GEETHANJALIINSTITUTEOFSCIENCE&TECHNOLOGY: NELLORE
(AUTONOMOUS)

NELLORE–524317(A.P) INDIA

B.TECH IN ELECTRICAL AND ELCTRONICS ENGINEERING
(ACCREDITATED BY NBA)

COURSE STRUCTURE AND SYLLABI
UNDER RG- 23 REGULATIONS

DEPARTMENT VISION

To make the department as a hub of technological excellence, transforming the future Electrical Engineers into innovative, ethical and responsible professionals.

DEPARTMENT MISSION

DM1: Adopting effective result oriented techniques that deliver quality education in a learning environment striving to enhance the intellectual capabilities and skills of the learners.

DM2: Providing adequate infrastructure for technical skill development and encourage research in order to meet Industrial demands.

DM3: Promoting industry interface and exposure, positive values of integrity, ecological awareness, and societal accountability among the Engineering aspirants.

DM4: Empowering undergraduates, guiding them towards bright professional prospects through personality development and life skill-based activities.

PROGRAMME EDUCATIONAL OBJECTIVES:

Graduates of B. Tech., in Electrical and Electronics Engineering program shall able to

PEO1: Acquiring professional expertise in several kinds of industrial, societal, and pragmatic uses

PEO2: Pursuing higher studies, research and development, with other innovative skills and being creative striving in the fields of engineering, science, and technology, proceeding on multiple career paths.

PEO3: Exhibit excellence in Multi-Disciplinary collaborationsby showcasingunique interpersonal competencies and ethical practices.

PEO4: Engage in lifelong learning and adapt to the perpetually evolving trends in profession and societal needs.

Program Specific Outcomes

PSO1: Capability to exhibit expertise and experience in accurately evaluating the origins and impact electrical systems, processes, and technologies, in this present digital era.

PSO2: Conceive, identify, and execute ideas for electrical industry applications by employing MATLAB / SciLAB.

Program Outcomes

PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering Fundamentals and an engineering specialization the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning in formed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering Solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development
PO8	**Ethic**s: Apply ethical principles and commit to professional ethics and responsibilities and Norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual and as a member or Leader in diverse teams and in multi disciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations and give And receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member And leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage In independent and life- long learning in the broadest context of technological change.

GEETHANJALI INSTITUTE OF SCIENCE AND TECHNOLOGY
(AUTONOMOUS)
NELLORE–524137(A.P) INDIA

Electrical and Electronics Engineering

(B.TECH)

Course Structure (RG23)

Semester - 1 (Theory-5, Lab-4)

Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1	BS&H	23A0009T	Communicative English	2	0	0	2
2	BS&H	23A0004T	Chemistry	3	0	0	3
3	BS&H	23A0001T	Linear Algebra and calculus	3	0	0	3
4	ES	23A0101T	Basic Civil and Mechanical Engineering	3	0	0	3
5	PC	23A0501T	Introduction to programming	3	0	0	3
6	ES	23A0302P	Engineering Workshop	0	0	3	1.5
7	BS&H	23A0009T	Communicative English Lab	0	0	2	1
8	BS&H	23A0007P	Chemistry Lab	0	0	2	1
9	PC	23A0502P	Computer Programming Lab	0	0	3	1.5
10	BS&H	23AYG01P	Health and Wellness, Yoga and Sports	0	0	1	0.5
Total credits							**19.5**

HoD **Dean of Academics** **Principal**

COMMUNICATIVE ENGLISH
(Common to all Branches of Engineering)

Course Code	L:T: P: S	Credits	Exam marks	Exam Duration	Course Type
23A0009T	2: 0: 0: 0	2	CIE:30 SEE:70	3 Hours	HS

Course Objectives:

- Facilitate effective **listening skills** for better comprehension of academic lectures and English spoken by native speakers
- Help improve **speaking skills** motivating the learners to participate in activities such as role plays, discussions and structured talks/oral presentations
- Focus on appropriate **reading skills** for comprehension of various academic texts and authentic materials
- Impart effective strategies for good **writing skills** in summarizing, writing well organized essays, drafting formal letters and designing well structured reports
- Broaden the knowledge base of **grammatical structures** and **vocabulary** and encourage their appropriate use in speech and writing

Syllabus		Total Hours:32
Module - I	**HUMAN VALUES:** Gift of Magi **(Short Story)**	**8 Hrs**

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.

