

**Course Structure – R23**  
**(With effect from 2023-2024)**

**I Year - I Semester**

| S.No         | Category | Course Code | Course Title                                  | L         | T        | P         | C           | IM         | EM         | TM         |
|--------------|----------|-------------|---|-----------|----------|-----------|-------------|------------|------------|------------|
| 1            | BS&H     | UGBS1T0423  | Chemistry                                     | 3         | 0        | 0         | 3           | 30         | 70         | 100        |
| 2            | BS&H     | UGBS1T0323  | Linear Algebra & Calculus                     | 3         | 0        | 0         | 3           | 30         | 70         | 100        |
| 3            | ES       | UGBS1T1323  | Basic Electrical & Electronics Engineering    | 3         | 0        | 0         | 3           | 30         | 70         | 100        |
| 4            | ES       | UGME1T0123  | Engineering Graphics                          | 1         | 0        | 4         | 3           | 30         | 70         | 100        |
| 5            | ES       | UGCS1T0123  | Introduction to Programming                   | 3         | 0        | 0         | 3           | 30         | 70         | 100        |
| 6            | BS&H     | UGBS1P0923  | Chemistry Lab                                 | 0         | 0        | 2         | 1           | 30         | 70         | 100        |
| 7            | ES       | UGBS1P1423  | Electrical & Electronics Engineering Workshop | 0         | 0        | 3         | 1.5         | 30         | 70         | 100        |
| 8            | ES       | UGCS1P0223  | Computer Programming Lab                      | 0         | 0        | 3         | 1.5         | 30         | 70         | 100        |
| 9            | BS&H     | UGBS1P1123  | NSS/Community Service                         | 0         | 0        | 1         | 0.5         | 100        | -          | 100        |
| <b>Total</b> |          |             |   | <b>13</b> | <b>0</b> | <b>13</b> | <b>19.5</b> | <b>340</b> | <b>560</b> | <b>900</b> |

**I Year - II Semester**

| S.No         | Category | Course Code | Course Title                               | L         | T        | P         | C           | IM         | EM         | TM          |
|--------------|----------|-------------|--|-----------|----------|-----------|-------------|------------|------------|-------------|
| 1            | BS&H     | UGBS2T0323  | Communicative English                      | 2         | 0        | 0         | 2           | 30         | 70         | 100         |
| 2            | BS&H     | UGBS2T0423  | Engineering Physics                        | 3         | 0        | 0         | 3           | 30         | 70         | 100         |
| 3            | BS&H     | UGBS2T0223  | Differential Equations and Vector Calculus | 3         | 0        | 0         | 3           | 30         | 70         | 100         |
| 4            | ES       | UGBS2T1023  | Basic Civil and Mechanical Engineering     | 3         | 0        | 0         | 3           | 30         | 70         | 100         |
| 5            | PC       | UGCS2T0123  | Data Structures                            | 3         | 0        | 0         | 3           | 30         | 70         | 100         |
| 6            | BS&H     | UGBS2P0723  | Communicative English Lab                  | 0         | 0        | 2         | 1           | 30         | 70         | 100         |
| 7            | BS&H     | UGBS2P0823  | Engineering Physics Lab                    | 0         | 0        | 2         | 1           | 30         | 70         | 100         |
| 8            | ES       | UGME2P0223  | Engineering Workshop                       | 0         | 0        | 3         | 1.5         | 30         | 70         | 100         |
| 9            | PC       | UGCS2P0323  | Data Structures Lab                        | 0         | 0        | 3         | 1.5         | 30         | 70         | 100         |
| 10           | ES       | UGCS2P0223  | IT Workshop                                | 0         | 0        | 2         | 1           | 30         | 70         | 100         |
| 11           | BS&H     | UGBS2P0923  | Health and Wellness, Yoga and Sports       | 0         | 0        | 1         | 0.5         | 100        | -          | 100         |
| <b>Total</b> |          |             |  | <b>14</b> | <b>0</b> | <b>13</b> | <b>20.5</b> | <b>400</b> | <b>700</b> | <b>1100</b> |

**I YEAR  
I SEMESTER**

**CHEMISTRY**  
(Common to IT, ECE and EEE)

**Subject Code: UGBS1T0423**  
**I Year / I Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**Prerequisites:** Basic knowledge in chemistry.

**Course Objectives:** This course helps students to acquire basic knowledge

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods for chemical analysis

**Course Outcomes:**

Upon completion of this course, the students will be able to

**CO1:** Apply molecular orbital theory to understand bonding between homo and hetero diatomic molecules.

**CO2:** Apply the principle of Band diagrams in the application of conductors and semiconductors.

**CO3:** Compare the materials of construction for battery and electrochemical sensors

**CO4:** Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers& conducting polymers.

**CO5:** Summarize the concepts of Instrumental methods.

**Syllabus:**

**UNIT I: (9 Hours)**

**Structure and Bonding Models:** Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of  $\Psi$  and  $\Psi^2$ , particle in one dimensional box, molecular orbital theory – bonding in homo - and hetero nuclear diatomic molecules – energy level diagrams of  $O_2$  and  $CO$ , etc.  $\pi$ -molecular orbitals of butadiene and benzene, calculation of bond order.

**UNIT II: (8 Hours)**

**Modern Engineering materials**

**Semiconductors:** Introduction, basic concept, application

**Super conductors:** Introduction basic concept, applications.

**Super capacitors:** Introduction, Basic Concept - Classification – Applications.

**Nano materials:** Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphene nanoparticles.

**UNIT III: (14 Hours)**

**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-Oxygen fuel cell – working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

**UNIT IV: (10 Hours)****Polymer Chemistry:**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

**Plastics** – Thermo and Thermosetting plastics, Preparation, properties and applications of – PVC, 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), Poly L Lactic Acid (PLA).

