**B. Tech (R23) JNTUGV-CEV (Autonomous) w.e.f 2023-24**
DEPARTMENT OF **COMPUTERSCIENCE&ENGINEERING**

**JNTU-GV COLLEGE OF ENGINEERING, VIZIANAGARAM (Autonomous)**
**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY:GURAJADA VIZIANAGARAM**
**VIZIANAGARAM-535003, ANDHRA PRADESH, INDIA.**

B.Tech (R23) COURSE STRUCTURE - DEPARTMENT OF **COMPUTERSCIENCE&ENGINEERING**

**B.Tech - COURSE STRUCTURE – R23**
(Applicable from the academic year 2023-24 onwards)

| **I-B.Tech I-Semester** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Category** | **Course Code** | **Course Name** | **L** | **T** | **P** | **Credits** |
| 1. | BS | R23BS01 | Linear Algebra & Calculus | 3 | 0 | 0 | 3 |
| 2. | BS | R23BS03T | Engineering Physics | 3 | 0 | 0 | 3 |
| 3. | HS | R23HS01T | Communicative English | 2 | 0 | 0 | 2 |
| 4. | ES | R23ES01 | Basic Civil & Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5. | ES | R23ES07T | Introduction to Programming | 3 | 0 | 0 | 3 |
| 6. | HS | R23HS01P | Communicative English Lab | 0 | 0 | 2 | 1 |
| 7. | BS | R23BS03P | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| 8. | BS | R23ES02 | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 9. | ES | R23ES06 | IT Workshop | 0 | 0 | 2 | 1 |
| 10. | ES | R23ES07P | Computer Programming Lab | 0 | 0 | 3 | 1.5 |
| 11. | Audit | R23MC01 | Health and Wellness, Yoga, and Sports | 0 | 0 | 1 | 0.5 |
| | | | **Total** | | | | **20.5** |

| **Category** | **Credits** |
|---|---|
| Basic Science Course | 10 |
| Engineering Science Courses | 10 |
| Mandatory Course | 0.5 |
| Total Credits | 20.5 |

| I-B.Tech II-Semester | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S. No.** | **Category** | **Course Code** | **Course Name** | **L** | **T** | **P** | **Credits** |
| 1. | BS | R23BS02 | Differential Equations and Vector calculus | 3 | 0 | 0 | 3 |
| 2. | BS | R23BS05T | Chemistry | 3 | 0 | 0 | 3 |
| 3. | ES | R23ES03 | Engineering Graphics | 1 | 0 | 4 | 3 |
| 4. | ES | R23ES04 | Basic Electrical &Electronics Engineering | 3 | 0 | 0 | 3 |
| 5. | PC | R23PC04T | Data Structures | 3 | 0 | 0 | 3 |
| 6. | BS | R23BS05P | Chemistry Lab | 0 | 0 | 2 | 1 |
| 7. | ES | R23ES05 | Electrical &Electronics Engineering workshop | 0 | 0 | 3 | 1.5 |
| 8. | PC | R23PC04P | Data Structures Lab | 0 | 0 | 3 | 1.5 |
| 9. | Audit | R23MC02 | NSS/NCC/Scouts &Guides/Community Service | 0 | 0 | 1 | 0.5 |
| | | | **Total** | | | | **19.5** |

| **Category** | **Credits** |
|---|---|
| Basic Science Course | 7 |
| Engineering Science Courses | 7.5 |
| Professional core Courses | 4.5 |
| Mandatory Course | 0.5 |
| **TOTAL** | 19.5 |

**IYear-ISemester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

## LINEAR ALGEBRA& CALCULUS
## (Common for all branches)

**Course Objectives:**
To equip the students with standard concepts and tools of mathematics to handle various real-world problems and their applications.

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

- Develop matrix algebra techniques that is needed by engineers for practical applications.
- Familiarize with functions of several variables which is useful in optimization.
- Learn important tools of calculus in higher dimensions.
- Familiarize with double and triple integrals of functions of several variables in two and three dimensions.

**UNIT I 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, Gauss Seidel Iteration Method.

**UNITII Linear Transformation 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.

**UNITIII 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.

**UNITIV Partial differentiation and Applications (Multi variable calculus)**
Partial derivatives, total derivatives, chain rule, change of variables, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**UNITV 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).

**Textbooks:**

1. B.S.Grewal,HigherEngineeringMathematics,44/e,KhannaPublishers,2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.

**Reference Books:**

1. R.K.JainandS.R.K.Iyengar,AdvancedEngineeringMathematics,5/e,AlphaScienceInternationalLtd.,2021 (9th reprint).
2. GeorgeB.Thomas,MauriceD.WeirandJoelHass,ThomasCalculus,14/e,PearsonPublishers,2018.
3. GlynJames, Advanced Modern Engineering Mathematics, 5/e, Pearson publishers, 2018.

