-long learning.
- ➢ To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Perform Hardware troubleshooting. **(K2)**

CO2: Understand Hardware components and inter dependencies. **(K2)**

CO3: Safeguard computer systems from viruses/worms. **(K3)**

CO4: Document/ Presentation preparation. **(K3)**

CO5: Perform calculations using spreadsheets. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	2	1	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	1	2	-	-	-	-	-	-	-	1	-
CO3	1	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	1	2	-	-	-	-	-	-	-	-	2
CO5	1	3	2	2	2	-	-	-	-	-	-	-	-	2

PC Hardware & Software Installation:
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 (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:

Task 1: 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 power point 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.

AI TOOLS – ChatGPT:

Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

REFERENCE BOOKS:
1. "Comdex Information Technology course tool kit", Vikas Gupta, WILEY Dream tech, 2003
2. "The Complete Computer upgrade and repair book", Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd Edition
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education, 2012, 2nd Edition
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", David Anfinson and Ken Quamme, CISCO Press, Pearson Education, 3rd Edition
7. "IT Essentials PC Hardware and Software Labs and Study Guide", Patrick Regan, CISCO Press, Pearson Education, 3rd Edition

Course Code	HEALTH AND WELLNESS, YOGA AND SPORTS (Common to all branches)		L	T	P	C
23A11109A			0	0	1	0.5
Pre-requisite	NIL	Semester	I			

COURSE OBJECTIVES:
  ➢ To make the students maintain their mental and physical wellness by balancing emotions in their life
  ➢ To enhance the essential traits required for the development of the personality.

COURSE OUTCOMES:

After completion of the course, the student will be able to

  CO1: Understand the importance of yoga and sports for Physical fitness and sound health. **(K2)**

  CO2: Demonstrate an understanding of health-related fitness components. **(K3)**

  CO3: Compare and contrast various activities that help enhance their health. **(K4)**

  CO4: Assess current personal fitness levels. **(K2)**

  CO5: Develop Positive Personality. **(K5)**

UNIT – I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity, Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

  ● Organizing health awareness programmes in community
  ● Preparation of health profile
  ● Preparation of chart for balance diet for all age groups

UNIT – II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

  ● Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

  ● Participation in one major game and one individual sport viz., Athletics, Volleyball,

Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
- Practicing general and specific warm up, aerobics
- Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

REFERENCE BOOKS:
1. "Health and Wellness", Gordon Edlin, Eric Golanty. 14th Edition, Jones & Bartlett Learning, 2022
2. "The Heart of Yoga: Developing a Personal Practice", T. K. V. Desikachar
3. "Yoga Sutras of Patanjali", Archie J. Bahm, Jain Publishing Company, 1993
4. "SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere", Wiseman, John Lofty, 3rd Edition, William Morrow Paperbacks, 2014
5. "The Sports Rules Book/ Human Kinetics with Thomas Hanlon", 3rd Edition, Human Kinetics, Inc.2014

GENERAL GUIDELINES:
1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

EVALUATION GUIDELINES:
- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

Course Code	DIFFERENTIAL EQUATIONS & VECTOR CALCULUS		L	T	P	C
23A11102A	**CALCULUS** (Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To enlighten the learners in the concept of differential equations and multivariablecalculus.
- ➢ To furnish the learners with basic concepts and techniques at plus two level to lead theminto advanced level by handling various real-world applications.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Apply first order and first degree differential equations to model and solve problems in various scientific and engineering disciplines, including electrical circuits. **(K3)**

CO2: Solve the differential equations related to various engineering fields**. (K3)**

CO3: Identify solution methods for partial differential equations that model physical processes. **(K3)**

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence. **(K2)**

CO5: Estimate the work done against a field, circulation and flux using vector calculus. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2	-	-	-	-	-	-	-	2	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	2	2	-
CO3	3	2	3	2	-	-	-	-	-	-	-	1	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	2	1	-
CO5	2	3	2	2	-	-	-	-	-	-	-	1	1	-

UNIT – I (9 Hrs)
Differential equations of first order and first degree: Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

Learning Outcomes: At the end of this unit, students should be able to
- Learn the effective mathematical tools for solutions of first order differential equations(L2)
- Apply mathematical tools to model physical processes such as Newton's law of cooling, electrical circuits (L3).