**UNIT V: (8 Hours)****Instrumental Methods and Applications:**

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

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| <b>CO1</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO2</b>  | 3   | -   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO3</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO4</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO5</b>  | 3   | 3   | 3   | -   | 3   | -   | -   | -   | -   | -        | -        | -        |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

**LINEAR ALGEBRA & CALCULUS**  
**(Common to All Branches)**

|                                 |          |          |          |          |
|---------------------------------|----------|----------|----------|----------|
| <b>Subject Code: UGBS1T0323</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>I Year / I Semester</b>      | <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**Prerequisites:** Basics of Matrices, Differentiation and Integration

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

**Course Outcomes:**

At the end of this course, students will be able to:

- CO1:** Develop and use matrix algebra techniques that are needed by engineers for practical applications. (L4)
- CO2:** Calculate Eigen values and Eigen vectors and apply to Diagonalization, Cayley-Hamilton theorem, Quadratic forms and their canonical forms
- CO3:** Utilize mean value theorems to real life problems (L3)
- CO4:** Familiarize with functions of several variables and Learn important tools of calculus in higher dimensions which is useful in optimization (L3)
- CO5:** Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. (L3)

**Syllabus:**

**UNIT-I: (10 Hours)**

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

**UNIT-II: (8 Hours)**

**Eigen values, Eigenvectors and Orthogonal Transformation:**

Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

**UNIT-III: (8 Hours)**

**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's theorems with remainders (without proof), Problems and applications on the above theorems.

**UNIT-IV: (8 Hours)**

**Partial Differentiation and Applications (Multivariable calculus):**

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

**UNIT-V: (8 Hours)**

**Multiple Integrals (Multivariable 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).

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |
| <b>CO2</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |
| <b>CO3</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |
| <b>CO4</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**BASIC ELECTRICAL & ELECTRONICS ENGINEERING**  
(Common to IT, ECE, EEE, ME and CE)

|                                 |          |          |          |          |
|---------------------------------|----------|----------|----------|----------|
| <b>Subject Code: UGBS1T1323</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>I Year / I Semester</b>      | <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**PART-A: BASIC ELECTRICAL ENGINEERING**

**Course Objectives:**

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

**Course Outcomes:**

After 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.

**Syllabus:**

**UNIT I: DC & AC Circuits** **(8 Hours)**

**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 (8 Hours)**

**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 (8 Hours)**

**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.

| CO – PO Mapping |   |   |   |   |   |   |   |   |   |    |    |    |      |      |
|-----------------|---|---|---|---|---|---|---|---|---|----|----|----|------|------|
| POs             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | PSO1 | PSO2 |
| CO1             | 3 | - | - | - | - | - | - | - | - | -  | -  | -  | -    | -    |
| CO2             | 3 | 3 | - | - | - | - | 3 | - | - | -  | -  | 3  | -    | -    |
| CO3             | 3 | - | 3 | - | - | - | 2 | - | - | -  | -  | 2  | -    | -    |
| CO4             | 3 | 3 | - | - | - | - | 3 | - | - | -  | -  | 3  | -    | -    |
| CO5             | 3 | 3 | - | - | - | - | - | - | - | -  | -  | -  | -    | -    |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

4. Basic Electrical and Electronics Engineering, S. K. Bhattacharya, Person Publications, 2018, Second Edition.

**Web Resources:**

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

**PART-B: BASIC ELECTRONICS ENGINEERING**

**Course Objectives:**

To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

**Course Outcomes:**

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

CO1: Analyze the operation and characteristics of diodes, transistor, rectifiers, power supplies, amplifier design and electronic instrumentation systems.

CO2: Demonstrate a comprehensive understanding of digital electronics, encompassing the application of concepts related to number systems, logic gates, Boolean algebra, truth tables, and the design of simple combinational and sequential circuits using flip-flops, registers and counters.

**Syllabus:**

**UNIT I: Semiconductor Devices (8 Hours)**

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 (8 Hours)**

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****(8 Hours)**

Overview of Number Systems, 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 including Universal 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)

**CO-PO Mapping:**

| COs/POs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | PSO1 | PSO2 |
|---------|---|---|---|---|---|---|---|---|---|----|----|----|------|------|
| CO1     | 3 | 3 | 3 | - | - | - | - | - | - | -  | -  | -  | -    | -    |
| CO2     | 3 | 3 | 3 | - | - | - | - | - | - | -  | -  | -  | -    | -    |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**ENGINEERING GRAPHICS**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGME1T0123**  
**I Year / I Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>1</b> | <b>0</b> | <b>4</b> | <b>3</b> |

**Course Objectives:**

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

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Apply precise engineering drawing techniques and standards, including dimensioning, geometric constructions, and polygon construction, following industry norms.

**CO2:** Use orthographic projection for accurate 3D to 2D representation.

**CO3:** Project straight lines and planes proficiently.

**CO4:** Represent solids effectively, including revolution solids.

**CO5:** Apply sectioning techniques for accurate visualization and develop surfaces as needed for recreating 3D solids.

**CO6:** Convert between isometric and orthographic views, use AutoCAD for 2D/3D drawings, including PCB with transformations.

**Syllabus:**

**UNIT I: (9 Hours)**

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

**Curves:** Construction of ellipse, parabola, and hyperbola by general, Cycloids, Involutives, Normal and tangent to Curves.

**Scales:** Plain scales, Diagonal scales and Vernier scales.

**UNIT II: (9 Hours)**

**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 the 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: (9 Hours)**

**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: (9 Hours)**

**Sections of Solids:** Perpendicular and inclined section planes, Sectional views and True shape of the 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: (9 Hours)**

**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 AutoCAD (Not for end examination).

**Mapping of COs to POs:**

| POs/<br>COs | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| <b>C01</b>  | 3       | 3       | -       | -       | -       | 3       | 3       | -       | -       | -        | -        | 2        |
| <b>C02</b>  | 3       | 3       | -       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| <b>C03</b>  | 3       | 3       | -       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| <b>C04</b>  | 3       | 3       | -       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| <b>C05</b>  | 3       | 3       | 3       | -       | -       | 3       | -       | -       | -       | 3        | -        | -        |
| <b>C06</b>  | 3       | 3       | 3       | -       | 3       | 3       | -       | -       | -       | 3        | -        | 3        |

**TEXT BOOK:**

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.