4. Michael Greenberg, Advanced EngineeringMathematics,9th edition, Pearson edn
5. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand,2021

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**IYear-Isemester**

# Engineering Physics

**COURSE OBJECTIVES**

1 Bridging the gap between the Physics in school at 10+2 level and UG level engineering courses.

2 To identify the importance of the optical phenomenon. interference, diffraction and polarization related to its Engineering applications

3 EnlightentheperiodicarrangementofatomsinCrystallinesolidsbyBragg'slaw

4 To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.

5 Enlightenment of the concepts of Quantum Mechanics and to provide fundamentals of deBroglie matter waves, quantum mechanical wave equation and its application, the importance of free electron theory for metals.

6. To Understand the Physics of Semiconductors and their working mechanism, Concept utilization of transport phenomenon of charge carriers in semiconductors.

**COURSE OUTCOMES**

CO1 **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** the applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary refracted light and extraordinary refracted rays by their states of polarization (L2)

CO2 **Classify** various crystal systems (L2). **Identify** different planes in the crystal structure (L3). **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4).

CO3 **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2).

CO4 **Describe** the dual nature of matter (L1). **Explain** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). **Identify** the role of classical and quantum freeelectron theory in the study of electrical conductivity (L3).

CO5 **Classify** the crystalline solids (L2).**Outline** the properties of charge carriers in semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Apply** the concept of effective mass of electron (L3).

**Unit-I: Wave Optics** **12hrs**

**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 & Diffraction Grating (Qualitative).

**Polarization:** Introduction -Types of polarization - Polarization by reflection, and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

**Unit Outcomes:**

**The students will be able to**

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference (L3)
- **Illustrate** the concept of polarization of light and its applications (L2)
- **Classify** ordinary polarized light and extraordinary polarized light (L2)

**Unit II: Crystallography** **8hrs**

**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. Bragg's law - X-ray Diffractometer.

**Unit Outcomes:**

**The students will be able to**

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4)

**Unit-III: Dielectric and Magnetic Materials** **8hrs**

**Dielectric Materials:** Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius-Mossotti equation.

**Magnetic Materials:** Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability - Classification of magneticmaterials: Dia, para, Ferro, antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials.

**Unit Outcomes:**

**The students will 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 Claussius- Mosotti relation in dielectrics(L2)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence(L2)

**Unit-IV: Quantum Mechanics and Free electron theory** **10hrs**

**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 and its temperature dependence.

**Unit Outcomes:**

**The students will be able to**

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

**Unit – V: Semiconductors** **10hrs**

**Semiconductors:** Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Extrinsic semiconductors: density of charge carriers - Drift and diffusion currents – Einstein's equation - Hall effect and its Applications.

**Unit Outcomes:**

**The students will be able to**

- **Outline** the properties of charge carriers in semiconductors (L2)
- **Understand** the carrier transportation in semiconductors (L2)
- **Identify** the type of semiconductor using Hall effect (L2)

**Text books:**


1. "A Text book of Engineering Physics" - M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S.Chand Publications, 11th Edition 2019.
2. "Engineering Physics" - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015).
3. "Engineering Physics" - P.K.Palanisamy SciTech publications.


**Reference Books:**


1. "Fundamentals of Physics" - Halliday, Resnick and Walker, John Wiley &Sons.
2. "Engineering Physics" - M.R. Srinivasan, New Age international publishers (2009).
3. "Engineering Physics" - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. "Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
5. "Semiconductor physics and devices:Basic principle" - A. Donald, Neamen, Mc GrawHill.
6. "Engineering Physics" - B.K. Pandey and S. Chaturvedi, Cengage Learning
7. "Solid state physics" – A.J.Dekker ,Pan Macmillan publishers
8. "Introduction to Solid State Physics" -Charles Kittel ,Wiley

| L | T | P | C |
|---|---|---|---|
| 2 | 0 | 0 | 2 |

**IYear-I Semester**

## COMMUNICATIVE ENGLISH

(Common to All Branches of Engineering)

**Course Objectives:**

The main objective of introducing this course, communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry-ready.

**Course Outcomes**

- By the end of the course the students will have Learned how to understand the context, topic, and specific information from social or transactional dialogues.
- Remedially learn applying grammatical structures to formulate sentence sand use appropriate words and correct word forms.
- Using discourse markers to speak clearly on a specific topic in formal as well as informal discussions.(not required)
- Improved communicative competence in formal and informal contexts and for social and academic purposes.
- Critically comprehending and appreciating reading /listening texts and to write summaries.
- Writing coherent paragraphs essays, letters/e-mails and resume.