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Module - II	**The Brook by Alfred Tennyson (Poem)**	**7Hrs**

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structured 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.

Module - III	**BIOGRAPHY: Elon Musk**	**6 Hrs**

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**,**
Vocabulary: Compound words, Collocations

Module - IV	**INSPIRATION: The Toys of Peace -Saki**	**6 Hrs**

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

Module - V	MOTIVATION: The Power of Intrapersonal Communication (An Essay)	5 Hrs

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 for 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

Course Outcomes (CO):

On completion of this course, student will be able to

- The learner will be able to speak and write grammatically accurate sentences through applications of principles of English grammar
- The learner will enhance vocabulary skills to build strong language skills.
- The learner acquires the ability to understand the academic text from multiple dimensions employing ethical and logical reasoning based on accurate comprehension
- The learner gains evaluation potential by employing standard reading & listening strategies to grasp the core essence and spirit of the text
- The learner will gain mastery on speaking & writing skills through the application of relevant guidelines, through consistent practice of functional English expression

Textbooks:

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

Reference Books:

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

Web 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

CHEMISTRY
(Common to CSE, AI&ML, CS, ECE, EEE, DS)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
23A0004T	3:0:0:0	3	CIE: 30 SEE:70	3 Hours	BSC

Course Objectives: Student will be able to

- To familiarize chemistry and its applications.
- To train the students on the principles and applications of electrochemistry and polymers.
- To introduce instrumental methods.

Syllabus	Total Hours: 48 Hrs

Unit- I	Structure and Bonding Models	9Hrs

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2, Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ2 , particle in one dimensional box, molecular orbital theory – bonding in homo- and hetero-nuclear diatomic molecules – energy level diagrams of O2, CO, and NO. π-molecular orbitals of butadiene and benzene, calculation of bond order.

Unit-II	Modern Engineering materials	10Hrs

Semiconductors – Introduction, basic concept, application
Superconductors: Introduction, Basic concept and Applications.
Supercapacitors: Introduction, Basic concept, Classification and Applications.
Nanomaterials: Introduction, classification, properties and applications of Fullerenes, carbon nanotubes and Graphine nanoparticles.

Unit-III	Electrochemistry and Applications	10Hrs

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-oxygenfuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

Unit-IV	Polymer Chemistry	10Hrs

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, Teflon, Bakelite, Nylon-6,6, carbon fibres.
Elastomers–Buna-S, Buna-N–preparation, properties and applications.
Conducting polymers – polyacetylene, polyaniline, – mechanism of conduction and applications.
Biodegadable polymers - **poly dioxanone,** Polyglycolic Acid (PGA), Polylactic Acid (PLA).

Unit-V	Instrumental Methods and applications	9Hrs

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, **Gas chromatography,** HPLC: Principle, Instrumentation and applications.

Course Outcomes (CO): After completion of the course, students will be able to

- Describe Planck's quantum theory, dual nature of matter, Schrodinger equation, molecular orbital Theory and molecular orbital energy level diagram of differentmolecules
- Explain Crystal field theory, splitting in octahedral and tetrahedral geometry and themagnetic behavior, Oxidation state, coordination and color of complexes.
- Explain the principle of Band diagrams of conductors, superconductor, semiconductorsand insulator and nonmaterial
- Discuss the principles of electrochemistry in potentiometry, conductometry, battery and electrochemical sensors
- Explain polymerization and the preparation, properties, and applications of thermoplastics &thermosetting, elastomers, & conducting polymers
- Discuss the different applications of analytical instruments

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. J.M.Lehn, Supra Molecular Chemistry, VCH Publications

LINEAR ALGEBRA & CALCULUS (Common to All Branches of Engineering)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
23A0001T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**BS**

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.