UNIT – II (9 Hrs)
Linear differential equations of higher order (Constant Coefficients): Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit

problems and Simple Harmonic motion.

Learning Outcomes: At the end of this unit, students should be able to
- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L4)
- Formulate and solve the higher order differential equation by analyzing physical situations (L6)

UNIT – III (9 Hrs)

Partial Differential Equations: Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

Learning Outcomes: At the end of this unit, students should be able to
- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT – IV (9 Hrs)

Vector differentiation: Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

Learning Outcomes: At the end of this unit, students should be able to
- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT – V (9 Hrs)

Vector integration: Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Learning Outcomes: At the end of this unit, students should be able to
- Find the work done in moving a particle along the path over a force field (L1)
- Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXTBOOKS:
1. "Higher Engineering Mathematics", B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. "Advanced Engineering Mathematics", Erwin Kreyszig, John Wiley & Sons, 2018, 10th

Edition.

REFERENCE BOOKS:

1. "Thomas' Calculus", George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. "Advanced Engineering Mathematics", Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. "Advanced Modern Engineering Mathematics", Glyn James, Pearson publishers, 2018, 5th Edition.
4. "Advanced Engineering Mathematics", R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. "Higher Engineering Mathematics", B. V. Ramana, McGraw Hill Education, 2017

Course Code	**ENGINEERING PHYSICS**		**L**	**T**	**P**	**C**
23A11103A	(Common to all branches)		**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:

➢ To identify the importance of the physical optics i.e., interference, diffraction and polarization related to its engineering applications

➢ To present the basic concepts needed to understand the crystal structure of materials, X-ray diffraction

➢ To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging microdevices

➢ To enlighten the concepts of Quantum mechanics and to provide fundamentals of the de Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory.

➢ Evolution of band theory to distinguish materials and explain the properties of semiconductors

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Analyze the intensity variation of light due to interference, diffraction & polarization. **(K3)**

CO2: Familiarize with the basics of crystals and their structures**. (K2)**

CO3: Summarize various types of polarization of dielectrics and classify the magnetic materials. **(K3)**

CO4: Explain the basic concepts of quantum mechanics and the band theory of solids. **(K2)**

CO5: Identify the type of semiconductor using Hall effect **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO3	3	1	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Wave Optics:

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double

refraction - Nicol's Prism -Half wave and Quarter wave plates.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the need of coherent sources and the conditions for sustained interference (L2)
- Identify scientific & engineering applications of interference (L3)
- Analyze the differences between interference and diffraction with applications (L4)
- Illustrate the concept of polarization of light and its applications (L2)
- Classify ordinary light and polarized light (L2)

UNIT – II (9 Hrs)

Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

Learning Outcomes: At the end of this unit, students should be able to

- Classify various crystal systems (L2)
- Identify different planes in the crystal structure (L3)
- Analyze the crystalline structure by using Laue method & powder method (L4)

UNIT – III (9 Hrs)

Dielectric and Magnetic Materials

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concept of dielectric constant and polarization in dielectric materials (L2)
- Summarize various types of polarization of dielectrics (L2)
- Interpret Lorentz field and Clausius- Mosotti relation indielectrics (L2)
- Classify magnetic materials based on susceptibility and their temperature dependence (L2)
- Explain the applications of dielectric and magnetic materials (L2)

UNIT – IV (9 Hrs)

Quantum Mechanics and Free electron Theory

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

Learning Outcomes: At the end of this unit, students should be able to

- Explain the concepts of dual nature of matter (L2)
- Understand the significance of wave function (L2)
- Interpret the concepts of classical and quantum free electron theories (L2)
- Understand the concept of density of states (L2)

UNIT – V (8 Hrs)

Semiconductors: Formation of energy bands – classification of crystalline solids – Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Hall effect and applications.