## **INTRODUCTION TO PROGRAMMING** (Common to All Branches)

**Subject Code: UGCS1T0123**  
**I Year / I Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**Prerequisites:** Basic knowledge on Mathematics and problem solving skills.

### **Course Objectives:**

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

### **Course Outcomes:**

Upon completion of this course, the students will be able to:

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

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

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

**CO4:** Understand more advanced features of C language.

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

### **Syllabus:**

#### **UNIT I: Introduction to Programming and Problem Solving (12 Hours)**

History of Computers, Basic organization of a Computer: ALU, Input-Output units, Memory, Program Counter. Introduction to Programming Languages, Basics of a Computer Program: Algorithms, Flowcharts (Using Dia Tool), Pseudo Code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion and Casting.

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

#### **UNIT II: Control Structures (8 Hours)**

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

**UNIT III: Arrays and Strings****(8 Hours)**

Arrays indexing, Memory model, Programs with array of integers, Two dimensional arrays, Introduction to Strings.

**UNIT IV: Pointers & User Defined Data types****(8 Hours)**

Pointers, Dereferencing and address operators, Pointer and address arithmetic, Array manipulation using pointers, User defined data types: Structures and Unions.

**UNIT V: Functions & File Handling****(10 Hours)**

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

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

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| CO1         | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| CO2         | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| CO3         | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| CO4         | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| CO5         | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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



**CHEMISTRY LAB**  
(Common to IT, ECE and EEE)

**Subject Code: UGBS1P0923**  
**I Year / I Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> |

**Prerequisites:** Basic knowledge in Chemical analysis.

**Course Objectives:** This course helps students to acquire basic knowledge to verify the fundamental concepts with experiments.

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Determine the EMF, cell constant, conductance and redox potentials of solutions.

**CO2:** Prepare advanced materials and to study its applications.

**CO3:** Measure the strength of an acid present in secondary batteries.

**CO4:** Understand the spectroscopic techniques and analyze the spectra of some organic compounds.

**CO5:** Ferrous iron in given sample by volumetric method.

**List of Experiments:**

1. Conductometric titration of strong acid vs. strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and e.m.fs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of Bakelite
7. Verify Lambert-Beer's law
8. Identification of simple organic compounds by IR
9. Preparation of nanomaterials by precipitation method
10. Estimation of Ferrous Iron by Dichrometry

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| <b>CO1</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO2</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO3</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO4</b>  | 3   | 3   | 3   | -   | 3   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO5</b>  | 3   | 3   | -   |     | -   | -   | -   | -   | -   | -        | -        | -        |

**REFERENCE BOOKS:**

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

**ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS1P1423**  
**I Year / I Semester**

|          |          |          |            |
|----------|----------|----------|------------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>   |
| <b>0</b> | <b>0</b> | <b>3</b> | <b>1.5</b> |

**PART-A: ELECTRICAL ENGINEERING LAB**

**Course Objectives:**

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

**Course Outcomes:**

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

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

**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:** Analyze various characteristics of electrical circuits, electrical machines and measuring instruments.

**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.

**List of Experiments:**

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

**Note:** Minimum Six Experiments to be performed.

| <b>CO – PO Mapping</b> |          |          |          |          |          |          |          |          |          |           |           |           |             |             |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-------------|-------------|
| <b>POs</b>             | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>6</b> | <b>7</b> | <b>8</b> | <b>9</b> | <b>10</b> | <b>11</b> | <b>12</b> | <b>PSO1</b> | <b>PSO2</b> |
| <b>CO1</b>             | 3        | -        | -        | -        | -        | -        | 3        | -        | -        | -         | -         | 3         | -           | -           |
| <b>CO2</b>             | 3        | 3        | -        | -        | -        | -        | -        | -        | 3        | 3         | -         | 2         | -           | -           |
| <b>CO3</b>             | 3        | 3        | -        | -        | -        | -        | -        | -        | 3        | 3         | -         | 2         | -           | -           |
| <b>CO4</b>             | 3        | 3        | -        | -        | -        | 3        | 3        | -        | 2        | 2         | -         | 3         | -           | -           |
| <b>CO5</b>             | 3        | -        | 3        | -        | -        | 3        | -        | -        | 3        | 3         | -         | 3         | -           | 2           |

**REFERENCE BOOKS:**

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

## 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.

### List of Experiments:

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

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

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

### CO-PO Mapping :

| COs | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 | PSO 1 | PSO 2 |
|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|
| CO1 | 3    | 3    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | -     |
| CO2 | 3    | 3    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | -     |
| CO3 | 3    | 3    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | -     |
| CO4 | 3    | 3    | -    | -    | -    | -    | -    | -    | -    | -     | -     | -     | -     | -     |

### REFERENCE BOOKS:

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

## **COMPUTER PROGRAMMING LAB (Common to All Branches)**

**Subject Code: UGCS1P0223**

**I Year / I Semester**

|          |          |          |            |
|----------|----------|----------|------------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>   |
| <b>0</b> | <b>0</b> | <b>3</b> | <b>1.5</b> |

**Prerequisites:** Basic knowledge on Mathematics and problem solving skills.

### **Course Objectives:**

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

### **Course Outcomes:**

Upon completion of this course, the students will be able to:

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

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

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

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

### **List of Experiments:**

#### **UNIT I**

##### **WEEK 1**

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

##### **Suggested Experiments/Activities:**

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

**Lab 1:** Familiarization with programming environment

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

##### **WEEK 2**

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

##### **Suggested Experiments /Activities:**

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

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

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

### **WEEK 3**

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

#### **Suggested Experiments/Activities:**

**Tutorial 3:** Variable types and type conversions:

**Lab 3:** Simple computational problems using arithmetic expressions.

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

### **UNIT II**

#### **WEEK 4**

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

#### **Suggested Experiments/Activities:**

**Tutorial 4:** Operators and the precedence and associativity:

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

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

#### **WEEK 5**

**Objective:** Explore the full scope of different variants of "if construct" namely if-else, null else, if - else if - else, switch and nested-if including in what scenario each

one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

### **Suggested Experiments/Activities:**

**Tutorial 5:** Branching and logical expressions:

**Lab 5:** Problems involving if-then-else structures.

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

## **WEEK 6**

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

### **Suggested Experiments/Activities:**

**Tutorial 6:** Loops, while and for loops

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

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) Compute sine and cos series
- iv) Checking a number palindrome
- v) Construct a pyramid of numbers.