Syllabus		**Total Hours: 45**
Unit - I	**Matrices**	**9 Hrs**

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 - Gauss elimination method, Iteration Methods: Gauss - Jacobi and Gauss Seidel Iteration Methods. Applications: Finding the current in electrical circuits.

Unit - II	**Eigenvalues, Eigenvectors and Orthogonal Transformation**	**9 Hrs**

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.

Unit - III	**Calculus**	**9 Hrs**

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

Unit - IV	**Partial differentiation and Applications (Multi variable calculus)**	**9 Hrs**

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, 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.

Unit - V	**Multiple Integrals (Multi variable Calculus)**	**9 Hrs**

Double integrals, triple integrals, change of order of integration (Cartesian Coordinate only), change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals)

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

CO1: Solving systems of linear equations that is needed by engineers for practical applications.

CO2: Find the eigen values and eigen vectors to facilitate the calculation of matrix characteristics.

CO3: Utilize mean value theorems to real life problems.

CO4: Apply the technique of partial differentiation to find the Jacobian and the extreme values of functions of several variables.

CO5: Apply the techniques of multiple integrals to find the areas and volumes.

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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, Micheael Greenberg, Pearson publishers, 9th edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021
6. Engineering Mathematics III by N.P. Bali, Dr. K.L. Sai Prasad, University Science Press.
7. Engineering Mathematics I by T.K.V. Iyengar, B.Krishna Gandhi,, S. Chand Publications, 2019 Edition.
8. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad, S. Chand Publications.
9. Higher Engineering Mathematics, B. V. Ramana, McGraw Hill Education, 2017.

Basic Civil & Mechanical Engineering (Common for all branches)					
Course Code	**L:T:P:S**	**Credits**	**Exam Marks**	**Exam Duration**	**Course Type**
23A0101T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	**ESC**

Course Objectives:

- Get familiarized with the scope and importance of Civil Engineering sub-divisions
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familiarized with the importance of quality, conveyance and storage of water
- Introduction to basic civil engineering materials and construction techniques

Syllabus	**PART-A (CIVIL)**	**Total Hours: 48**
Unit - I	**Introduction**	**9 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. Introduction to Prefabricated construction Techniques

Unit - II	**Fluid Mechanics, Surveying & Bearings**	**9 Hrs**

Fluid Mechanics: Properties of fluids and types of fluids.
Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

Unit - III	**Basics on Constructions**	**9 Hrs**

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.
Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Textbooks:

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

E-Resources :

https://archive.nptel.ac.in/courses/105/106/105106201/

	PART-B (BASIC MECHANICALENGINEERING)	
Unit - I	**Introduction**	

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.

Unit - II	**Manufacturing Processes & Thermal Engineering**	

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.

Unit - III	**Power plants,Transmission & Robotics**	

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.

(**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 Outcomes:

On completion of the course, the student should be able to

1. Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying
2. Realize the importance of Transportation in nation's economy and the engineering measures related to highways in terms of geometrics.
3. Understand the importance of water resources and storage structures so that the social responsibilities of water conservation will be appreciated.
4. Understand the different manufacturing processes
5. The basics of thermal engineering and its applications.
6. Describe the working of different mechanical power transmission systems and power plants; learn basics of robotics.

Textbooks:

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

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

3.An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, cengage learning India pvt. Ltd.

ReferenceBooks:

1.Appuu Kuttan KK, Robotics, 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 by Mahesh M Rathore Tata Mcgraw Hill publications (India) Pvt. Ltd.

4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata Mcgraw Hill publications (India) Pvt. Ltd.

INTRODUCTION TO PROGRAMMING
(Common to All branches of Engineering)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
23A0501T	**3: 0:0:0**	**3**	**CIE: 30 SEE:70**	**3 Hours**	

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

Syllabus — **Total Hours: 48**

Unit		
Unit - I	**Introduction to Programming and Problem Solving**	**10 Hrs**

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..