**Instructions**:

1. The reading texts can be given as podcasts to the students so that their listening skills can be enhanced.
2. While listening and reading to the text can be given as homework, the class work for the students can be to discuss and critically evaluate the texts based on the context, purpose or writing the text and understanding it from the author's as well as reader's point of view.
3. Reading as habit for both academic and non-academic ( pleasure) purposes has to be inculcated in the students. So training has to be given in intensive and extensive reading strategies.
4. Writing for both academic (assignments, examinations, reports, e-mails/letters etc)
5. The writing tasks given in the class are to be self and peer evaluated by the students before they are finally graded by the faculty. Note: Please note that the texts given here are just contexts for teaching various language skills and sub skills. The students' ability to use language cannot be confined to comprehending or using the language related to the given texts (textbooks). The given texts can be used only for practice.
6. All the activities to develop language skills have to be integrated and interconnected, within each unit and across the units.

**UNIT I**

**Lesson: HUMAN VALUES: A Power of a Plate of Rice by Ifeoma Okoye (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.( That has to be part of the bridge course- 2 weeks before the actual academic Programme starts)

**Grammar**: Parts of Speech, Basic Sentence Structures-forming questions

**Vocabulary**: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words

**UNIT-II**

Lesson: **NATURE: Night of the Scorpion by Nissim Ezekiel (Indian and contemporary)**

**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 helptolink the ideas in a paragraph together.

**Writing:** Structure of a paragraph - Paragraph writing (specific topics)

**Grammar:** Cohesive devices -linkers, useof articles and zeroarticle prepositions.

**Vocabulary:** Homonyms, Homophones, Homographs.

**UNIT-III**

**Lesson: BIOGRAPHY: Steve Jobs.**

**Listening:** Listening for globalcomprehensionandsummarizingwhatislistenedto.

**Speaking:** Discussing specific topicsin pairs orsmall groups and reporting what is discussed

**Reading:** Readingatextindetailbymakingbasicinferences-recognizingandinterpretingspecific Context clues; strategies touse textclues for comprehension.

**Writing:** Summarizing, Note-making, paraphrasing.

**Grammar:** Verbs - tenses; subject-verbagreement; Compound words, Collocations

**Vocabulary:** Compound words, Collocations

**UNIT- IV**

**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 elementsintextstoconveyinformation,revealtrends/ Patterns/ relationships, communicate processesor display complicated data.

**Writing:** Letter Writing: Official Letters, Resumes

**Grammar:** Reporting verbs, Direct & Indirect speech, Active& PassiveVoice

**Vocabulary:** Words often confused, Jargons

**UNIT- V**

**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

**Textbooks:**

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, OrientBlackSwan, 2023 (Units 1,2 & 3)
2. Empowering English 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

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**IYear- ISemester**

**BASIC CIVIL& MECHANICAL ENGINEERING**

**(Common toAll branches of Engineering)**

**Course Objectives:**

- GetfamiliarizedwiththescopeandimportanceofCivilEngineeringsub-divisions.
- Introduce the preliminary conceptsofsurveying.
- Acquire preliminary knowledge on Transportation and its importance innation's economy.
- Get familiarizedwiththeimportanceofquality,conveyanceandstorageofwater.
- Introductiontobasiccivilengineeringmaterialsandconstructiontechniques.

**Course Outcomes:** On completion of the course,the student should be ableto:

CO1:Understand varioussub-divisionsofCivilEngineeringandtoappreciatetheirroleinensuringbettersociety.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3:Realize the importance of Transportation Innation's economy and the engineering measures related to Transportation.

CO4:Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

CO5:Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

**PART A: BASIC CIVIL ENGINEERING**

**UNITI**

**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

eachdiscipline-BuildingConstructionandPlanning-ConstructionMaterials-Cement -Aggregate-Bricks-Cementconcrete-Steel.IntroductiontoPrefabricated construction Techniques.

**UNITII**

**Surveying:**ObjectivesofSurveying-HorizontalMeasurements-AngularMeasurements-IntroductiontoBearingsLevellinginstrumentsusedforlevelling-Simpleproblemsonlevellingandbearings-Contour mapping.

**UNITIII**

**TransportationEngineering**ImportanceofTransportationinNation'seconomicdevelopment- 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.FourthEdition.
2. IntroductiontoCivilEngineering,S.S.Bhavikatti,NewAgeInternationalPublishers.2022.First Edition.
3. BasicCivilEngineering,SatheeshGopi,PearsonPublications,2009,FirstEdition.


**ReferenceBooks:**


1. Surveying,Vol-IandVol-II,S.K.Duggal,TataMcGrawHillPublishers2019.FifthEdition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, KhannaPublishers,Delhi.2016
3. IrrigationEngineeringandHydraulicStructures-SantoshKumarGarg,KhannaPublishers,Delhi2023.38$^{th}$Edition.
4. HighwayEngineering,S.K.Khanna,C.E.G.JustoandVeeraraghavan,NemchandandBrothersPublications2019. 10$^{th}$Edition.
5. IndianStandardDRINKINGWATER—SPECIFICATIONIS10500-2012.