## **UNIT III**

### **WEEK 7:**

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

### **Suggested Experiments/Activities:**

**Tutorial 7:** 1 D Arrays: searching.

**Lab 7:** 1D Array manipulation, linear search

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 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 character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

### **Suggested Experiments/Activities:**

**Tutorial 8:** 2 D arrays, sorting and Strings.

**Lab 8:** Matrix problems, String operations, Bubble sort

- i) Addition of two matrices
- ii) Multiplication of two matrices
- iii) Sort array elements using bubble sort
- iv) Concatenate two strings without built-in functions
- v) Reverse a string using built-in and without built-in string functions

## **UNIT IV**

## **WEEK 9:**

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

### **Suggested Experiments/Activities:**

**Tutorial 9:** Pointers, structures and dynamic memory allocation

**Lab 9:** Pointers and structures, memory dereference.

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

## **WEEK 10:**

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

### **Suggested Experiments/Activities:**

**Tutorial 10:** Bit fields, Self-Referential Structures, Linked lists

**Lab10:** Bit fields, linked lists

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



## UNIT V

### WEEK 11:

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

#### **Suggested Experiments/Activities:**

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

**Lab 11:** Simple functions using call by value, solving differential equations using Euler's theorem.

- i) Write a C function to calculate NCR value.
- ii) Write a C function to find the length of a string.
- iii) Write a C function to transpose of a matrix.
- iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

### WEEK 12:

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

#### **Suggested Experiments/Activities:**

**Tutorial 12:** Recursion, the structure of recursive calls

**Lab 12:** Recursive functions

- i) Write a recursive function to generate Fibonacci series.
- ii) Write a recursive function to find the LCM of two numbers.
- iii) Write a recursive function to find the factorial of a number.
- iv) Write a C Program to implement Ackermann function using recursion.
- v) Write a recursive function to find the sum of series.

### WEEK 13:

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

#### **Suggested Experiments/Activities:**

**Tutorial 13:** Call by reference, dangling pointers

**Lab 13:** Simple functions using Call by reference, Dangling pointers.

- i) Write a C program to swap two numbers using call by reference.
- ii) Demonstrate Dangling pointer problem using a C program.

- iii) Write a C program to copy one string into another using pointer.
- iv) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

**WEEK14:**

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

**Suggested Experiments/Activities:**

**Tutorial 14:** File handling

**Lab 14:** File operations

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

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| <b>CO1</b>  | 3   | -   | -   | -   | -   | -   | -   | -   | 3   | -        | -        | -        |
| <b>CO2</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | 3   | -        | -        | -        |
| <b>CO3</b>  | 3   | 3   | 3   | -   | -   | -   | -   | 3   | 3   | -        | -        | -        |
| <b>CO4</b>  | 3   | 3   | 3   | -   | -   | -   | -   | 3   | 3   | -        | -        | -        |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**NSS/COMMUNITY SERVICE**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS1P1123**  
**I Year / I Semester**

|          |          |          |            |
|----------|----------|----------|------------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>   |
| <b>0</b> | <b>0</b> | <b>1</b> | <b>0.5</b> |

**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.

**Syllabus:**

**UNIT I: Orientation**

General Orientation on NSS/Community Service activities and career guidance.

**Activities:**

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

**UNIT II: Nature & Care**

**Activities:**

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

**UNIT III: Community Service**

**Activities:**

- i) Conducting One Day Special Camp in a village - contacting village area

leaders - Survey in the village, identification of problems - helping them to solve via media – authorities – experts - etc.

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

#### Mapping of COs to POs:

| POs/<br>COs | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| <b>CO1</b>  | -       | -       | -       | -       | -       | -       | -       | 3       | -       | -        | -        | -        |
| <b>CO2</b>  | -       | -       | 3       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| <b>CO3</b>  | -       | -       | -       | -       | -       | 3       | -       | 3       | 3       | -        | -        | -        |
| <b>CO4</b>  | -       | -       | -       | -       | -       | -       | -       | 3       | 3       | -        | -        | -        |
| <b>CO5</b>  | -       | -       | -       | -       | -       | -       | -       | 3       | 3       | -        | -        | -        |

#### 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 Defense, 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 viva voce on the subject.

**I YEAR  
II SEMESTER**

**COMMUNICATIVE ENGLISH**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS2T0323**

**L T P C**

**I Year / II Semester**

**2 0 0 2**

**Prerequisites:** Students must possess basic knowledge in grammar and use of English for general purposes along with their understanding in various genres and LSRW skills for honing their oral and written communication.

**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:**

Upon completion of this course, the students will be able to:

**CO1:** Appreciate a piece of prose; employ suitable strategies for skimming and scanning to get the general idea of a text; learn the mechanics of writing; Parts of Speech- Nouns and Pronouns; Basic Sentence Structures and Vocabulary - Synonyms, Antonyms and Affixes.

**CO2:** Evaluate a piece of prose; write well-structured paragraphs and understand applying cohesive devices, use Articles and Prepositions, learn good Vocabulary - Homonyms, Homophones and Homographs.

**CO3:** Analyze a text in detail and summarize; employ Verbs, Tenses and Subject Verb Agreement appropriately; apply Vocabulary and Word Associations- Compound words and Collocations.

**CO4:** Understand a text, and learn and apply information transfer; use Voice and Reported Speech properly; write Formal Letters, Resume, emails, Covering Letter, SOP; Words Often Confused and Jargons.