Unit - II	**Control Structures**	**8 Hrs**

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

Unit - III	**Arrays and Strings**	**10 Hrs**

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

Unit - IV	**Pointers & User Defined Data types**	**10 Hrs**

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

Unit - V	**Functions & File Handling**	**10 Hrs**

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, command line arguments, Preprocessor directives, Basics of File Handling.

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

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

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.
CO2: Analyse a problem and develop an algorithm to solve it.
CO3: Implement various algorithms using the C programming language.
CO4: Understand more advanced features of C language.
CO5: Develop problem-solving skills and the ability to debug and optimize the code.

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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, Balagurusamy, E., 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

ENGINEERING WORKSHOP
(Common to All branches of Engineering)

Course Code	L : T : P	Credits	Exam Marks	Exam Duration	Course Type
23A0302P	**0 : 0 : 3**	**1.5**	**CIE: 30 EE:70**	**3 Hours**	

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

Course Outcomes:

On completion of this course, the students are able to:-

1. Identify workshop tools and their operational capabilities.
2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
3. Apply fitting operations in various applications.
4. Apply basic electrical engineering knowledge for House Wiring Practice.

SYLLABUS **Total Hours : 32**

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.
3. Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
4. Sheet Metal Working: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
5. Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
6. Fitting: Familiarity with different types of tools used in fitting and do the following fitting exercises.
7. V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
8. Electrical Wiring: Familiarity with different types of basic electrical circuits and make the following connections.
9. Parallel and series b) Two-way switch c) Godown lighting
10. d) Tube light e) Three phase motor f) Soldering of wires
11. Foundry Trade: Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
12. Welding Shop: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
13. 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. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. 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 by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22.

COMMUNICATIVE ENGLISH LAB
(Common to all Branches of Engineering)

Course Code	L : T : P	Credits	Exam Marks	Exam Duration	Course Type
23A0009P	0 : 0 : 2	1	CIE: 30 EE:70	3 Hours	HS

Course Objectives:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning students will get trained in the basic communication skills and also make them ready to face job interviews.

Course Outcomes:

On completion of this course, the students are able to:-

1. Analyze the English speech sounds, stress, intonation for better Listening practice
2. Apply communication skills through various language learning activities
3. Application of writing skills through design and preparation of professional Resume & email writing
4. Create effective resonate and prepare themselves to face interviews in future

List of Experiments — **Total Hours : 32**

1. VOWELS & CONSONANTS
2. NEUTRILIZATION/ ACCENT RULES
3. COMMUNICATION SKILLS & JAM
4. ROLE PLAY OR CONVERSATIONAL PRACTICE
5. EMAIL WRIRING
6. RESUME WRITING, COVER LETTER, SOP
7. GRPOUP DISCUSSION-METHODS & PRACTICE
8. DEBATE - METHOD & PRACTICE
9. PPT PRESENTATION / PSTER PRESENTATION
10. INTERVIEW SKILLS

Suggested Software: Walden InfoTech / Young India Films

Reference Books:

1. Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. T. Balasubramanyam, A Textbook of English Phonetics for Indian Students,(3rd Ed) Trinity Press.

Online Learning Resources/Virtual Labs:

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

COMPUTER PROGRAMMING LAB
(Common to All branches of Engineering)

Course Code	L : T : P	Credits	Exam Marks	Exam Duration	Course Type
23A0502P	**0 : 0 : 3**	**1.5**	**CIE: 30 EE:70**	**3 Hours**	

Course Objectives:

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

Course Outcomes:

On completion of this course, the students are able to:-

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

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

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

SYLLABUS **Total Hours : 32**

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.

Lab1: Familiarization with programming environment

I. Basic Linux environment and its editors like Vi, Vim & Emacs etc.
II. Exposure to Turbo C, gcc
III. 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 1: 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:

Tutorial4: Operators and the precedence and as associativity:
Lab4: 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 7:1D 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
Lab10 : 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 Eulers 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.