## PART B: BASIC MECHANICAL ENGINEERING

**Course Objectives:** The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

**Course Outcomes:** On completion of the course, the student should be able to

CO1: Understand the different manufacturing processes.

CO2: Explain the basics of thermal engineering and its applications.

CO3: Describe the working of different mechanical power transmission systems and power plants.

CO4:Describe the basics of robotics and its applications.

CO5: Explain the basics of engineering materials and its applications

**UNIT I**

**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:** 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** – 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)**

**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.

**Reference Books:**

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.

**I Year-I Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

# INTRODUCTION TO PROGRAMMING

**(Common to All branches of Engineering)**

## Course Objectives:

**The objectives of this course is to acquire knowledge on the**

- To impart adequate knowledge on the need of programming languages and problem-solvingtechniques and develop programming skills.
- To enable practical usage of Control Structures and Implement different operations on arrays.
- To demonstrate the use of Strings and Functions.
- To impart the knowledge of pointers and understand the principles of dynamic memoryallocation.
- To understand structures and unions and illustrate the file concepts and its operations.
- To impart the Knowledge Searching and Sorting Techniques.

**UNIT-I Introduction to Computer Problem Solving:**

Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

**UNIT-II Introduction to C Programming:**

Introduction, Structure of a C Program, Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements. Operators, Type Conversion, Control Flow, Relational Expressions: Conditional Branching Statements: if, if-else, if-else—if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.

**UNIT-III Arrays:**

Introduction, Operations on Arrays, Arrays as Function Arguments, Two Dimensional Arrays, Multidimensional Arrays

Pointers: Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments.

**UNIT-IV Functions:**

Introduction Function: Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes, Recursion.

Strings: String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.

**UNIT-V**

Structures, Unions, Bit Fields: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type —Enum variables, Using Type def keyword, Bit Fields. Data Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

**Note:** The syllabus is designed with C Language as the fundamental language ofimplementation**.**

**Course Outcomes:**

At the end of the Course, Student should be able to:

i. Illustrate the Fundamental concepts of Computers and basics of computer programming and problem-solving approach.
ii. Understand the Control Structures, branching and looping statements.
iii. Use of Arrays and Pointers in solving complex problems.
iv. Develop Modular program aspects and Strings fundamentals.

v. Demonstrate the ideas of User Defined Data types, files. Solve real world problems using the concept of Structures, Unions and File operations.

**Textbooks:**

1. A Structured Programming Approach UsingC,Forouzan,Gilberg, 3rd Edition,Cengage.
2. How to solve it by Computer. G. Dromey, 12thEdition, Pearson Education.
3. ProgrammingInCA-Practia1Approach.AjayMittal, 1st EditionPearson

**References:**

1. ByronGottfried, Schaum'sOutlineofProgrammingwithC, 4thEdition, 2020,McGraw-Hill.
2. ComputerProgramming.ReemaThareja,3rd Edition, 2023, Oxford University Press
3. The C ProgrammingLanguage, DennisRichieAndBrian Kernighan,2nd Edition, Pearson Education.
4. Programming InC,Ashok Kamthane,2ndEdition,PearsonPublication.
5. LetusC,YaswanthKanetkar,16thEdition,BPBPublication.
6.Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education,2008

**Web References:**

1. http://www.c4learn.com/
2. http://www.geeksforgeeks.org/c/
3. http://nptel.ac.in/courses/122104019/
4. http://www.learn-c.org/
5. https://www.tutorialspoint.com/cprogramming/

**IYear-I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**COMMUNICATIVE ENGLISH LAB**

(Common to All Branches of Engineering)

**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:**

- Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
- Apply communication skills through various language learning activities.
- Analyze the English speech sounds, stress, rhythm, intonation and syllabledivision for better listening and speaking comprehension.
- Evaluate and exhibit professionalism in participating in debates and group discussions.
- Create effective resonate and prepare themselves to face interviews in future.