**CO5:** Interpret ideas from Reading Comprehension; write essays; and edit short texts by correcting Common Errors and learn Vocabulary - Technical Jargons.

**Syllabus:**

**UNIT I:**

**(9 Hours)**

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

**Listening:** Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

**Speaking:** Asking and answering general questions on familiar topics such as

home, family, work, studies and interests; introducing oneself and others.

**Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.

**Writing:** Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

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

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

**UNIT II: (11 Hours)**

**Lesson: NATURE: The Brook by Alfred Tennyson (Poem)**

**Listening:** Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

**Speaking:** Discussion in pairs/small groups on specific topics followed by short structure talks.

**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

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

**Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions.

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

**UNIT III: (11 Hours)**

**Lesson: BIOGRAPHY: Elon Musk**

**Listening:** Listening for global comprehension and summarizing what is listened to.

**Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed.

**Reading:** Reading a text in detail by making basic inferences - recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

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

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

**Vocabulary:** Compound words, Collocations

**UNIT IV: (11 Hours)**

**Lesson: INSPIRATION: The Toys of Peace by Saki**

**Listening:** Making predictions while listening to conversations/transactional dialogues without video; listening with video.

**Speaking:** Role plays for practice of conversational English in academic contexts

(formal and informal) - asking for and giving information/directions.

**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

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

**Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice

**Vocabulary:** Words often confused, Jargons

**UNIT V: (11 Hours)**

**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

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| CO1         | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3        | -        | 3        |
| CO2         | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3        | -        | 3        |
| CO3         | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3        | -        | 3        |
| CO4         | -   | -   | -   | -   | -   | -   | -   | -   | 2   | 3        | -        | 3        |
| CO5         | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3        | -        | 3        |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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



## **WEB RESOURCES:**

### **GRAMMAR**

1. [www.bbc.co.uk/learningenglish](http://www.bbc.co.uk/learningenglish)
2. <https://dictionary.cambridge.org/grammar/british-grammar/>
3. [www.eslpod.com/index.html](http://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](https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA)

**ENGINEERING PHYSICS**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS2T0423**  
**I Year / II Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**Prerequisites:** Ray optics, Basics of Mechanics, Properties of Matter

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

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Analyze the intensity variation of light due to interference diffraction and polarization

**CO2:** Familiarize with the basics of crystals and their structures

**CO3:** Summarize various types of polarization of dielectrics and classify the magnetic materials

**CO4:** Apply the basic concepts of Quantum Mechanics to understand the free electron theory

**CO5:** Identify the type of semiconductor using Hall effect

**Syllabus:**

**UNIT-I: (12Hours)**

**Wave Optics :** Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton’s Rings, Determination of wavelength and refractive index. Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

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

**UNIT-II: (10Hours)**

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

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

**UNIT–III: (12Hours)**

**Dielectric and Magnetic Materials:** Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss  
 Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

**UNIT–IV: (10Hours)**

**Quantum Mechanics and Free electron Theory:** Quantum Mechanics: Dual nature of matter – Heisenberg’s Uncertainty Principle – Significance and properties of wave function – Schrodinger’s time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.  
 Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

**UNIT–V: (10Hours)**

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

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| <b>CO1</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO2</b>  | 3   | 3   | -   | 2   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO3</b>  | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO4</b>  | 3   | 3   | -   | 2   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO5</b>  | 3   | 3   | -   | 2   | -   | -   | -   | -   | -   | -        | -        | -        |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**Web Resources:** <https://www.loc.gov/rr/scitech/selected-internet/physics.html>

## **DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS** (Common to All Branches)

**Subject Code: UGBS2T0223**  
**I Year / II Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**Prerequisites:** Basics of Differentiation and Integration.

### **Course Objectives:**

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

### **Course Outcomes:**

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

CO1: Solve First order differential equations and apply them to problems of Newton's Law of cooling, Law of Natural growth and Decay and Electrical circuits.

CO2: Solve linear differential equations of higher order and apply them to problems of Electrical circuits and Simple Harmonic Motion.

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

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

CO5: Estimate the work done against a field, circulation and flux using vector Integration.

### **Syllabus:**

#### **UNIT-I: (8Hours)**

##### **Differential equations of first order and first degree:**

Linear differential equations – Bernoulli's equations - Exact equations and equations reducible to exact form.

Applications: Newton's Law of cooling – Law of natural growth and decay - Electrical circuits.

#### **UNIT-II: (10Hours)**

##### **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: (8Hours)****Partial Differential Equations:**

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

**UNIT-IV: (8Hours)****Vector Differentiation:**

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

**UNIT-V: (8Hours)****Vector Integration**

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

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| <b>CO1</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |
| <b>CO2</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |
| <b>CO3</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |
| <b>CO4</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |
| <b>CO5</b>  | 3   | 3   | 3   | -   | -   | -   | -   | -   | -   | -    | -    | 3    |

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

**BASIC CIVIL AND MECHANICAL ENGINEERING**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS2T1023**  
**I Year / II Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**PART-A: BASIC CIVIL ENGINEERING**

**Prerequisites:** Basic knowledge on Trigonometry and Science

**Course Objectives:**

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

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society and basic characteristics of Civil Engineering Materials.

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

**CO3:** Realize the importance of Transportation in nation'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.

**Syllabus:**

**UNIT I: (7 Hours)**

**Basics of Civil Engineering:** Role of Civil Engineers in Society - Various Disciplines of Civil Engineering - Structural Engineering - Geo-technical Engineering - Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering - Scope of each discipline - Building Construction and Planning - Construction Materials - Cement - Aggregate – Bricks - Cement concrete - Steel. Introduction to Prefabricated construction Techniques.

