# COURSE STRUCTURE

## For

# B.Tech.

## Department of Civil Engineering

*(from 2024 Admitted batch onwards)*



Learning is Supreme Deity

# PRAGATI ENGINEERING COLLEGE

**(An Autonomous Institution)**
ADB Road, Surampalem, Kakinada District, A.P.-533 437
**(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada)**
**(Recognized by UGC under sections 2 (f) and 12 (b) of UGC act, 1956)**

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering

### COURSE STRUCTURE

### INDUCTION PROGRAMME

| S.No. | Course Name | Category | L | T | P | Credits |
|-------|-------------|----------|---|---|---|---------|
| 1 | Physical Activities -- Sports, Yoga and Meditation, Plantation | MC | 0 | 0 | 6 | 0 |
| 2 | Career Counselling | MC | 2 | 0 | 2 | 0 |
| 3 | Orientation to all branches -- career options, tools, etc. | MC | 3 | 0 | 0 | 0 |
| 4 | Orientation on admitted Branch -- corresponding labs, tools and platforms | EC | 2 | 0 | 3 | 0 |
| 5 | Proficiency Modules & Productivity Tools | ES | 2 | 1 | 2 | 0 |
| 6 | Assessment on basic aptitude and mathematical skills | MC | 2 | 0 | 3 | 0 |
| 7 | Remedial Training in Foundation Courses | MC | 2 | 1 | 2 | 0 |
| 8 | Human Values & Professional Ethics | MC | 3 | 0 | 0 | 0 |
| 9 | Communication Skills -- focus on Listening, Speaking, Reading, Writing skills | BS | 2 | 1 | 2 | 0 |
| 10 | Concepts of Programming | ES | 2 | 0 | 2 | 0 |

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering
### 2024-2025 Admitted Batch
### COURSE STRUCTURE

### I YEAR – I SEMESTER

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|--------|----------|-------------|--------------|---|---|---|---------|
| 1 | BS&H | 24BP101T | Engineering Physics | 3 | 0 | 0 | 3 |
| 2 | BS&H | 24BM101T | Linear Algebra and Calculus | 3 | 0 | 0 | 3 |
| 3 | Engineering Science | 24EE101T | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 |
| 4 | Engineering Science | 24ME101T | Engineering Graphics | 1 | 0 | 4 | 3 |
| 5 | Engineering Science | 24CS101T | Introduction to programming | 3 | 0 | 0 | 3 |
| 6 | BS&H | 24BP101P | Engineering Physics Laboratory | 0 | 0 | 2 | 1 |
| 7 | Engineering Science | 24EE101P | Electrical and Electronics Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 8 | Engineering Science | 24CS101P | Computer Programming Laboratory | 0 | 0 | 3 | 1.5 |
| 9 | Engineering Science | 24IT101P | IT Workshop | 0 | 0 | 2 | 1 |
| 10 | BS&H | 24MH102P | NSS/NCC/Scouts and Guides/Community Service | 0 | 0 | 1 | 0.5 |
| **Total Credits** | | | | | | | **20.5** |

### I YEAR – II SEMESTER

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|--------|----------|-------------|--------------|---|---|---|---------|
| 1 | BS&H | 24BE201T | Communicative English | 2 | 0 | 0 | 2 |
| 2 | BS&H | 24BM201T | Differential equations and Vector Calculus | 3 | 0 | 0 | 3 |
| 3 | BS&H | 24BC202T | Engineering Chemistry | 3 | 0 | 0 | 3 |
| 4 | Engineering Science | 24CM201T | Basic Civil and Mechanical Engineering | 3 | 0 | 0 | 3 |
| 5 | Professional Core | 24ME202T | Engineering Mechanics | 3 | 0 | 0 | 3 |
| 6 | Engineering Science | 24ME203P | Engineering Workshop | 0 | 0 | 3 | 1.5 |
| 7 | BS&H | 24BE201P | Communicative English Laboratory | 0 | 0 | 2 | 1 |
| 8 | Professional Core | 24CE201P | Engineering Mechanics and Building Practices Lab | 0 | 0 | 3 | 1.5 |
| 9 | BS&H | 24BC202P | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 10 | BS&H | 24MH201P | Health and wellness, Yoga and sports | 0 | 0 | 1 | 0.5 |
| **Total Credits** | | | | | | | **19.5** |

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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### II YEAR I SEMESTER