WEEK14:

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-line arguments.
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. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice- Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

CHEMISTRY LAB

(**Common to CSE, AI&ML, ECE, EEE, DS**)

CourseCode	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
23A0007P	0:0:2:0	1	CIE:30 SEE:70	3 Hours	BSC

Course Objectives:

- Verify the fundamental concepts with experiments

Syllabus — **Total Hours: 48**

List of Experiments

1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strong acid vs. strong base
3. Conductometric titration of weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite
8. Verify Lambert-Beer's law
9. Simultaneous estimation of Mn and Cr ions by spectrophotometry in water samples.
10. Wavelength measurement of sample through UV-Visible Spectroscopy
11. Identification of functional groups in organic compounds by IR Spectroscopy.
12. Preparation of nanomaterials by precipitation method
13. Estimation of Ferrous Iron by Dichrometry
14. Determination of Hardness of a groundwater sample
15. pH metric titration of strong acid vs strong base

(**Any 10 experiments from the above list)**

Course Outcomes:

On completion of this course, the students are able to:

- Determine the cell constant and conductance of solutions and the strength of an acid by conductometry
- Synthesize of advanced polymer materials
- Measure the strength of an acid present in secondary battery and Ferrous ion usingvolumetric analysis
- Determine the potentials and EMFs of solutions by Potentiometry
- Identify some organic and inorganic compounds by instrumental methods
- Synthesize of nanomaterials by simple methods

Text Book(s):

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Jain & Jain. Engineering Chemistry: Dhanapath rai Publications., 2015.
3. S.S.Dara, Experiments and Calculations in Engineering Chemistry: S-Chand Publications, Revised edition, 2008.

Reference Book(s):

- "Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

HEALTH AND WELLNESS, YOGA AND SPORTS

(Common to CSE, AI&ML, ECE, EEE, DS)

CourseCode	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
23AYG01P	0:0:1:0	0.5	100	3 Hours	BSC

Course Objectives:

- The main objective of introducing this course is to make the students maintain their mental andphysical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality

Syllabus	Total Hours: 18

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:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) 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:

i) 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
ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

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.
CO2: Demonstrate an understanding of health-related fitness components.
CO3: Compare and contrast various activities that help enhance their health.
CO4: Assess current personal fitness levels.
CO5: Develop Positive Personality

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.

Reference Book(s):

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

GEETHANJALI INSTITUTE OF SCIENCE AND TECHNOLOGY (AUTONOMOUS)
NELLORE–524137(A.P) INDIA

Electrical and Electronics Engineering

(B.TECH)

Course Structure (RG23)

Semester - 2 (Theory-5, Lab-4)							
Sl. No.	Category	Course Code	Course Title	Hours per week			Credits
				L	T	P	C
1.	BS&H	23A0003T	Engineering Physics	3	0	0	3
2.	BS&H	23A0002T	Differential Equations and vector calculus	3	0	0	3
3.	PC	23A0203T	Electrical Circuits Analysis – I	3	0	0	3
4.	ES	23A0201T	Basic Electrical and Electronics Engineering	3	0	0	3
5.	ES	23A0301T	Engineering Graphics	1	0	4	3
6.	ES	23A0202P	Electrical and Electronics Engineering Workshop	0	0	3	1.5
7.	ES	23A0503P	IT Workshop	0	0	2	1
8.	BS&H	23A0006P	Engineering Physics Lab	0	0	2	1
9.	PC	23A0204P	Network Analysis and Simulation Lab / Electrical Circuits Lab / Data Structures Lab	0	0	3	1.5
10	BS&H	23ANS01P	NSS/NCC/Scouts and Guides / Community Service	0	0	1	0.5
			Total credits				**20.5**

HoD **Dean of Academics** **Principal**

ENGINEERING PHYSICS

(Common to all branches)

Course Code	L : T : P	Credits	Exam Marks	Exam Duration	Course Type
23A0003T	3 : 0 : 0	3	CIE: 30 EE:70	3 Hours	BS

Prerequisite: Student should know about fundamental and basic principles in physics

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

Course Outcomes:

On completion of this course, the students are able to:-

1. Analyze the intensity variation of light due to polarization, interference anddiffraction.
2. Familiarize with the basics of crystals and their structures.
3. Summarize various types of polarization of dielectrics and classify the magneticmaterials.
4. Apply fundamentals of quantum mechanics to band theory of solids.
5. Identify the type of semiconductor using Hall effect.