**List of Topics:**

1. Vowels & Consonants ( Not rules but use of them in various syllable structures)
2. Neutralization/Accent Rules (No rules again, required more practice)
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. ( This can be part of theory course)Resume Writing, Cover letter, SOP
6. Group Discussions-methods & practice
7. Debates- Methods & Practice
8. PPT Presentations/ Poster Presentation
9. Interviews Skills

**Suggested Software:**

- Walden Infotech

- Young India Films

**Reference Books:**

1.Meenakshi Raman, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.( This can be for theory and not for lab)
2. Samson T : Innovate with English, Foundations
3. Grant Taylor: English Conversation Practice, Tata McGraw-Hill EducationIndia,2016
4. Jayashree, M Let's Hear them Speak: Developing Listening-Speaking skills in English.
. Sage Publications
5. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012. ( That is for reading and writing and can be used in theory classes but not in Lab)
6. T.Balasubramanyam, A Textbook of English Phonetics for Indian Students,(3rd Ed)
Trinity Press. (This is all theory and can be for MA English students but not for B.Tech students)

**Web 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
12. https://www.linguahouse.com/en-GB
13. https://www.ted.com/watch/ted-ed

**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

**IYear-I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

**ENGINEERING PHYSICS LAB**
**(Common to All Branches of Engineering)**

(Any **TEN** of the following listed experiments)

(Out of which any **TWO** experiments m ay be conducted in virtual mode)

**List of Engineering Physics 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 usingdiffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using parallel plate capacitor.
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 energy gap of a semiconductor using PN junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart & Gee'sMethod.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Halleffect.
12. Determination of rigidity modulus of the material of the given wire using Torsionalpendulum.
13. V-I Characteristics ofa PN junction diode
14. V-I Characteristics of Zener diode
15. To study the various types of crystal structures.

**References**:

1. "A Text Book of Practical Physics" - S. Balasubramanian, M.N. Srinivasan, S. ChandPublishers, 2017.

**URL**:www.vlab.co.in

**IYear-I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

## ENGINEERING WORKSHOP

**(Common to All branches of Engineering)**

**CourseObjectives:**

To familiarize students with wood working, sheet metal operations, fitting and electrical housewiring skills

**Course Outcomes:**

CO1: Identify workshop tools and their operational capabilities.
CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
CO3: Apply fitting operations in various applications.
CO4: Apply basic electrical engineering knowledge for house wiring Practice
CO5: Construct the sheet metal jobs from GI sheets and preparation of pipe joints using plumbing

**SYLLABUS**

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 followingfitting 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. 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.

**I Year-I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

## ITWORKSHOP

## (Common to all branchesofEngineering)

**Course Objectives:**

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

**PC Hardware & Software Installation**

**Task 1:** Identify the peripherals of a computer, components in a CPU, and 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. Labinstructors should verify thework and follow it up with a Viva. Also, students must go through the video showing the PC assembling process. A videowould be given as part of the course content.

**Task 3**: Students should install MS windows on their personal computer. The labinstructor should verify the installation and follow it 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 Windows and Linux. Lab instructors should verify the installation andfollow it up with a Viva.

**Task 5:** Every student should install BOSS on the computer. The system should be configuredas dual boot (VMWare) withWindows 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 connect 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. Without internet connectivity, instructors must 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 howto 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 theinstructors by the student.

**Task 4:** Every student should install Windows10 on the computer. Then every student should install Linux on the computer. 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 aViva

**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 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 LaTeX and word – Accessing, overview of toolbars, saving files, Usinghelp 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 options in 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 Contents, 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 the 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 an overview oftoolbars, saving Excel files, Using helpand 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, Hyperlinking, Count function,Macros

**LOOKUP/LOOKUP**

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

**POWERPOINT**

**Task 1:** Students will be working on essential PowerPoint utilities and tools which help them create introductory

PowerPoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

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

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

**AI TOOLS – Chat GPT**

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

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

**Task 2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a storyor a scene description, and
let the model generate the rest of the content. This can be a funway 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 themodel to translate it into another language. Compare the output tosee how accurate and fluent the translations are.

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

**Course Outcomes:**

**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, PearsonEducation, 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

**I Year-I Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

## COMPUTER PROGRAMMING LAB
## (Common to All branches of Engineering)

**Course Objectives:**

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

**UNIT-I WEEK 1:**

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

Suggested Experiments/Activities:

**Tutorial 1:** Problem-solving using Computers.

**Lab1:** Familiarization with the 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 seriesof finite steps using textual 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 traveled 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's 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. c. A+++B---A
   d. d. J= (i++) + (++i)

ii) Find the maximum of three numbers using the 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 can be used and how to use them. Explore all relational and logical operatorswhile 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 a switch case.

v) Write a C program to find whether the given year is a leap year.

**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 eachof these statements is more appropriate.

**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 a given number using any loop.

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

iii) Compute sine and cos series

iv) Checking whether a number is palindrome

v) Construct a pyramid of numbers.

**UNIT-III WEEK**

**7:**

**Objective:** Explore the full scope of the 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 on the 1D 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 characters and get comfortable with strings 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-IVWEEK**

**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. Gainexperience 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 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 samewithout 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 Eulerstheorem.

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 functionsthat can be invoked from themain 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 betweentext 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.

Course Outcomes:

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

**CO2:** Select the proper control structure for solving the problem.

**CO3:** Develop C programs that utilize memory efficiently using programming constructs likepointers.

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

Text books:

1. Ajay Mittal, Programming in C: A practical approach, 1st Edition, Pearson.
2. Byron Gottfried, Schaum' s Outline of Programming with C, 4th Edition, 2020, McGraw Hill.