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | BS&H | 24BM301T | Numerical Techniques And Statistical Methods | 3 | 0 | 0 | 3 |
| 2 | HSMC | 24HM301T | Universal human values – understanding harmony and Ethical human conduct | 2 | 1 | 0 | 3 |
| 3 | Engineering Science | 24CE301T | Surveying | 3 | 0 | 0 | 3 |
| 4 | Professional Core | 24CE302T | Strength of Materials | 3 | 0 | 0 | 3 |
| 5 | Professional Core | 24CE303T | Fluid Mechanics | 3 | 0 | 0 | 3 |
| 6 | Professional Core | 24CE301P | Surveying Laboratory | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | 24CE302P | Strength of Materials Laboratory | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement Course | 24CE301S | Building Planning and Drawing | 0 | 1 | 2 | 2 |
| | | | **Total** | **14** | **2** | **8** | **20** |
| 9 | Audit Course | 24BC301T | Environmental Science | 2 | 0 | 0 | - |

### II YEAR II SEMESTER

| Sl. No | Category | Course Code | Course Title | L | T | P | Credits |
|---|---|---|---|---|---|---|---|
| 1 | Management Course-I | 24HM401T | Managerial Economics and Financial Analysis | 2 | 0 | 0 | 2 |
| 2 | Engineering Science / Basic Science | 24CE401T | Engineering Geology | 3 | 0 | 0 | 3 |
| 3 | Professional Core | 24CE402T | Concrete Technology | 3 | 0 | 0 | 3 |
| 4 | Professional Core | 24CE403T | Structural Analysis | 3 | 0 | 0 | 3 |
| 5 | Professional Core | 24CE404T | Hydraulics & Hydraulic Machinery | 3 | 0 | 0 | 3 |
| 6 | Professional Core | 24CE402P | Concrete Technology Laboratory | 0 | 0 | 3 | 1.5 |
| 7 | Professional Core | 24CE401P | Engineering Geology Laboratory | 0 | 0 | 3 | 1.5 |
| 8 | Skill Enhancement course | 24CE401S | Remote Sensing & Geographical Information Systems | 0 | 1 | 2 | 2 |
| 9 | Engineering Science | 24HM401P | Design Thinking & Innovation | 1 | 0 | 2 | 2 |
| | | | **Total** | **15** | **1** | **10** | **21** |
| 10 | Mandatory course | 24CE405T | Building materials and Construction | 3 | 0 | 0 | - |
| Mandatory Community Service Project Internship of 08 weeks duration during summer vacation | | | | | | | |

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering
### I Year I Semester
### ENGINEERING PHYSICS
### (Common to CSE, CSE (AI), CE, EEE ME)

| Course Category | Basic Sciences | | Course Code | 24BP101T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 3-0-0-3 |
| | | | Continuous Internal Assessment | 30 |
| Prerequisites | Intermediate Physics | | Semester End Examination | 70 |
| | | | Total Marks | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization required to design instruments with higher resolution. |
| 2 | Impart the knowledge of Dielectric& Magnetic materials for engineering Applications. |
| 3 | Understand the basics of Semiconductors and their working mechanism for their utility in Engineering applications. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Analyzetheintensityvariationoflightduetopolarization,interferenceanddiffraction | K4 |
| CO2 | Familiarize with the basics of crystals and their structures. | K2 |
| CO3 | Applying the concepts of quantum mechanics for calculation of free quantum particle energies and phenomenon of electrical & thermal conductivities to sub microscopic particles | K3 |
| CO4 | Apply the basics of phenomenon related to dielectric materials and Magnetic Materials to study their dependence on temperature and frequency response. | K3 |
| CO5 | Understand the Band formation, electrical conductivities in semiconductors and study the types of semiconductors using Hall Effect. | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

## COURSE CONTENT

### UNIT – I -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).

### UNIT - II - 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 - 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 - QUANTUM MECHANICS AND FREE ELECTRON THEORY

Quantum Mechanics: Introduction-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: Introduction-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 - BAND THEORY OF SOLIDS  & SEMICONDUCTOR PHYSICS
### BAND THEORY OF SOLIDS

Bloch's Theorem (Qualitative) - Kronig Penny Model(Qualitative)-E vs K diagram-V vs K diagram, Effective mass of electron- Classification of Crystalline Solids-Concept of hole

### SEMICONDUCTOR PHYSICS

Semiconductors: Introduction-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.

**TEXT BOOKS**

"A Text book of Engineering Physics" by M.N.Avadhanulu, P.G.Kshir sagar -S.Chand Publications,

"Engineering Physics" by Tirupati Naidu &Veeranjaneyalu, V G S  Publishers

"Engineering Physics" by P.K Palanisamy,Sci Tech Publication

**REFERENCE BOOKS**

Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition

Solid State Physics ,AJ Dekker, I Edition,Macmillan Publishers India Private Limited

"Engineering Physics" by M.R.Srinivasan, New Age international publishers.