SYLLABUS — **Total Hours:48**

Unit- I — WAVE OPTICS — 10

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colors 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 andDouble refraction - Nicol's Prism -Half wave and Quarter wave plates

Unit- II — CRYSTALLOGRAPHY AND X-RAY DIFFRACTION — 8

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.

Unit- III — DIELECTRIC AND MAGNETIC MATERIALS — 10

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 dilectric 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

Unit- IV — QUANTUM MECHANICS AND FREE ELECTRON THEORY — 10

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 freeelectron theory

- Fermi-Dirac distribution - Density of states - Fermi energy.

Unit- V	SEMICONDUCTORS	10

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 effectand its applications.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – High T_C superconductors– Applications of superconductors

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).
3. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers

Reference Books:

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

E-resources:

- https://www.textbooks.com/Catalog/MG5/Applied-Physics.php
- https://edurev.in/courses/9596_Electromagnetic-Theory-Notes--Videos--MCQs--PPTs
- https://libguides.ntu.edu.sg/c.php?g=867756&p=6226561
- https://bookauthority.org/books/best-applied-physics-books
- https://www.electronicsforu.com/resources/16-free-ebooks-on-material-science/2

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All Branches of Engineering)

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
23A0002T	3: 0:0:0	3	CIE: 30 SEE:70	3 Hours	BS

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

Syllabus		Total Hours: 45
Unit - I	Differential equations of first order and first degree	9 Hrs

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 decayElectrical circuits.

Unit - II	Linear differential equations of higher order (Constant Coefficients)	9 Hrs

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.

Unit - III	Partial Differential Equations	9 Hrs

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.

Unit - IV	Vector differentiation	9 Hrs

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.

Unit - V	Vector integration	9 Hrs

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

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

CO1: Solve the first order differential equations related to various engineering fields.

CO2: Solve the linear differential equations of higher order with constant coefficients

CO3: Identify solution methods for partial differential equations that model physical processes.

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

CO5: Apply Green's, Stokes and Divergence theorem in work done, circulation, flux and triple integrals.

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
6. Engineering Mathematics I by T.K.V. Iyengar, B.Krishna Gandhi,, S. Chand Publications, 2015 Edition.

ELECTRICAL CIRCUIT ANALYSIS -I
(EEE)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
23A0203T	3:0:0	3	CIE:30 & SEE:70	3 Hours	PCC

Course Objectives:

The objectives of the course are to make the students learn about:

- To develop an understanding of the fundamental laws, elements of electrical circuits and toapply circuit analysis to DC and AC circuits.

Syllabus — **Total Hours: 48Hrs**

Unit-I	INTRODUCTION TO ELECTRICAL CIRCUITS	9Hrs

Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff'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.

Unit-II	MAGNETIC CIRCUITS	10Hrs

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.

Unit -III	SINGLE PHASE CIRCUITS	10Hrs

Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, 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.

Unit -IV	RESONANCE AND LOCUS DIAGRAMS	10Hrs

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.

Unit -V	NETWORK THEOREMS (DC & AC XCITATIONS)	9Hrs

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

CO1: Remembering the basic electrical elements and different fundamental laws.

CO2: Understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance, phasor diagrams, resonance and network theorems.

CO3: Apply the concepts to obtain various mathematical and graphical representations.

CO4: Analyse nodal and mesh networks, series and parallel circuits, steady state response, different circuit topologies (with R, L and C components).

CO5: Evaluation of Network theorems, electrical, magnetic and single-phase circuits.

Textbooks:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition

Reference Books:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, Mc Graw Hill Education (India), 2013, Fifth Edition
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and
3. K. Rao, Mc Graw Hill Education, 2017, Fifth Edition.
4. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
5. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition.
6. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.