Reference Books:

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

C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, 3rd Edition, CENGAGE

**IYear-ISemester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 1 | 0.5 |

HEALTH AND WELLNESS, YOGA AND SPORTS

**(Common to All branches of Engineering)**

**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.

**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

**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 andModern Olympics, Asian games and Common wealth 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 andrunning.

**Reference Books:**

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

**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 manyas 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 vivavoce on the subject.

**IYear-II Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

## DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
**(Common for all branches)**

**Course Objectives:**

- To enlighten the learner, sin 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.

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

- Solve the differential equations related to various engineering fields.
- Identify solution methods for partial differential equations that model physical processes.
- Interpret the physical meaning of different operators such as gradient, curl and divergence.
- Estimate the work done against a field, circulation and flux using vector calculus.

**UNIT I Differential equations of first order and first degree**

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: orthogonal trajectories

Newton's Law of cooling – Law of natural growth and decay- Electrical circuits (RL & RC)

**UNIT II 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.

**UNIT III 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. Charpt's method Homogeneous & Non-Homogeneous Linear Partial differential equations with constant coefficients.

**UNIT IV Vector differentiation**

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

**UNIT V 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 applications of these theorems.

**Textbooks:**


1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
2. B.S. Grewal, Higher EngineeringMathematics,44/e, Khanna publishers,2017.


**Reference Books:**


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

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**I Year-II Semester**

**Chemistry**
**(Common to EEE, ECE, CSE & IT)**

**Course Objectives**:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches

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

- Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers.
- Compare the materials of construction for battery and electrochemical sensors.
- Synthesis and characterization of modern engineering materials.
- Explain the principles of spectrometry, Chromatographic separation of solid and liquid mixtures.
- Summarize the conceptsofcolloids,micelle and nanomaterials.

**UNIT I Polymer Chemistry**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization,
Plastics –Thermoand 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. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

**UNIT II Electrochemistry 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-oxygenfuel cell– working of the cells.

**UNIT III Modern Engineering materials**

Semiconductors, band diagram in solids, Semiconductor devices (p-n junction diode as rectifier and transistors)
Super conductors - Introduction basic concept, applications.
Super capacitors: Introduction, Basic Concept-Classification – Applications.

**UNIT IV Instrumental Methods and Applications**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopy, fundamental modes and selection rules, Instrumentation. Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

**UNITV Surface Chemistry and Nanomaterials**

Introductiontosurfacechemistry,colloids,nanometalsandnanometaloxides,micelleformation,synthesis of colloids (Bragg'sMethod),Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphines nano particles and metal oxides, BET equation(no derivation)applications of colloid sand nano materials– catalysis, medicine, sensors, etc.

**Textbooks:**

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.

2. Sashi Chawla, Engineering chemistry,Dhanpat rai Publicating Co(Latest edition)

**Reference Books:**

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.M.Lehn, Supra Molecular Chemistry, VCH Publications
3. D.J.Shaw,Introduction to Colloids and Surface Chemistry,Butterworth-Heineman,1992.

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**IYear-IISemester**

**ENGINEERING GRAPHICS**

(Common to All branches of Engineering)

**Course Outcomes:** On completion of the course, the student should be able to:
CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
CO3: Understand and draw projection of solids in various positions in first quadrant.
CO4: Explain principles behind development of surfaces.
CO5: Prepare isometric and perspective sections of simple solids

**Course Outcomes:** On completion of the course, the student should be able to:
CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
CO3: Understand and draw projection of solids in various positions in first quadrant.
CO4: Explain principles behind development of surfaces.
CO5: Prepare isometric and perspective sections of simple solids

**UNIT I**

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

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

**Scales:** Plain scales, diagonal scales and vernier scales.

**UNIT II**

**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.

**UNIT III**

**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.

**UNIT IV**

**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**: 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).

**Textbook:**

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.

**IYear-IISemester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

**BASICELECTRICAL&ELECTRONICS ENGINEERING**
**(Common to All branches of Engineering)**

**PART A: BASIC ELECTRICAL ENGINEERING**

**CourseObjectives**

To expose to the field of electrical engineering, laws and principles of electrical engineeringandto acquirefundamentalknowledgein therelevant field.

**Course Outcomes:** After the completion of the course students will 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.