"Solid State Physics" by SO Pilai., - New age International Publishers

**WEB RESOURCES**

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

Unit I:https://nptel.ac.in/courses/122/107/122107035/#

Unit II: https://nptel.ac.in/courses/113/104/113104014/

Unit III: https://nptel.ac.in/courses/113/104/113104090/
           https://youtu.be/DDLljK1ODeg

Unit IV :https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html
          https://nptel.ac.in/courses/115/101/115101107/
          https://nptel.ac.in/courses/115/105/115105122/

Unit V :https://www.electronics-tutorials.ws/diode/diode_1.html
          https://nptel.ac.in/courses/115/105/115105099/
          https://nptel.ac.in/courses/108/108/108108122/

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering
### I Year I Semester
### LINEAR ALGEBRA AND CALCULUS
### (Common to All Branches)

| Course Category | Basic Sciences | | Course Code | 24BM101T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 3-0-0-3 |
| Prerequisites | Matrix Algebra, Limits, Continuity, Differentiability and inerrability | | Continuous Internal Assessment | 30 |
| | | | Semester End Examination | 70 |
| | | | Total Marks | 100 |

| 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 | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Developanduseofmatrixalgebratechniquesthatareneededbyengineersforpractical applications. | K3 |
| **CO2** | Find the Eigen values and Eigen vectors and able to reduce the given quadratic form into canonical form by orthogonal transformation. | K3 |
| **CO3** | Utilize mean value theorems to real life problems. | K3 |
| **CO4** | Familiarize with functions of several variables which is useful in optimization & learn important tools of calculus in higher dimensions | K3 |
| **CO5** | Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |

## COURSE CONTENT

### UNIT I - Matrices:

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

### UNIT II - Eigen values, Eigenvectors and Orthogonal Transformation:

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

### UNIT III - Calculus:

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

### UNIT IV - Partial differentiation and Applications (Multi variable calculus):

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

### UNIT V - Multiple Integrals (Multi variable Calculus):

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

### TEXT BOOKS

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

### REFERENCE BOOKS

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5$^{th}$ Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9$^{th}$ edition.
5. Higher Engineering Mathematics, H. K Das, Er. RajnishVerma, S. Chand Publications,2014, Third Edition (Reprint 2021)
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22$^{nd}$ Edition(Reprint 2022).

### WEB RESOURCES

1. https://en.wikipedia.org/wiki/System_of_linear_equations
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://www.math.hmc.edu/calculus/tutorials/eigenstuff/
4. https://en.wikipedia.org/wiki/Quadratic_form
5. https://en.wikipedia.org/wiki/Calculus
6. https://en.wikipedia.org/wiki/Partial_derivative
7. https://www.whitman.edu/mathematics/calculus_online/section14.03.html
8. https://en.wikipedia.org/wiki/Multiple_integral
9. http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx

**I Year I Semester**
**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**
**(Common to CSE, CSE (AI), CE, EEE ME)**

| Course Category | Engineering Science | Course Code | 24EE101T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

### 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 | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Know the fundamental laws, operating principles of motors, generators, MC and MI instruments | K2 |
| **CO2** | Apply 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. | K3 |
| **CO3** | Apply the 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. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | 2 | - | - | - | - | - | - | - | - | - |
| **CO2** | 2 | 2 | 2 | - | - | 2 | - | - | - | - | - | - |
| **CO3** | 3 | 3 | - | - | - | - | 2 | 2 | - | - | - | - |

## COURSE CONTENT

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

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

### UNIT - II
**Machines and Measuring Instruments**

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

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

### UNIT – III
**Energy Resources, Electricity Bill & Safety Measures**

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

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

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

**Textbooks:**

1. 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, DhanpatRai& 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, McGraw Hill, 2019, Fourth Edition

2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020

3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017

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

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

**PART-B :BASIC ELECTRONICS ENGINEERING**

| COURSE OBJECTIVES | |
|---|---|
| 1 | To impart knowledge on semiconductor devices. |
| 2 | To introduce concepts of biasing and applications of diodes and transistors. |
| 3 | To introduce fundamentals of digital electronics. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Understand the basic concepts of diodes and transistors | K2 |
| **CO2** | Understand the working principles of semiconductor devices and applications | K2 |
| **CO3** | Understand number system, Boolean algebra, basics of combinational and sequential circuits | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 2 | | | | | | | | | | |
| **CO2** | 2 | 2 | | | | | | | | | | |
| **CO3** | 2 | 2 | | | | | | | | | | |

**COURSE CONTENT**

**UNIT - I**
**SEMICONDUCTORDEVICES**

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**
**BASICELECTRONICCIRCUITSANDINSTRUMENTTAION**

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, Block diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

**UNIT - III**
**DIGITAL ELECTRONICS**

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

**Textbooks:**
1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation,2021.
2. Digital Design by Morris Mano, 3E, Prentice Hall, India, 2001

**Reference Books:**
1. R.S.Sedha, A Text book 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.

**Web References:**
1. NPTEL- https://archive.nptel.ac.in/courses/108/108/108108122/
2. Neso Academy- https://www.nesoacademy.org/ec/05-digital-electronics