**UNIT II: (7 Hours)**

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

**UNIT III: (9 Hours)**

**Transportation Engineering:** Importance of Transportation in Nation's economic development - Types of Highway Pavements - Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

**Water Resources and Environmental Engineering:** Introduction, Sources of water - Quality of water – Specifications - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| <b>CO1</b>  | 3   | 3   | -   | -   | -   | 3   | -   | -   | -   | -        | -        | -        |
| <b>CO2</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO3</b>  | 3   | -   | -   | -   | -   | 3   | -   | -   | -   | -        | -        | -        |
| <b>CO4</b>  | 3   | -   | -   | -   | -   | 3   | 3   | -   | -   | -        | -        | -        |

**Textbooks:**

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

**Reference Books:**

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



## **PART-B: BASIC MECHANICAL ENGINEERING**

**Prerequisites:** Basic knowledge in Physics.

**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:** Apply the fundamentals of mechanical engineering to engineering application.

**CO2:** Explored to the applications of manufacturing and role of robots in manufacturing.

**CO3:** Differentiate the science of thermal engineering and design for power transmission.

### **Syllabus:**

#### **UNIT I: (8 Hours)**

**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: (8 Hours)**

**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: (8 Hours)**

**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.)

**Mapping of COs to POs:**

| <b>POs/<br/>COs</b> | <b>PO1</b> | <b>PO2</b> | <b>PO3</b> | <b>PO4</b> | <b>PO5</b> | <b>PO6</b> | <b>PO7</b> | <b>PO8</b> | <b>PO9</b> | <b>PO<br/>10</b> | <b>PO<br/>11</b> | <b>PO<br/>12</b> |
|---------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------------|------------------|------------------|
| <b>CO1</b>          | 3          | -          | -          | -          | 3          | 3          | -          | -          | -          | -                | -                | 3                |
| <b>CO2</b>          | 3          | -          | -          | 2          | 3          | 3          | 2          | -          | -          | -                | -                | 3                |
| <b>CO3</b>          | 3          | -          | -          | 3          | 3          | 3          | 2          | -          | -          | -                | -                | 3                |

**Textbooks:**

1. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. Internal Combustion Engines by V. Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.

**Reference Books:**

1. G. Shanmugam and M.S. Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
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. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

**DATA STRUCTURES**  
(Common to CSE, IT & Allied Branches)

**Subject Code: UGCS2T0123**  
**I Year / II Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>3</b> | <b>0</b> | <b>0</b> | <b>3</b> |

**Prerequisites:** Basic knowledge on C programming.

**Course Objectives:**

- To provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

**CO2:** Design, implement, and apply linked lists for dynamic data storage, demonstrating, understanding of memory allocation.

**CO3:** Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

**CO4:** Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.

**CO5:** Devise novel solutions to small scale programming challenges involving data structures such as Stacks, Queues and Trees.

**CO6:** Recognize scenarios where hashing is advantageous and design hash-based solutions for specific problems.

**Syllabus:**

**UNIT I: (10 Hours)**

**Introduction to Linear Data Structures:** Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort.

**UNIT II: (9 Hours)**

**Linked Lists:** Singly linked lists representation and operations, doubly linked lists and circular linked lists, Comparing arrays & linked lists, Applications of linked lists.

**UNIT III: (10 Hours)**

**Stacks:** Introduction to stacks: properties and operations, Implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list, etc.

**UNIT IV: (10 Hours)**

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

**Deque:** Introduction to deque (double-ended queues), Operations on deque and their applications.

**UNIT V: (10 Hours)**

**Trees:** Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal

**Hashing:** Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

**Mapping of COs to POs:**

| POs/<br>COs | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO<br>10 | PO<br>11 | PO<br>12 | PSO<br>1 | PSO<br>2 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| <b>CO1</b>  | 3       | -       | -       | -       | -       | -       | -       | -       | -       | -        | -        | -        | -        | -        |
| <b>CO2</b>  | 3       | 3       | 3       | -       | -       | -       | -       | -       | -       | -        | -        | -        | 3        | -        |
| <b>CO3</b>  | 3       | 3       | 3       | -       | -       | -       | -       | -       | -       | -        | -        | -        | 3        | -        |
| <b>CO4</b>  | 3       | 3       | 3       | 3       | -       | -       | -       | -       | -       | -        | -        | -        | 3        | -        |
| <b>CO5</b>  | 3       | 3       | 3       | 3       | -       | -       | -       | -       | -       | -        | -        | -        | 3        | -        |
| <b>CO6</b>  | 3       | 3       | 3       | 3       | -       | -       | -       | -       | -       | -        | -        | -        | 3        | -        |

**TEXT BOOKS:**

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Silicon Press, 2008

**REFERENCE BOOKS:**

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures by Brad Miller and David Ranum

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 Graph Algorithms" by Robert Sedgewick

**COMMUNICATIVE ENGLISH LAB**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS2P0723**  
**I Year / II Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> |

**Prerequisites:** Students must possess basic knowledge in sounds of English and identification of sound symbols along with the ability to speak and write in English.

**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. The students will get trained in basic communication skills and also make them ready to face job interviews.

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Articulate Vowels and Consonants properly, understand Non Verbal Communication and identify the topic, the context, specific questions and overall idea by listening to short audio texts and answering a series of questions and will also be able to introduce themselves and others.

**CO2:** Practice Neutralization/Accent Rules and answer a series of questions about main idea and supporting ideas after listening to audio texts.

**CO3:** Understand stress and listen for global comprehension and summarize what is listened to and will be able to participate in Group Discussions and Debates.