Learning Outcomes: At the end of this unit, students should be able to

- Classify the energy bands of semiconductors (L2)
- Understand the differences between intrinsic and extrinsic semiconductors (L2)
- Identify the type of semiconductor using Hall effect (L2)
- Identify applications of semiconductors in electronic devices (L2)

TEXTBOOKS:

1. "A Text book of Engineering Physics", M. N. Avadhanulu, P. G. Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition, 2019.
2. "Engineering Physics", D. K. Bhattacharya and Poonam Tandon, Oxford press, 2015

REFERENCE BOOKS:

1. "Engineering Physics", B. K. Pandey and S. Chaturvedi, Cengage Learning, 2021.
2. "Engineering Physics", Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. "Engineering Physics", Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press, 2010
4. "Engineering Physics", M. R. Srinivasan, New Age international publishers, 2009

ONLINE LEARNING RESOURCES:

1. https://www.loc.gov/rr/scitech/selected-internet/physics.html

Course Code	CHEMISTRY	L	T	P	C
23A11104A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)	**3**	**0**	**0**	**3**
Pre-requisite	NIL		Semester		II	

COURSE OBJECTIVES:

➢ To familiarize chemistry and applications.
➢ To train the students on the principles and applications of electro chemistry and polymers.
➢ To introduce instrumental methods and applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the salient features of different theories along with their applications. **(K2)**

CO2: Discuss about the model engineering materials. **(K3)**

CO3: Apply the knowledge of various electrodes for the development of new batteries. **(K3)**

CO4: Identify the different polymers and their uses in various fields of engineering. **(K3)**

CO5: Analyze the knowledge of different analytical techniques used engineering and also development of new techniques. **(K4)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	-	-

UNIT – I (10 Hrs)

Structure and Bonding Models: Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in one dimensional box, molecular orbital theory – bonding in homo - and hetero nuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes: At the end of this unit, students should be able to

● Illustrate the molecular orbital energy level diagram of different molecular species (L2)
● Discuss the basic concept of molecular orbital theory (L3)
● Explain the calculation of bond order of O2 and CO molecules (L2)

UNIT – II (9 Hrs)

Modern Engineering Materials: Semiconductors: Introduction, basic concept, applications

Super conductor: Introduction, basic concept, applications.

Super capacitors: Introduction, Basic Concept, Classification, Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphine nanoparticles.

Learning Outcomes: At the end of this unit, students should be able to

- Explain the band theory of solids for conductors, semiconductors and insulators (L2)
- Demonstrate the application of Fullerenes, Carbon nanotubes and Graphene nanoparticles (L2)

UNIT – III (9 Hrs)

Electro Chemistry and Applications: Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors: Potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc- air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell – working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Learning Outcomes: At the end of this unit, students should be able to

- Apply the Nernst equation for calculating electrode and cell potentials(L3)
- Differentiate between potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)

UNIT – IV (9 Hrs)

Polymer Chemistry: Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, Bakelite, Nylon-6,6, Carbon fibers.

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – Polyacetylene, polyaniline, – mechanism of conduction and applicatio Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

Learning Outcomes: At the end of this unit, students should be able to

- Explain the different types of polymers and their applications (L2)
- Explain the preparation, properties and applications of Bakelite, Nylons (L2)
- Describe the mechanism of conduction in conducting polymers (L2)
- Discuss Buna-S and Buna-N and their applications (L2)

UNIT – V (8 Hrs)

Instrumental Methods and Applications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography-Basic principle, Classification- HPLC: Principle, Instrumentation and Applications.