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering

**I Year I Semester**
**ENGINEERING GRAPHICS**
**(Common to CSE, CSE (AI), CE, EEE ME)**

| Course Category | Engineering Science | Course Code | 24ME101T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 1-0-4-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing. |
| 2 | To impart knowledge on the projection of points, lines and plane surfaces. |
| 3 | To improve the visualization skills for better understanding of projection of solids. |
| 4 | To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces. |
| 5 | To make the students understand the viewing perception of a solid object in Isometric and Perspective projections. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections. | K2 |
| CO2 | Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views. | K3 |
| CO3 | Understand and draw projection of solids in various positions in first quadrant. | K3 |
| CO4 | Explain principles behind development of surfaces. | K2 |
| CO5 | Prepare isometric and perspective sections of simple solids. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO3 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO4 | 3 | 2 | 2 | - | - | - | - | - | - | - | 1 | - |
| CO5 | 3 | 2 | 2 | - | 3 | - | - | - | - | - | 1 | - |

**COURSE CONTENT**

**UNIT - I**
**Introduction:** Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.
**Curves:** construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.
**Scales:** Plain scales, diagonal scales and vernier scales.

**UNIT - II**
**Orthographic Projections**: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.
**Projections of Straight Lines:** Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes
**Projections of Planes:** regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

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

**UNIT - IV**
**Sections of Solids:** Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.
**Development of Surfaces:** Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

**UNIT - V**
**Conversion of Views**: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.
**Computer graphics**: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

**Textbook:**
1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

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

**Web References:**
1. http://nptel.ac.in/courses/112103019/
2. https://www.cadtutor.net/tutorials/autocad/

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering
### I Year I Semester
### INTRODUCTIONTOPROGRAMMING
### (Common to All Branches)

| Course Category | Engineering Science | | Course Code | 24CS101T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 3-0-0-3 |
| **Prerequisites** | | Continuous Internal Assessment | | 30 |
| | | Semester End Examination | | 70 |
| | | Total Marks | | 100 |

| COURSEOBJECTIVES | |
|---|---|
| 1 | To introduce students to the fundamentals of computer programming. |
| 2 | To provide hands-on experience with coding and debugging. |
| 3 | To foster logical thinking and problem-solving skills using programming. |
| 4 | Tofamiliarizestudentswithprogrammingconceptssuchasdatatypes,control structures, functions and arrays. |
| 5 | To encourage collaborative e learning and team work in coding projects. |

| COURSEOUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be ableto :** | | **Cognitive Level** |
| CO1 | Understand basics of computers, the concept of algorithm and algorithmic thinking. | K3 |
| CO2 | Analyze a problem and develop an algorithm to solve it. | K4 |
| CO3 | Implement various algorithms using the C programming language. | K5 |
| CO4 | Understand more advanced features of C language. | K3 |
| CO5 | Developproblem-solvingskillsandtheabilitytodebugandoptimizethecode. | K4 |

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

| ContributionofCourseOutcomestowardsachievementofProgramOutcomes(1– Low, 2 -Medium, 3– High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 3 | 2 | 1 | - | - | - | - | - | - | - |
| CO4 | 2 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |

**COURSE CONTENT**

## UNIT-I
### Introduction to Programming and Problem Solving
History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operations, Type Conversion and Casting.
Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

## UNIT-II
### Control Structures
Simple sequential programs, Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue, Programming Examples.

## UNIT-III
### Arrays and Strings
Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Arrays Applications , Introduction to Strings, String input and output functions, String handling functions.

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

## UNIT-V
### Functions& File Handling
Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Life time of Variables, Storage Classes, Basics of File Handling.
**Note:** The syllabus is designed with C Language as the fundamental language of implementation.

**TEXTBOOKS**
1. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall,2005,  2nd Edition
2. Schaum's Outline of  Programming with C,Byron S Gottfried, McGraw-Hill Education,4th edition, 2018

**REFERENCEBOOKS**
1. Computing fundamentals and C Programming, Balaguruswamy,E., Mc Graw-Hill Education, 7th Edition, 2017
2. Programming in C, Rema Theraja, Oxford,2016,2ndedition
3. C Programming, A ProblemSolvingApproach,Forouzan,Gilberg,Prasad,CENGAGE,3rdedition, 2009

**WEB RESOURCES**
1. http://nptel.ac.in/courses/106104128/
2. http://students.iitk.ac.in/programmingclub/course/#notes
3. http://c-faq.com/~scs/cclass/cclass.html