**CO4:** Make predictions while listening to conversations, videos, and enact Dialogues/Role Plays.

**CO5:** Build and practice topics from Science and Technology - using PPT Presentations/Poster Presentation.

**LIST OF TOPICS:**

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/Poster Presentation
10. Interviews Skills

### Mapping of COs to POs:

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| CO1         | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3        | -        | 3        |
| CO2         | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3        | -        | 3        |
| CO3         | -   | -   | -   | -   | -   | -   | -   | -   | -   | 3        | -        | 3        |
| CO4         | -   | -   | -   | -   | -   | -   | -   | -   | 2   | 3        | -        | 3        |
| CO5         | -   | -   | -   | -   | -   | -   | -   | -   | 2   | 3        | -        | 3        |

### Suggested Software:

- Walden Infotech
- Young India Films

### REFERENCE BOOKS:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India,2016
3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2<sup>nd</sup> Ed),Kindle, 2013

### WEB RESOURCES:

#### Spoken English:

1. [www.esl-lab.com](http://www.esl-lab.com)
2. [www.englishmedialab.com](http://www.englishmedialab.com)
3. [www.englishinteractive.net](http://www.englishinteractive.net)
4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. [https://www.youtube.com/c/mmmEnglish\\_Emma/featured](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](https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw)

#### Voice & Accent:

1. <https://www.youtube.com/user/letstalkaccent/videos>
2. <https://www.youtube.com/c/EngLanguageClub/featured>
3. [https://www.youtube.com/channel/UC\\_OskgZBoS4dAnVUgJVexc](https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc)
4. [https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp\\_IA](https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA)

**ENGINEERING PHYSICS LAB**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS2P0823**  
**I Year / II Semester**

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

**Prerequisites:** Knowledge on optics, oscillations, electricity & magnetism

**Course Objectives:** To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Operate optical instruments to estimate the optical parameters

**CO2:** Evaluate dielectric constant and magnetic parameters for dielectric and magnetic materials respectively

**CO3:** Measure the value of Planck's constant using photo electric effect

**CO4:** Calculate the electronic parameters of a given semiconductor

**CO5:** Estimate the frequency of vibrating bodies

**CO6:** Determine the physical parameters by observing oscillatory motion

**Syllabus:**

**EXPERIMENT 1:**

Determination of radius of curvature of a given Plano-convex lens by Newton's rings.

**EXPERIMENT 2:**

Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.

**EXPERIMENT 3:**

Verification of Brewster's law

**EXPERIMENT 4:**

Determination of dielectric constant using charging and discharging method.

**EXPERIMENT 5:**

Study the variation of B versus H by magnetizing the magnetic material (B-H curve).

**EXPERIMENT 6:**

Determination of wavelength of Laser light using diffraction grating.

**EXPERIMENT 7:**

Estimation of Planck's constant using photoelectric effect.

**EXPERIMENT 8:**

Determination of the resistivity of semiconductors by four probe methods.

**EXPERIMENT 9:**

Determination of energy gap of a semiconductor using p-n junction diode.



**EXPERIMENT 10:**

Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.

**EXPERIMENT 11:**

Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

**EXPERIMENT 12:**

Determination of temperature coefficients of a thermistor.

**EXPERIMENT 13:**

Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.

**EXPERIMENT 14:**

Determination of magnetic susceptibility by Kundt's tube method.

**EXPERIMENT 15:**

Determination of rigidity modulus of the material of the given wire using Torsional pendulum.

**EXPERIMENT 16:**

Sonometer: Verification of laws of stretched string.

**EXPERIMENT 17:**

Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.

**EXPERIMENT 18:**

Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

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

**Mapping of COs to POs:**

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| <b>CO1</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO2</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO3</b>  | 3   | 3   | -   | 2   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO4</b>  | 3   | 3   | -   | 2   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO5</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |
| <b>CO6</b>  | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -        | -        | -        |

**References:**

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

**Web Resources:**

1. [www.vlab.co.in](http://www.vlab.co.in)
2. <https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

**ENGINEERING WORKSHOP**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGME2P0223**

**I Year / II Semester**

| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>   |
|----------|----------|----------|------------|
| <b>0</b> | <b>0</b> | <b>3</b> | <b>1.5</b> |

**Course Objectives:**

To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills and basic repairs of two-wheeler vehicle.

**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.

**Syllabus:**

1. **Demonstration:** Safety practices and precautions to be observed in the workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and making 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 jobs from GI sheets.

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.

a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tire

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 the same diameter and with reducer for different diameters.

9. **Basic repairs of Two-wheeler vehicle:** Demonstration of working of two-wheeler vehicle and its repairs.

**Mapping of COs to POs:**

| <b>POs/<br/>COs</b> | <b>PO<br/>1</b> | <b>PO<br/>2</b> | <b>PO<br/>3</b> | <b>PO<br/>4</b> | <b>PO<br/>5</b> | <b>PO<br/>6</b> | <b>PO<br/>7</b> | <b>PO<br/>8</b> | <b>PO<br/>9</b> | <b>PO<br/>10</b> | <b>PO<br/>11</b> | <b>PO<br/>12</b> |
|---------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| <b>CO1</b>          | 3               | 2               | 2               | -               | -               | -               | -               | -               | -               | 3                | -                | 2                |
| <b>CO2</b>          | 3               | 2               | 2               | -               | -               | -               | -               | -               | -               | 3                | -                | 2                |
| <b>CO3</b>          | 3               | 2               | 2               | -               | -               | -               | -               | -               | -               | 3                | -                | 2                |
| <b>CO4</b>          | 3               | 3               | 3               | -               | -               | -               | -               | -               | -               | 3                | -                | 3                |

**TEXT BOOKS:**

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.

**DATA STRUCTURES LAB**  
(Common to CSE, IT & Allied Branches)

**Subject Code: UGCS2P0323**  
**I Year / II Semester**

|          |          |          |            |
|----------|----------|----------|------------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>   |
| <b>0</b> | <b>0</b> | <b>3</b> | <b>1.5</b> |

**Prerequisites:** Basic knowledge on C programming.

**Course Objectives:**

The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.

**CO2:** Design, implement and apply linked lists for dynamic data storage, demonstrating, understanding of memory allocation.

**CO3:** Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.

**CO4:** Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.

**CO5:** Recognize scenarios where hashing is advantageous and design hash-based solutions for specific problems.

**List of Experiments:**

**Exercise 1: Array Manipulation**

- i) Write a program to reverse an array.
- ii) C Programs to implement the Searching Techniques – Linear & Binary Search
- iii) C Programs to implement Sorting Techniques – Bubble, Selection and Insertion Sort

**Exercise 2: Linked List Implementation**

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

**Exercise 3: Linked List Applications**

- i) Create a program to detect and remove duplicates from a linked list.