**UNIT I 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).

**UNIT II 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.

**UNIT III 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.

**Textbooks:**

1. BasicElectricalEngineering,D.C.Kulshreshtha,TataMcGrawHill,2019,First Edition
2. PowerSystemEngineering,P.V.Gupta,M.L.Soni,U.S.BhatnagarandA.Chakrabarti, Dhanpat Rai& Co, 2013

3. FundamentalsofElectricalEngineering,RajendraPrasad,PHIpublishers,2014,Third Edition

**ReferenceBooks:**

1. BasicElectricalEngineering,D.P.KothariandI.J.Nagrath,McGrawHill,2019,FourthEdition
2. PrinciplesofPowerSystems,V.K.Mehtha,S.ChandTechnicalPublishers,2020
3. BasicElectricalEngineering,T.K.NagsarkarandM.S.Sukhija,OxfordUniversityPress,2017
4. BasicElectricalandElectronicsEngineering,S.K.Bhatacharya,PersonPublications,2018,Second Edition.

**WebResources:**

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

## PART B: BASIC ELECTRONICS ENGINEERING

**CourseObjectives:**

Toteachthefundamentalsofsemiconductordevicesanditsapplications,principlesofdigitalelectronics.

**Course Outcomes:** After the completion of the course students will be able to

**CO1:** Remember the fundamental concepts of semiconductor devices, rectifiers, electronic instrumentation systems, and number systems.

**CO2:** Understand the concepts associated with vacuum tubes, nanoelectronics, diodes, and various configurations and characteristics of transistors and digital electronics.

**CO3:** Apply mathematical tools and fundamental concepts to derive various equations related to PN diodes, Zener diodes, transistors, and their properties, as well as basic theorems of Boolean algebra.

**CO4:** Analyze the characteristics of diodes, transistors, rectifiers, and amplifiers, and analyse the truth tables and functionality of logic gates.

**CO5:** Evaluate different circuit configurations using diodes, transistors, electronic instrumentation systems, simple combinational and sequential circuits, flipflops, registers, and counters.

### UNIT I 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.

### UNIT II 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.

**UNIT III 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 Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary treatment only).

Textbooks:

1. R.L.Boylestad&LouisNashlesky,ElectronicDevices&CircuitTheory,Pearson Education, 2021.
2. R.P.Jain, ModernDigitalElectronics, 4th Edition, TataMcGraw Hill,2009

ReferenceBooks:

1. R.S.Sedha,ATextbook ofElectronicDevicesandCircuits, S.Chand&Co,2010.
2. SantiramKal,BasicElectronics-Devices,CircuitsandITFundamentals,PrenticeHall,India,2002.

R.T.Paynter,IntroductoryElectronicDevices&Circuits-ConventionalFlowVersion,PearsonEducation, 2009

**I Year-II Semester**

| L | T | P | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

# DATASTRUCTURES
**(Common toCSE,IT&alliedbranches)**

**Course Objectives:**

- Understand the significance of linear data structures in problem-solving and basic time/space complexity analysis.
- Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
- Implement and apply stacks to manage program flow and solve problems involving expression evaluation and backtracking.
- Utilize queues to model real-world scenarios, such as process scheduling and breadth-first search algorithms and understand the versatility of deques and prioritize data management using priority queues.
- Impart basic understanding of non-linear datastructures suchastrees.
- Explore basic concepts of hashing and apply it to solve problems requiring fast data retrieval and management.

**UNITI**

**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.

**Sorting Techniques**: Bubble sort, Selection sort, Insertion Sort

**Searching Techniques**: Linear & Binary Search

**UNITII**

**Linked Lists:** Singly linked lists, representation and operations, doubly linked lists and circula rlinkedlists, Comparing arrays and linked lists, Applications of linked lists

**UNITIII**

**Stacks**: Introduction to stacks: properties and operations, implementing stacks using arrays and

linked lists,Applicationsofstacks in expressionevaluation, backtracking, reversinglist etc.

**UNITIV**

**Queues:** Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

**UNITV**

**Trees:** Introduction to Trees- what is Tree? Binary Tree, properties, Tree Traversals, Binary SearchTree– Insertion, Deletion &Traversals

**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.

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

i) Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
ii) Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
iii) Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
iv) 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.
v) Devise novel solutions to small scale programming challenges involving data structures such as stacks ,queues, Trees.
vi) Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

**Textbooks:**

1. DataStructuresandalgorithmanalysisinC,MarkAllenWeiss,Pearson,2ndEdition.
2. Fundamentals of data structures in C, Ellis Horowitz, SartajSahni,Susan Anderson-Freed,

Silicon Press, 2008

**Reference Books:**

1. Algorithms and Data Structures: The Basic ToolboxbyKurtMehlhorn and PeterSanders
2. C Data Structures and Algorithms by AlfredV. Aho, JeffreyD. Ullman,andJohn E. Hopcroft
3. Problem Solving with Algorithms and Data Structures"byBradMillerand DavidRanum
4. Introduction to Algorithms by 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 GraphAlgorithms"byRobert Sedgewick.

.