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering

### I Year I Semester
### ENGINEERING PHYSICS LABORATORY
### (Common to CSE, CSE (AI), CE, EEE ME)

| Course Category | Basic Sciences | | Course Code | 24BP101P |
|---|---|---|---|---|
| Course Type | Laboratory | | L-T-P-C | 0-0-2-1 |
| **Prerequisites** | Intermediate Physics | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | The student will have exposure to various experimental skills which isessential for an Engineering student. |
| 2 | To gain practical knowledge by applying the experimental methods to correlate with the Theoretical Physics. |
| 3 | Apply the Analytical techniques and graphical analysis to the experimental data |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Understand the basics of Interference, Diffraction in Physics using instruments like Spectrometer, Travelling microscope. | K2 |
| **CO2** | Study the Mechanical Laws, Strength of materials, Magnetic and Dielectric constants of materials. | K3 |
| **CO3** | Apply the basics of Current Electricity and Semiconductors in engineering application | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | - | - | - | 1 | - | - | - | - | - | - | - |
| **CO2** | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 2 | 2 | 2 | - | 1 | - | - | - | - | - | - | - |

## COURSE CONTENT

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

1. Determination of radius of curvature of a given Plano-convex lens by Newton's Rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of wavelength of Laser light using diffraction grating.
5. Estimation of Planck's constant using photoelectric effect.
6. Sonometer: Verification of laws of stretched string.
7. Determination of young's modulus for the given material of wooden scale by non- uniform bending (or double cantilever) method.
8. Determination of rigidity modulus of the material of the given wire using Torsional pendulum
9. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
10. Determination of magnetic susceptibility by Kundt's tube method.
11. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
12. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
13. Determination of dielectric constant using charging and discharging method.
14. Determination of the resistivity of semiconductors by four probe methods.
15. Determination of energy gap of a semiconductor using p-n junction diode.
16. Determination of temperature coefficients of a thermistor.
17. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

## TEXT BOOKS
College Customized Manual

## REFERENCE BOOKS
ATextbookofPracticalPhysics-S.Balasubramanian,M.N.Srinivasan,S.Chand Publishers, 2017

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

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering
### I Year I Semester
### ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP
### (Common to CSE, CSE (AI), CE, EEE ME)

| Course Category | Engineering Science | Course Code | 24EE101P |
|---|---|---|---|
| Course Type | Laboratory | L-T-P-C | 0-0-3-1.5 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

### PART-A: ELECTRICAL ENGINEERING WORKSHOP

**COURSE OBJECTIVES**

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

**COURSE OUTCOMES**

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| CO1 | Know the Electrical circuit design concepts; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. | K2 |
| CO2 | Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor. | K3 |
| CO3 | Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor. | K3 |
| CO4 | Analyse various characteristics of electrical circuits, electrical machines and measuring instruments. | K4 |
| CO5 | Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**List of experiments:**
1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Measurement of Three- phase power in Three-phase induction motor using two wattmeter method
5. Speed control of DC shunt motor
6. Measurement of Power and Power factor using Single-phase wattmeter
7. Measurement of Earth Resistance using Megger
8. Calculation of Electrical Energy for Domestic Premises

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

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

## PART B: ELECTRONICS ENGINEERING LABORATORY

| COURSE OBJECTIVES |
|---|
| Toimpartknowledgeontheprinciplesofdigitalelectronicsandfundamentalsofelectrondevices& its applications. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO6** | Identify & testing of various electronic components. | K3 |
| **CO7** | Understand the usage of electronic measuring instruments. | K3 |
| **CO8** | Plot and discuss the characteristics of various electron devices. | K3 |
| **CO9** | Explain the operation of a digital circuit. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO6** | 2 | 2 | | 2 | 2 | | | | | | | |
| **CO7** | 2 | 2 | | 2 | 2 | | | | | | | |
| **CO8** | 2 | 2 | | 2 | 2 | | | | | | | |
| **CO9** | 2 | 2 | | 2 | 2 | | | | | | | |

**List of experiments:**
1. Introduction to Active and Passive devices must be experiment-1 (includes Resistors, Capacitors, Inductors, Diodes, Transistors, Power supplies, Ammeter(s), Voltmeter(s), necessary devices)
2. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
3. Plot V– I characteristics of Zener Diode and its application as voltage Regulator.
4. Determine ripple factor of full wave rectifier.
5. Plot Input & Output characteristics of BJT in CE and CB configurations.
6. Determining CE Amplifier input and output impedance with and without bypass capacitor.
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, Mult imeters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices. Multi sim /PSPICE software for Simulation.

**References:**
1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation, 2021.
2. R.P.Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill,2009
3. R.T.Paynter,IntroductoryElectronicDevices&Circuits–ConventionalFlowVersion,PearsonEducation,2009.