Learning Outcomes: At the end of this unit, students should be able to
- Explain the different types of spectral series in electromagnetic spectrum (L2)
- Understand the principles and applications of different analytical instruments (L2)

TEXTBOOKS:
1. "Engineering Chemistry", Jain and Jain, Dhanpat Rai publications, 17th Edition, 2018
2. "Atkins' Physical Chemistry", Peter Atkins, Julio de Paula and James Keeler, Oxford University Press, 10th Edition, 2010
3. "Concise Inorganic Chemistry", J. D. Lee, Wiley Publications, 5th Edition, Feb 2008

REFERENCE BOOKS:
1. "Principles of Instrumental Analysis", Skoog and West, 6th Edition, Thomson, 2007.
2. "Textbook of Polymer Science", Fred W. Billmayer Jr, 3rd Edition

Course Code	BASIC CIVIL AND MECHANICAL ENGINEERING (Common to all branches)		L	T	P	C
23A01301A			**3**	**0**	**0**	**3**
Pre-requisite	NIL	Semester		II		

COURSE OBJECTIVES:

➢ To get familiarized with scope and importance of Civil and Mechanical Engineering in different sectors and industries.

➢ To introduce the preliminary concepts of Building Planning, Construction, Materials and related tests.

➢ To acquire preliminary knowledge of surveying and understand the importance of the quality of the drinking water.

➢ To explain different engineering materials and manufacturing processes.

➢ To provide an overview of different thermal and mechanical systems, introduce basics of robotics and its applications.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand various sub-divisions of Civil Engineering and appreciate their role in ensuring better society. **(K2)**

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying. **(K3)**

CO3: Realize the importance of Transportation in nation's economy and engineering measures related to highways in terms of geometrics. **(K3)**

CO4: Understand the importance of water resources and storage structures so that social responsibilities of water conservation will be appreciated.**(K1)**

CO5: Understand the different manufacturing processes and explain the basics of thermal engineering and its applications. **(K2)**

CO6: Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics. **(K2)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-
CO6	3	2	3	-	-	-	-	-	-	-	-	-	-	-

PART A: BASIC CIVIL ENGINEERING

UNIT – I (8 Hrs)

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering -Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks - Cement concrete- Steel-Tests on these materials.

Factors to be considered in Building Planning- Nature of Buildings- Typical Layouts of a Residential Building- Industrial Building- Commercial Building like a Supermarket / Hotel / Theatre.

Learning Outcomes: At the end of this unit, students should be able to

- Identify the role of civil Engineers in the society and Various Disciplines of Civil Engineering. (L2)
- Develop typical layouts for different residential commercial and Industrial buildings. (L3)

UNIT – II (7 Hrs)

Surveying: Objectives of Surveying- Horizontal Measurements- Vertical Measurements-Angular Measurements- Leveling instruments used for leveling- Introduction to Bearings Simple problems on leveling and bearings-Contour mapping.

Learning Outcomes: At the end of this unit, students should be able to

- Describe objectives of surveying and Horizontal and vertical measurements (L2)
- Measure Horizontal and vertical angles using surveying Instruments (L3)

UNIT – III (8 Hrs)

Transportation Engineering, Water Resources and Environmental Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences - Basic geometric design elements of a highway- Camber- Stopping Sight Distance- Super elevation Introduction.

Water Resources and Environmental Engineering: Sources of water- Quality of water - Specifications and Tests- Introduction to Hydrology- Hydrograph -Rain water Harvesting - Rain water runoff- Water Storage Structures (Simple introduction to Dams and Reservoirs).