- ii) Implement a linked list to represent polynomials and perform addition.
- iii) Implement a double-ended queue (deque) with essential operations.

**Exercise 4: Double Linked List Implementation**

- i) Implement a doubly linked list and perform various operations to understand its properties and applications.
- ii) Implement a circular linked list and perform insertion, deletion, and traversal.

**Exercise 5: Stack Operations**

- i) Implement a stack using arrays and linked lists.
- ii) Write a program to evaluate a postfix expression using a stack.
- iii) Implement a program to check for balanced parentheses using a stack.

**Exercise 6: Queue Operations**

- i) Implement a queue using arrays and linked lists.
- ii) Develop a program to simulate a simple printer queue system.
- iii) Solve problems involving circular queues.

**Exercise 7: Stack and Queue Applications**

- i) Use a stack to evaluate an infix expression and convert it to postfix.
- ii) Create a program to determine whether a given string is a palindrome or not.
- iii) Implement a stack or queue to perform comparison and check for symmetry.

**Exercise 8: Binary Search Tree**

- i) Implementing a BST using Linked List.
- ii) Traversing of BST.

**Exercise 9: Hashing**

- i) Implement a hash table with collision resolution techniques.
- ii) Write a program to implement a simple cache using hashing.

**Mapping of COs to POs:**

| POs/<br>COs | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO<br>10 | PO<br>11 | PO<br>12 | PSO<br>1 | PSO<br>2 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
| <b>CO1</b>  | 3       | -       | -       | -       | -       | -       | -       | -       | -       | -        | -        | -        | -        | -        |
| <b>CO2</b>  | 3       | 3       | 3       | -       | -       | -       | -       | -       | 3       | -        | -        | -        | 3        | -        |
| <b>CO3</b>  | 3       | 3       | 3       | -       | -       | -       | -       | -       | 3       | -        | -        | -        | 3        | -        |
| <b>CO4</b>  | 3       | 3       | 3       | 3       | -       | -       | -       | -       | 3       | -        | -        | -        | 3        | -        |
| <b>CO5</b>  | 3       | 3       | 3       | 3       | -       | -       | -       | -       | 3       | -        | -        | -        | 3        | -        |

**TEXT BOOKS:**

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, Silicon Press, 2008

**REFERENCE BOOKS:**

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures" by Brad Miller and David Ranum
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 Graph Algorithms by Robert Sedgewick

**IT WORKSHOP**  
**(Common to All Branches)**

**Subject Code:UGCS2P0223**  
**I Year / II Semester**

|          |          |          |          |
|----------|----------|----------|----------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b> |
| <b>0</b> | <b>0</b> | <b>2</b> | <b>1</b> |

**Prerequisites:** Basic knowledge on Computers.

**Course Objectives:**

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

**Course Outcomes:**

Upon completion of this course, the students will be able to:

**CO1:** Perform Hardware troubleshooting.

**CO2:** Understand Hardware components and inter dependencies.

**CO3:** Safeguard computer systems from viruses/worms.

**CO4:** Document/ Presentation preparation.

**CO5:** Perform calculations using spreadsheets.

**Syllabus:**

**1) PC Hardware & Software Installation:**

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

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

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

**Task 4:** Every student should install Linux on the computer. This computer should

have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.

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

## **2) Internet & World Wide Web:**

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

**Task 2: Web Browsers, Surfing the Web:** Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

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

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

## **3) LaTeX and WORD:**

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

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



Time option in both LaTeX and Word.

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

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

#### **4) EXCEL:**

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

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

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

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

#### **5) POWER POINT:**

**Task 1:** Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

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

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

## 6) AI TOOLS – ChatGPT:

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

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

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

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

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

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

### Mapping of COs to POs:

| POs/<br>COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|----------|----------|----------|
| <b>CO1</b>  | 3   | 3   | -   | -   | -   | -   | -   | -   | 3   | -        | -        | -        |
| <b>CO2</b>  | 3   | -   | -   | -   | -   | -   | -   | -   | 3   | -        | -        | -        |
| <b>CO3</b>  | 3   | -   | -   | -   | 3   | -   | -   | -   | 3   | -        | -        | -        |
| <b>CO4</b>  | 3   | -   | -   | -   | 3   | -   | -   | -   | 3   | -        | -        | -        |
| <b>CO5</b>  | 3   | -   | -   | -   | 3   | -   | -   | -   | 3   | -        | -        | -        |

### REFERENCE BOOKS:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition

**HEALTH AND WELLNESS, YOGA AND SPORTS**  
(Common to IT, ECE, EEE, ME and CE)

**Subject Code: UGBS2P0923**

**I Year / II Semester**

|          |          |          |            |
|----------|----------|----------|------------|
| <b>L</b> | <b>T</b> | <b>P</b> | <b>C</b>   |
| <b>0</b> | <b>0</b> | <b>1</b> | <b>0.5</b> |

**Course Objectives:**

The main objective of introducing this course is to make the students maintain their mental and physical 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.

**Syllabus:**

**UNIT I:**

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

**Activities:**

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

**UNIT II:**

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

**Activities:**

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

**UNIT III:**

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

**Activities:**

- i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.  
Practicing general and specific warm up, aerobics
- ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

**Mapping of COs to POs:**

| POs/<br>COs | PO<br>1 | PO<br>2 | PO<br>3 | PO<br>4 | PO<br>5 | PO<br>6 | PO<br>7 | PO<br>8 | PO<br>9 | PO<br>10 | PO<br>11 | PO<br>12 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| CO1         | -       | -       | -       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| CO2         | -       | -       | -       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| CO3         | -       | -       | -       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| CO4         | -       | -       | -       | -       | -       | 3       | -       | -       | -       | -        | -        | -        |
| CO5         | -       | -       | -       | -       | -       | 3       | -       | 3       | -       | -        | -        | -        |

**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 many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

**Evaluation Guidelines:**

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