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

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering
### I Year I Semester
### COMPUTER PROGRAMMING LABORATORY
### (Common to All Branches)

| Course Category | Engineering Science | | Course Code | 24CS101P |
|---|---|---|---|---|
| Course Type | Laboratory | | L-T-P-C | 0-0-3-1.5 |
| Prerequisites | | | Continuous Internal Assessment | 30 |
| | | | Semester End Examination | 70 |
| | | | Total Marks | 100 |

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

**COURSE OUTCOMES**

| | Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|---|
| CO1 | Read, understand, and trace the execution of programs written in C language. | K3 |
| CO2 | Select the right control structure for solving the problem. | K3 |
| CO3 | Develop C programs which utilize memory efficiently using programming Constructs like pointers. | K3 |
| CO4 | Develop, Debug and Execute programs to demonstrate the Applications of arrays, functions, basic concepts of  pointer sin C. | K5 |

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1– Low,2 -Medium, 3– High)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 3 | 3 | 1 | - | - | - | - | - | - | - |

**COURSE CONTENT**

**WEEK 1**
**Objective:** Getting familiar with the programming environment on the computer and writing the first program.
**Suggested Experiments/Activities:**
**Tutorial 1 :**Problem-solving using Computers.
**Lab1:**Familiarization with programming environment
      i.    Basic Linux environment and its editors likeVi,Vim & Emacsetc.
      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 Flowcharts.
**Lab 2:**Converting algorithms /flowcharts into C Source code.
Developing the algorithms/flowcharts for the following sample programs
      i)    Sum and average of 3numbers
      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:
**Lab3:**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

**WEEK4**
**Objective :** Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.
**Suggested Experiments/Activities:**
**Tutorial 4:** Operators and the precedence and as associatively:
**Lab 4:**Simple computational problems using the operator' precedence and associatively
      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)    Takemarksof5subjectsinintegers, and find the total, average in float

**WEEK5**
**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 them axandm in off our 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.

**WEEK6**
**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:**Iterativeproblemse.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)  Computes in e and cos series
      iv)  Checking a number palindrome
      v)   Construct a pyramid of numbers.

**WEEK7**
**Objective:** Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-Dand more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-Darrays,explore search solution linear search.
**Suggested Experiments/Activities:**
**Tutorial 7:**1DArrays: searching.
**Lab 7:** 1D Array manipulation, linear search
      i)   Find the min and max of a1-D integer array.
      ii)   Perform linear search on 1 D array.
      iii)  There verse of a 1 D integer array
      iv)  Find 2's complement of the given binary number.
      v)   Eliminate duplicate elements in an array.

**WEEK8**
**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.
**Lab8:** Matrix problems, String operations, Bubble sort
      i)   Addition of two matrices
      ii)   Multiplication two matrices
      iii)  Sort array elements using bubble sort
      iv)  Concatenate two strings without built-in functions
      v)   Reverse a string using built-in and without built-in string functions

**WEEK9**
**Objective:** Explore pointers to manage a dynamic array of integers, including memory allocation & amp; 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 a1Darrayusingmalloc()
      ii)   Write a C program to find the total, average of n students using structures
      iii)  Entern students data using calloc() and display failed students list
      iv)  Readstudentnameandmarksfromthecommandlineanddisplaythestudentdetailsalongwith the total.
      v)   Write a C program to implement realloc ()

**WEEK10**
**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
**Lab 10:** Bit fields, linked lists
Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields
      i)   Create and display a singly linked list using self-referential structure.
      ii)   Demonstrate the differences between structures and unions using a C program.
      iii)  Write a C program to shift/rotate using bit fields.
      iv)  Write a C program to copy one structure variable to another structure of the same type.

**WEEK 11**
**Objective:** Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration
**Suggested Experiments/Activities:**
**Tutorial 11:** Functions, call by value, scope and extent,
**Lab 11:** Simple functions using call by value, solving differential equations using Eulers theorem.

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

**WEEK 12**
**Objective:** Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.
**Suggested Experiments/Activities:**
**Tutorial 12:** Recursion, the structure of recursive calls
**Lab12:** 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.

**WEEK13**
**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 lower case, uppercase, digits and other characters using pointers.

**WEEK14**
**Objective :** To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.
**Suggested Experiments/Activities:**
**Tutorial 14:** File handling
**Lab 14:** File operations

    i)    Write a C program to write and read text into a file.
    ii)   Write a C program to write and read text into a binary file usingf read() and f write()
    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.