Learning Outcomes: At the end of this unit, students should be able to

- Explain various types of pavements, their differences and basics of design (L2)
- Examine the quality of different sources of water and its storage (L3)

PART B: BASIC MECHANICAL ENGINEERING

UNIT – I (7 Hrs)

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace,

and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

Learning Outcomes: At the end of this unit, students should be able to

- Know the importance of machine and utilization in different fields. (L1)
- Know different kinds of materials and its classification. (L1)

UNIT – II (8 Hrs)

Manufacturing Processes: Principles of Casting, Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering - working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

Learning Outcomes: At the end of this unit, students should be able to

- Know different production technologies used in industries. (L1)
- Know working principles and elements of automobiles. (L2)

UNIT – III (7 Hrs)

Power plants - working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

Learning Outcomes: At the end of this unit, students should be able to

- Know working principles and elements used for power generation. (L1)
- Understand the concepts of various power transmission systems. (L2)
- Learn the robotics basic terminology and its usage in different sectors. (L1)

TEXTBOOKS:

For Basic Civil Engineering:

1. "Basic Civil and the Mechanical Engineering", G. Shanmugam and M. S. Palanisamy, Tata McGraw Hill publications (India) Pvt, Ltd.
2. "Basic Civil Engineering", S.S. Bhavikatti, New Age International Publishers.
3. "Engineering Materials", Dr. S.C. Rangwala, Charotor Publishing House.
4. "Highway Engineering", S. K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications.
5. "Irrigation Engineering and Hydraulic Structures", Santosh Kumar Garg, Khanna Publishers, Delhi.
6. "Building Construction", Dr. B. C. Punmia, Lakshmi Publications, Delhi.

For Basic Mechanical Engineering:

1. "Internal Combustion Engines", V. Ganesan, Tata McGraw Hill publications (India) Pvt.

Ltd.

2. "A Tear book of Theory of Machines", S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.

3. "An introduction to Mechanical Engineering", Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

REFERENCE BOOKS:

For Basic Civil Engineering:

1. "Surveying, Vol- I and Vol-II", S.K. Duggal, Tata McGraw Hill Publishers.

2. "Hydrology and Water Resources Engineering", Santosh Kumar Garg, Khanna Publishers, Delhi.

For Basic Mechanical Engineering:

1. "Robotics", Appuu Kuttan K K, I. K. International Publishing House Pvt. Ltd. Volume-I

2. "3D printing & Additive Manufacturing Technology", L. Jyothish Kumar, Pulak M Pandey, Springer publications

3. "Thermal Engineering", Mahesh M Rathore, Tata McGraw Hill publications (India) Pvt. Ltd.

4. "Basic Civil and Mechanical Engineering", G. Shanmugam and M. S, Palanisamy, Tata McGraw Hill publications (India) Pvt. Ltd.

Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject.

Course Code	DATA STRUCTURES		L	T	P	C
23A05401A	(Common to CSE, CSE – AI, AIML, CSE – IOT)		**3**	**0**	**0**	**3**
Pre-requisite	Introduction to Programming	Semester		II		

COURSE OBJECTIVES:

➢ To provide the knowledge of basic data structures and their implementations.
➢ To understand importance of data structures in context of writing efficient programs.
➢ To develop skills to apply appropriate data structures in problem solving.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. **(K2)**

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. **(K6)**

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. **(K3)**

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges. **(K3)**

CO5: Devise solutions to small-scale programs involving Tree data structure and recognize scenarios where hashing is advantageous and design hash-based solutions for specific problems. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	-	-	-	-	1	-
CO2	3	2	2	2	-	-	-	-	-	-	-	-	1	-
CO3	3	2	3	2	-	-	-	-	-	-	-	-	1	-
CO4	3	2	2	3	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	-	-	2

UNIT – I (10 Hrs)

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort.

Learning Outcomes: At the end of this unit, students should be able to

● Analyze various problem statements to estimate time and space complexities. (L4)
● Apply programming to solve searching and sorting problems. (L3)
● Design the different sorting techniques. (L3)

UNIT – II (9 Hrs)

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists

Learning Outcomes: At the end of this unit, students should be able to

- Analyze various operations on singly linked list. (L4)
- Interpret operations of doubly linked lists. (L2)
- Apply various operations on Circular linked lists. (L6)
- Design various applications of linked lists. (L3)

UNIT – III (9 Hrs)