Web 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

BASIC ELECTRICAL & ELECTRONICS ENGINEERING
(Common to All branches of Engineering)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
23A0201T	3:0:0	3	CIE:30 & SEE:70	3 Hours	PCC

Course Objectives:

The objectives of the course are to make the students learn about:

- 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.

Syllabus	PART A: BASIC ELECTRICAL ENGINEERING	Total Hours: 48Hrs
Unit-I	DC & AC Circuits	10Hrs

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).

Unit-II	Machines and Measuring Instruments	8Hrs

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.

Unit -III	Energy Resources, Electricity Bill & Safety Measures	6Hrs

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.

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

CO2: Understand the problem solving concepts associated to AC and DC circuits, construction and

operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.

CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

CO4: Analyze different electrical circuits, performance of machines and measuring instruments.

CO5: Evaluate different circuit configurations, Machine performance and Power systems operation.

Textbooks:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First 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, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

The objectives of the course are to make the students learn about:

- This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

Syllabus

Unit-I	**SEMICONDUCTOR DEVICES**	**6Hrs**

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

Unit-II	**BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION**	**10Hrs**

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.

Unit -III	**DIGITAL ELECTRONICS**	**8Hrs**

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).

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

CO1: Apply the concept of science and mathematics to understand the working of diodes, transistors, and their applications.

CO2: Explain the characteristics of diodes and transistors.

CO3: Familiarize with the number systems, codes, Boolean algebra and logic gates.

C04: Understand the working mechanism of different combinational, sequential circuits and their role in the digital systems

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

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

ENGINEERING GRAPHICS					
Course Code	**L:T:P**	**Credits**	**Exam marks**	**Exam Duration**	**Course Type**
23A0301T	**1:0:4**	**3**	**CIE:30 & SEE:70**	**3 Hours**	**PCC**

Course Objectives:

The objectives of the course are to make the students learn about:

- Understand the basic principles and conventions of engineering drawing, use engineering instruments and draw engineering curves.
- Use orthographic projections and make the students draw the projections of lines and planes inclined to both the planes.
- Draw the projections of the solids in different positions with respect to the reference planes.
- Understand the importance of sectioning and concept of development of surfaces.
- Represent and convert isometric views to orthographic views and vice versa.

Syllabus		**Total Hours: 48Hrs**
Unit-I	**Introduction:**	**9Hrs**

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.

Unit-II	**Orthographic Projections**	**10Hrs**

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.

Unit -III	**Projections of Solids**	**10Hrs**

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 other and axes inclined to both the reference planes.

Unit -IV	**Sections of Solids & Development of Surfaces**	**10Hrs**

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.

Unit -V	**Conversion of Views & Computer graphics**	**9Hrs**

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

Computer graphics: Creating 2D&3D drawings of objects including PCB and

Transformations using Auto CAD (Not for end examination).

Course Outcomes(CO):

At the end of studying the course, the student should be able to:

- Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
- Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
- Understand and apply concepts of sectional views to represent details of solids in simple positions.
- Gain a clear understanding of the principles behind development of surfaces and to understand how to unfold basic geometric shapes into flat patterns.
- Develop the ability to draw isometric views and orthographic views and should be able to convert isometric views to orthographic views and vice versa.

Textbooks:

1. N. D. Bhatt, Engineering Drawing, 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.

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP
(Common to All branches of Engineering)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
23A0202P	**0:0:3**	**1.5**	**CIE:30 & SEE:70**	**3 Hours**	**PCC**

Course Objectives:

This course will enable students to:

1. To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations

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.

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First 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, Third Edition

Note: Minimum Six Experiments to be performed

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

- To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications

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.

Course Outcomes(CO):

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

CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.

Reference Books:

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

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

IT WORKSHOP
(Common to All branches of Engineering)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
23A0503P	**0:0:2**	**1**	**CIE:30 & SEE:70**	**3 Hours**	**PCC**

Course Objectives:

This course will enable students to:

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

List of Experiments:

PC Hardware & Software Installation

1. 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.