**TEXT BOOKS**
    1.  Ajay Mittal, Programming in C: A practical approach, Pearson.
    2.  Byron Gottfried, Schaum 's Outline of Programming with C, McGrawHill

**REFERENCEBOOKS**
    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

**WEB RESOURCES**
    1.      https://www.researchgate.net/publication/322908864_C_Programming_Lab_Manual
    2.      https://www.javatpoint.com/c-programs

**I Year I Semester**
**IT WORKSHOP**
**(Common to CSE, CSE (AI), CE, EEE ME)**

| Course Category | Engineering Science | | Course Code | 24IT101P |
|---|---|---|---|---|
| Course Type | Laboratory | | L-T-P-C | 0-0-2-1 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

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### COURSE OBJECTIVES

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

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### COURSE OUTCOMES

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** Perform Hardware trouble shooting. | K3 |
| **CO2** Understand Hardware components and inter dependencies. | K3 |
| **CO3** Safe guard computer systems from viruses/worms. | K3 |
| **CO4** Document/ Presentation preparation. | K3 |
| **CO5** Perform calculations using spreadsheets. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

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**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

## COURSE CONTENT

### 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.

**Task2:** 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, Linux / BOSS on the personal computer. This computer should have windows installed. The system should be configured as dual boot (VM Ware) with both Windows and Linux / BOSS Lab instructor should verify the installation and follow it up with a Viva.

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

**Task2:** Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, book marks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

**Task3**: Search Engines & Net iquette: 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 popup, lock active x downloads to avoid viruses and/or worms.

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

**Task 2:** Using 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 Word.

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

**Task4:** Creating a Newsletter: Features to be covered:-Table of Content, News paper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Text boxes, Paragraphs and Mail Merge in word.

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

## POWERPOINT

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

**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– Back ground, textures, Design Templates, Hidden slides.

## AI TOOLS –ChatGPT

**Task1:** 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 acknowledgeable AI. Please answer the following question: What is the capital of France?"

**Task2:** Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

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

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

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

## Reference Books:

1. Comdex Information Technology course toolkit, Vikas Gupta, WILEY Dreamtech,2--3.
2. The Complete Computer upgrade and repair book, Chery lAS chmidt, WILEY Dreamtech, 2-13, 3rd edition.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2-12, 2nd edition.
4. PC Hardware- A Handbook, Kate J.Chase, PHI (Microsoft).
5. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme.– CISCO Press, Pearson Education,3rd edition.
6. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.

## Web References:

1. PC Hardware & Software Installation: Peripheral Devices: Computer Peripherals - Wikipedia
   Components in a CPU: CPU Components and Their Functions - Guru99
2. Internet & World Wide Web: TCP/IP and Networking Basics: TCP/IP Explained - Lifewire
   Internet Browsing and Configuration: How Web Browsing Works - HowStuffWorks
3. Word:  Microsoft Word Tutorials: Microsoft Word Basics - GCFGlobal
4. Excel: Excel Tutorial and Functions: Excel Tutorial - Microsoft
5. AI Tools - ChatGPT: GPT-3.5 and ChatGPT Information: GPT-3.5 Guide - OpenAI

**I Year I Semester**
**NSS / NCC / SCOUTS AND GUIDES / COMMUNITY SERVICE**
**(Common to CSE, CSE (AI), CE, EEE ME)**

| Course Category | Humanities | | Course Code | 24MH102P |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 0-0-1-0.5 |
| Prerequisites | | | Continuous Evaluation | 90 |
| | | | Viva Voce | 10 |
| | | | Total Marks | 100 |

**COURSE OBJECTIVES**

Theobjectiveofintroducingthiscourseistoimpartdiscipline,character,fraternity,teamwork, socialconsciousnessamongthestudentsandengagingtheminselflessservice.

**COURSE OUTCOMES**

| | Upon successful completion of the course, the student will be able to: | |
|---|---|---|
| CO1 | Understand the importance of discipline, character and service motto. | |
| CO2 | Solvesomesocietalissuesbyapplyingacquiredknowledge,facts,andtechniques. | |
| 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. | |

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

# COURSE CONTENT

## UNIT – I - Orientation
General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.
Activities:
   i) Conducting  ice breaking sessions-expectations from the course-knowing personal talents and skills
   ii) Conducting orientations programs for the students future plans-activities-releasing road map etc.
   iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
   iv) Conductingtalentshowinsingingpatrioticsongs-paintings-anyothercontribution.

## 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- are a 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.

**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, NewDelhi
   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.Eachactivityshallbeevaluatedbytheconcernedteacherfor15marks, totaling to 90marks.
   • Astudentshallbeevaluatedbytheconcernedteacherfor10marksbyconductingviva voce on the subject.