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

Learning Outcomes: At the end of this unit, students should be able to

- Describe the operations of Stack. (L2)
- Describe various notations of arithmetic expressions. (L5)
- Evaluate arithmetic expressions using stack. (L5)
- Develop the applications using stack data structure (L3)

UNIT – IV (9 Hrs)

Queues: Introduction to queues: properties and operations, implementing queues using arrays an lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications

Learning Outcomes: At the end of this unit, students should be able to

- Develop various operations on Queues. (L6)
- Develop the applications using Queue data structure (L3)
- Apply queue data structure to solve breadth-first search, scheduling etc. (L6)

UNIT – V (8 Hrs)

Trees: Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Learning Outcomes: At the end of this unit, students should be able to

- Develop the representation of Trees. (L3)
- Identify the various Binary Search Tree traversals. (L3)
- Select the appropriate hashing technique for a given application. (L5)
- Design a hashing technique. (L6)

TEXTBOOKS:

1. "Data Structures and algorithm analysis in C", Mark Allen Weiss, Pearson, 2nd Edition.
2. "Fundamentals of data structures in C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008.

REFERENCE BOOKS:

1. "Algorithms and Data Structures: The Basic Toolbox", Kurt Mehlhorn and Peter Sanders.
2. "C Data Structures and Algorithms", Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft.
3. "Problem Solving with Algorithms and Data Structures", Brad Miller and David Ranum.
4. "Introduction to Algorithms", Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.
5. "Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms", Robert Sedgewick.

ONLINE LEARNING RESOURCES:

1. https://www.simplilearn.com/tutorials/c-tutorial/data-structures-in-c
2. https://www.javatpoint.com/data-structure-tutorial
3. https://www.w3schools.com/c/c_intro.php
4. https://www.tutorialspoint.com/cprogramming/index.htm

Course Code	ENGINEERING PHYSICS LAB		L	T	P	C
23A11106A	(Common to all branches)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:

➢ To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors.
➢ To study the parameters and applications of dielectric and magnetic materials by conducting experiments

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Operate optical Instruments like travelling microscope and spectrometer. **(K2)**

CO2: Estimate the wavelengths of different colours using diffraction grating. **(K2)**

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance **(K3)**

CO4: Calculate the band gap of a given semiconductor. **(K3)**

CO5: Evaluate the acceptance angle and numerical aperture of an optical fiber. **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO2	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO3	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO4	3	2	-	-	-	-	-	-	1	1	-	-	-	-
CO5	3	2	-	-	-	-	-	-	1	1	-	-	-	-

LIST OF EXPERIMENTS:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
19. Determine the thickness of the wire using wedge shape method.
20. Determine the numerical aperture and acceptance angle of a given optical fiber.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

REFERENCE BOOKS:
1. "A Textbook of Practical Physics", S. Balasubramanian, M. N. Srinivasan, S. Chand Publishers, 2017.

ONLINE LEARNING RESOURCES:
1. www.vlab.co.in
2. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Course Code	CHEMISTRY LAB		L	T	P	C
23A11107A	(Common to EEE, ECE, CSE, CSE – AI, AIML, CSE – IOT)		**0**	**0**	**2**	**1**
Pre-requisite	NIL	Semester	II			

COURSE OBJECTIVES:
- ➢ To get familiar with the basic concepts of Chemistry.
- ➢ To verify the fundamental concepts with experiments.