**IYear-II Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 2 | 1 |

## CHEMISTRYLAB

**(Common to EEE, ECE, CSE & IT)**

**Course Objectives**:

- Verify the fundamental concepts with experiments.

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

- Determine conductance of solutions.
- Prepare advanced polymer Bakelite materials.
- Measure the strength of an oxidising agent.
- Analyse the IR spectra of some organic compounds.

**List of Experiments:**

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of conductance of solutions
4. Determination of strength $KMnO_4$ by using standard oxalic acid solution.
5. Determination of strength of an alkalinity present in water sample.
6. Potentiometry - determination of redox potentials and emfs
7. Preparation of a Bakelite ( Demo)
8. Verify Lambert-Beer's law
9. Wavelength measurement of sample through UV-Visible Spectroscopy
10. Measurement of 10Dq by spectrophotometric method
11. Identification of simple organic compounds by IR
12. Preparation of nanomaterials by precipitation method
13. Estimation of Ferrous Iron by Dichrometry.
14. pH metric titration of strong acid vs. strong base

**Reference:**


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

**IYear-IISemester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

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

**Course Objectives:**

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

**Course Outcomes:**

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

**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.

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

**CO4:** Analyse various characteristics of electrical circuits, electrical machines and measuringinstruments.

**CO5:** Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

**Activities:**

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set,wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, Multimeter,LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

### 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 Mc Graw Hill, 2019, FirstEdition
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.

**Course Outcomes:** 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.
CO5: Realize the truth tables of various Flip flops.

**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.

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 3 | 1.5 |

**IYear-II Semester**

## DATA STRCTURES LAB
## (Common to CSE,IT& allied branches of Engineering)

**Course Objectives:**

- Understand the significance of linear data structures in problem-solving and basic time/space complexity analysis.
- Create and manage linked lists to efficiently organize and manipulate data, emphasizing memory efficiency.
- Implement and apply stacks to manage program flow and solve problems involving expression evaluation and backtracking.
- Utilize queues to model real-world scenarios, such as process scheduling and breadth-first search algorithms and understand the versatility of deques and prioritize datamanagemen t using priority queues.
- Impart basic understanding of non-linear data structures such as trees.
- Explore basic concepts of hashing and apply it to solve problems requiring fast data retrieval and management.

**ListofExperiments:**

**Exercise1: Array Manipulation**

i) Write a program to reverse an array.
ii) C Programs to implement the SearchingTechniques–Linear&BinarySearch
iii) CProgramstoimplementSortingTechniques–Bubble,SelectionandInsertionSort

**Exercise2: LinkedList Implementation**

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked is iteratively and recursively.
iii) Solve problems involving linked list reversal and manipulation.

**Exercise3: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 performaddition.
iii) Implement a double-ended queue(deque )with essentialoperations.

**Exercise4: Double Linked List Implementation**

i) Implementadoublylinkedlistandperformvariousoperationstounderstanditspropertie sandapplications.

ii) Implement a circular linked list and perform insertion, deletion, and traversal.

**Exercise5: 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.

**Exercise6: 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.

**Exercise7: Stack and Queue Applications**

i) Use a stack to evaluate an in fix 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

**Exercise8: Binary Tree**

i) Binary Tree traversals (non-recursive).

ii) Binary Tree traversals (recursive).

**Exercise9: Binary Search Tree**

iii) Implementing a BST using Linked List.

iv) Traversing of BST.

**Exercise10: Hashing**

i) Implement a hash table with collision resolution techniques.

ii) Write a program to implement a simple cache using hashing.

**Course Outcomes:** At the end ofthe course, Student will be able to

i) Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

ii) Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.

iii) Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

iv) 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 managemen tchallenges.

v) Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees

vi) Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

**Textbooks:**

1. DataStructuresandalgorithmanalysisinC,MarkAllenWeiss,Pearson,2nd Edition.

2. Fundamentals of data structures in C, Ellis Horowitz, SartajSahni,Susan Anderson-Freed, SiliconPress,2008.

**ReferenceBooks:**

1. AlgorithmsandDataStructures:TheBasicToolboxbyKurtMehlhorn andPeterSanders

2. CDataStructures and Algorithms byAlfred V. Aho, JeffreyD. Ullman, and JohnE. Hopcroft

3. ProblemSolvingwith AlgorithmsandData Structures"byBradMillerand DavidRanum

4. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph

AlgorithmsbyRobert Sedgewick.

**IYear-II Semester**

| L | T | P | C |
|---|---|---|---|
| 0 | 0 | 1 | 0.5 |

**NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE**
**(Common to All branches of Engineering)**

**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.

**Course Outcomes:** After completion of the course the students 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.

**UNIT IOrientation**
General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance.
**Activities:**

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

**UNIT IINature & 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- Surveyin 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 Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

**Reference Books:**


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.


**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 vivavoce on the subject.

*********