2. 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.

3. 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.

4. 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

5. 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

1. **Task1:** Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.
2. **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.

3. **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.

4. **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.

5. **Task 5:** Install any anti-virus software on your computer

LaTeX and WORD

1. **Task 1** – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX 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 La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
2. **Task 2**: Using La TeX 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 La TeX and Word.
3. **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.
4. **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.

1. **Task 1**: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text
2. **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

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

POWER POINT

1. **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.
2. **Task 2:** Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.
3. **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

1. **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?"
2. **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."

3. **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?'"

Course Outcomes (CO):

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

CO1: Perform Hardware troubleshooting.
CO2: Understand Hardware components and inter dependencies.
CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation.
CO5: Perform calculations using spreadsheets

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 Anfins on 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

ENGINEERING PHYSICS LAB
(Common to All Branches of Engineering)

Course Code	L : T : P	Credits	Exam Marks	Exam Duration	Course Type
23A0006P	0 : 0 : 2	1	CIE: 30 EE:70	3 Hours	BS

Prerequisite: Student should know about fundamental and basic principles in physics

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

Course Outcomes:

On completion of this course, the students are able to:-

5. Operate optical instruments like travelling microscope and spectrometer.
6. Estimate dielectric constant of capacitor and magnetic induction of current carrying coil
7. Identify the type of semiconductor and calculate band gap of it.
8. Evaluate different modulus of materials.
9. Measure the frequency of tuning fork and verify the laws in Sonometer.

SYLLABUS | **Total Hours : 32**

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 wavelength of Laser light using diffraction grating.
5. Estimation of Planck's constant using photoelectric effect.
6. Magnetic field along the axis of a current carrying circular coil by Stewart Gee'sMethod.
7. Determination of dielectric constant using charging and discharging method.
8. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
9. Determination of magnetic susceptibility by Kundt's tube method.
10. Determination of the resistivity of semiconductors by four probe methods.
11. Determination of energy gap of a semiconductor using p-n junction diode.
12. Determination of Hall voltage and Hall coefficient of a given semiconductor usingHall effect.
13. Determination of temperature coefficients of a thermistor.
14. Determination of rigidity modulus of the material of the given wire using Torsionalpendulum.
15. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
16. Determination of Frequency of electrically maintained tuning fork by Melde'sexperiment.

17. Sonometer : Verification of laws of stretched string.
18. Determination of acceleration due to gravity and radius of Gyration by using acompound pendulum.

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

References: A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

URL:*www.vlab.co.in*

ELECTRICAL CIRCUITS LAB
(EEE & allied branches)

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
23A0204P	0:0:3	1.5	CIE:30 & SEE:70	3 Hours	PCC

Course Objectives:

1. 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

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

Course Outcomes (CO):

At the end 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.

CO2: Apply various theorems to compare practical results obtained with theoretical calculations.

CO3: Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil.

CO4: Analyse different circuit characteristics with the help of fundamental laws and various configurations.

CO5: Create locus diagrams of RL, RC series circuits and examine series and parallel resonance.

Reference Book(s):

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata Mc Graw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition.

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

(**Common to CSE, AI&ML, ECE, EEE, DS**)

CourseCode	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
23ANS01P	0:0:1:0	0.5	100	3 Hours	BSC

Course Objectives:

- The objective of introducing this course is to impart discipline, character, fraternity, teamwork,social consciousness among the students and engaging them in selfless service

Syllabus — **Total Hours: 18**

UNIT I Orientation

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

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasing road map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II Nature & Care Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT III Community Service Activities:

i) 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.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.
v) Any other programmes in collaboration with local charities, NGOs etc.

Course Outcomes:

After completion of the course the student will be able to

CO1: Understand the importance of discipline, character and service motto.
CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO3: Explore human relationships by analyzing social problems.
CO4: Determine to extend their help for the fellow beings and downtrodden people.
CO5: Develop leadership skills and civic responsibilities.

General Guidelines:

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

Reference Book(s):

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, 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. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.