COURSE OUTCOMES:
After completion of the course, the student will be able to

CO1: Distinguish different types of titrations in the volumetric analysis **(K3)**

CO2: Determine the cell constant and conductance of solutions **(K3)**

CO3: Calculate the strength of an acid present in secondary batteries **(K3)**

CO4: Analyze the effect of absorbance of given sample solution on concentration by using colorimetry **(K3)**

CO5: Prepare advanced polymer Bakelite materials **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

LIST OF EXPERIMENTS:
1. Determination of Strength of an acid in Lead-Acid battery
2. Estimation of Ferrous Iron by Dichrometry
3. Potentiometry –Determination of Ferrous Iron using Standard $K_2Cr_2O_7$ solution.
4. Conductometry-Determinationofcellconstantandconductanceofsolutions.
5. Conductometric titration of strong acid vs strong base
6. Conductometric titration of weak acid vs strong base
7. P^H-metric titration of a) strong acid vs strong base b) weak acid vs strong base.
8. Verification of the Beer-Lambert's law and determination of strength of the given sample solution.
9. Determination of CFSE (10Dq) by Spectrophotometric method.
10. Preparation of Bakelite
11. Preparation of Nanomaterials by Precipitation method

12. Determination of the R_f - value of given sample by Thin Layer Chromatography (TLC).

TEXTBOOKS:

1. "A Text Book on Experiments and Calculations in Engineering Chemistry", S. Chand Publications, 9th Edition, 2003.
2. "Engineering Chemistry", Shashi Chawla, Dhanpat Rai publications, 2nd Edition, 2014.
3. "Experiments in Applied Chemistry", Dr. Sunita Rattan, S. K. Kataria & Sons Publishers of Engineering, 2nd Edition, 2004.

REFERENCE BOOKS:

1. Vogel's Text Book of Quantitative Chemical Analysis", Mendham Jet.al, Pearson Education, 6th Edition, 2012.

Course Code	DATA STRUCTURES LAB		L	T	P	C
23A05402A	(Common to CSE, CSE – AI, AIML, CSE – IOT)		**0**	**0**	**3**	**1.5**
Pre-requisite	Computer Programming Lab	Semester	II			

COURSE OBJECTIVES:

➢ The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms. **(K2)**

CO2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation. **(K6)**

CO3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems. **(K3)**

CO4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges. **(K3)**

CO5: Recognize hashing advantages and design hash-based solutions for specific problems. **(K6)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	1	3	-	-	-	-	-	-	-	1	-
CO2	2	2	2	1	2	-	-	-	-	-	-	-	1	-
CO3	3	3	2	2	2	-	-	-	-	-	-	-	1	-
CO4	2	2	2	2	2	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	2	-	-	-	-	-	-	-	-	2

LIST OF EXPERIMENTS:

Exercise 1: Array Manipulation

i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques – Linear & Binary Search
iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

Exercise 2: Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications
  i) Create a program to detect and remove duplicates from a linked list.
  ii) Implement a linked list to represent polynomials and perform addition.
  iii) Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation
  i) Implement a doubly linked list and perform various operations to understand its properties and applications.
  ii) Implement a circular linked list and perform insertion, deletion, and traversal

Exercise 5: Stack Operations
  i) Implement a stack using arrays and linked lists.
  ii) Write a program to evaluate a postfix expression using a stack.
  iii) Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations
  i) Implement a queue using arrays and linked lists.
  ii) Develop a program to simulate a simple printer queue system.
  iii) Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications
  i) Use a stack to evaluate an infix expression and convert it to postfix.
  ii) Create a program to determine whether a given string is a palindrome or not.
  iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary Search Tree
  i) Implementing a BST using Linked List.
  ii) Traversing of BST.

Exercise 9: Hashing
  i) Implement a hash table with collision resolution techniques.
  ii) Write a program to implement a simple cache using hashing.

TEXTBOOKS:
  1. "Data Structures and algorithm analysis in C", Mark Allen Weiss, Pearson, 2nd Edition.
  2. "Fundamentals of data structures in C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008.

REFERENCE BOOKS:

1. "Algorithms and Data Structures: The Basic Toolbox", Kurt Mehlhorn and Peter Sanders.
2. "C Data Structures and Algorithms", Alfred V. Aho, Jeffrey D. Ullman and John E. Hopcroft.
3. "Problem Solving with Algorithms and Data Structures", Brad Miller and David Ranum.
4. "Introduction to Algorithms", Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.
5. "Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms", Robert Sedgewick.

Course Code	**ENGINEERING WORKSHOP**		**L**	**T**	**P**	**C**
23A05303A	(Common to all branches)		**0**	**0**	**3**	**1.5**
Pre-requisite	NIL	Semester		II		

COURSE OBJECTIVES:

➢ To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Identify workshop tools and their operational capabilities. **(K3)**

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry, welding and plumbing. **(K3)**

CO3: Apply fitting operations in various applications. **(K3)**

CO4: Apply basic electrical engineering knowledge for House Wiring Practice **(K3)**

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO2	3	1	-	-	3	-	1	-	2	1	-	3	2	2
CO3	3	2	2	-	3	-	1	-	2	1	-	3	2	2
CO4	3	2	2	-	3	-	1	-	2	1	-	3	2	2

LIST OF EXPERIMENTS:

1. **Demonstration**: Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
   a) Half – Lap joint
   b) Mortise and Tenon joint
   c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray
   b) Conical funnel
   c) Elbow pipe
   d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit

b) Dovetail fit
c) Semi-circular fit
d) Bicycle tire puncture and change of two-wheeler tyre

5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series
   b) Two-way switch
   c) Godown lighting
   d) Tube light
   e) Three phase motor
   f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

TEXTBOOKS:
1. "Basic Workshop Technology: Manufacturing Process", Felix W.; Independently Published, 2019.
2. "Workshop Processes, Practices and Materials", Bruce J. Black, Routledge Publishers, 5th Edition, 2015.
3. "A Course in Workshop Technology Vol I. & II", B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

REFERENCE BOOKS:
1. "Elements of Workshop Technology - Vol. I", S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th Edition
2. "Workshop Practice", H. S. Bawa, Tata-McGraw Hill, 2004.
3. "Wiring Estimating, Costing and Contracting", P.M. Soni & P.A. Upadhyay, Atul Prakashan, 2021-22.

Course Code	NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE		L	T	P	C
23A11110A	(Common to all branches)		0	0	1	0.5
Pre-requisite	NIL	Semester			II	

COURSE OBJECTIVES:

➢ To impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service

COURSE OUTCOMES:

After completion of the course, the student will be able to

CO1: Understand the importance of discipline, character and service motto. **(K2)**

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques. **(K3)**

CO3: Explore human relationships by analyzing social problems. **(K4)**

CO4: Determine to extend their help for the fellow beings and downtrodden people. **(K3)**

CO5: Develop leadership skills and civic responsibilities. **(K5)**

UNIT – I

Orientation: General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT – II

Nature & Care

Activities:

- Best out of waste competition.
- Poster and signs making competition to spread environmental awareness.
- Recycling and environmental pollution article writing competition.
- Organising Zero-waste day.
- Digital Environmental awareness activity via various social media platforms.
- Virtual demonstration of different eco-friendly approaches for sustainable living.
- Write a summary on any book related to environmental issues.

UNIT – III
Community Service
Activities:

- Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media, authorities, experts, etc.
- Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
- Conducting consumer Awareness. Explaining various legal provisions etc.
- Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
- Any other programmes in collaboration with local charities, NGOs etc.

REFERENCE BOOKS:

1. "A Text Book of National Service Scheme Vol – I", Nirmalya Kumar Sinha & Surajit Majumder, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. "Red Book - National Cadet Corps – Standing Instructions Vol I & II", Directorate General of NCC, Ministry of Defence, New Delhi.
3. "Introduction to Environmental Engineering", M. L. Davis and D. A. Cornwell, McGraw Hill, New York, 4th Edition, 2008.
4. "Introduction to Environmental Engineering and Science", G. M. Masters, K. Joseph and R. Nagendran, Pearson Education, New Delhi, 2nd Edition, 2007.
5. "Social Problems in India", Ram Ahuja, Rawat Publications, New Delhi.

GENERAL GUIDELINES:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

EVALUATION GUIDELINES:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.