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering

**R23**

## I Year II Semester
## COMMUNICATIVE ENGLISH
### (Common to CSE, CSE (AI), CE, EEE ME)

| Course Category | Humanities | | Course Code | 24BE201T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 2-0-0-2 |
| Prerequisites | LSRW Skills. | Continuous Internal Assessment | | 30 |
| | | Semester End Examination | | 70 |
| | | Total Marks | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. |
| 2 | It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. |
| 3 | This course helps the students to make them effective in speaking and writing skills and to make them industry ready. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Understand the context, topic, and pieces of specific information from social or Transactional dialogues. | K2 |
| CO2 | Apply grammatical structures to formulate sentences and correct word forms. | K3 |
| CO3 | Analyze discourse markers to speak clearly on a specific topic in informal discussions. | K4 |
| CO4 | Evaluate reading/listening texts and to write summaries based on glob | K5 |
| CO5 | Create a coherent paragraph, essay, and resume. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO3 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO4 | - | - | - | - | - | - | - | - | - | 2 | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | 2 | - | - |

## COURSE CONTENT

### UNIT I
**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
**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
**Lesson: BIOGRAPHY: ElonMusk**
**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
**Lesson: INSPIRATION: The Toys o f 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**
**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.

**TEXT BOOKS**
1. Path finder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023. (Units1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023(Units4 &5).

**REFERENCE BOOKS**
1. Dubey, ShamJi & 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**
1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

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

## PRAGATI ENGINEERING COLLEGE: SURAMPALEM
### (Autonomous)
### Department of Civil Engineering

**R23**

### I Year II Semester
### DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
### (Common to All Branches)

| Course Category | Basic Sciences | Course Code | 24BM201T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | Differentiation, Integration and Partial Differentiation. Differential Equations (Variable Separable) | Continuous Internal Assessment Semester End Examination Total Marks | 30 70 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To enlighten the learners in the concept of differential equations and multi variable calculus |
| 2 | To familiarize the students with the foundations of line, surface and volume integrals. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Solve the first order differential equations related to various engineering fields. | K3 |
| CO2 | Solve the higher order differential equations to various engineering fields. | K3 |
| CO3 | Identify solution methods for partial differential equations that model physical processes. | K3 |
| CO4 | Interpret the physical meaning of different operators such as gradient, curl and divergence. | K3 |
| CO5 | Estimate the work done against a field, circulation and flux using vector calculus. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| CO5 | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |

## COURSE CONTENT

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

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

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

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

### UNIT V
### Vector integration:
Line integral-circulation-work done by the force, Scalar potential, surface integral-flux, Green's theorem in a plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

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

### REFERENCE BOOKS
1. Thomas Calculus, George B.Thomas, Maurice D.Weir and JoelHass, Pearson Publishers,2018, 14th Edition.
2. Advanced Engineering Mathematics, DennisG.Zill andWarrenS.Wright, Jones and Bartlett,2018.
3. Advanced Modern Engineering Mathematics,GlynJames, Pearson publishers, 2018,5th Edition.
4. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 2021 5the Edition (9th reprint)
5. Higher Engineering Mathematics, B.V.Ramana,, McGraw HillEducation,2017
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22nd Edition(Reprint 2022).

### WEB RESOURCES
1. https://mathworld.wolfram.com/First-OrderOrdinaryDifferentialEquation.html
2. https://en.wikipedia.org/wiki/Differential_equation
3. https://en.wikipedia.org/wiki/Partial_differential_equation
4. https://en.wikipedia.org/wiki/Vector_calculus
5. https://en.wikipedia.org/wiki/Vector_calculus

**I Year II Semester**
**ENGINEERING CHEMISTRY**
**(Common to CE and MECH)**

| Course Category | Basic Science | Course Code | 24BC202T |
|---|---|---|---|
| **Course Type** | Theory | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

| COURSE OBJECTIVES | |
|---|---|
| **1** | familiarize engineering chemistry and its applications |
| **2** | impart the concept of soft and hard waters, softening methods of hard water |
| **3** | train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Compare the quality of drinking water with BIS and WHO Standards | K2 |
| **CO2** | Illustrate the principles and applications of Batteries, Fuel cells and fuels. | K2 |
| **CO3** | Explain calorific values, octane number, refining of petroleum and crack in go foils. | K2 |
| **CO4** | Explain the setting and hardening of cement. | K2 |
| **CO5** | Summarize the concepts of colloids, Micelle and nano materials. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

## UNIT -I
## Water Technology

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

## UNIT - II
### Electrochemistry and Applications

Electrodes–electrochemical cell, Nernst equation, cell potential calculations.
Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (Ni -Cd), and lithium ion batteries -working principle of the batteries Including cell reactions; Fuel Cells-Basic Concepts, the Principle and working of hydrogen-oxygen Fuel cell.
Corrosion: Introduction to corrosion, metal oxide formation by dry electrochemical corrosion, Pilling-Bedworth ratios and uses electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, Factors affecting the corrosion (Nature of the metal and nature of the environment), Corrosion controlling methods: cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

## UNIT - III
# Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.
Thermo plastics and Thermo-setting plastics- Preparation, properties and applications of polystyrene, PVC, Nylon 6, 6 and Bakelite.
Elastomers–Preparation, properties and applications of BunaS, BunaN, Thiokolrubbers.
Fuels – Types of fuels, calorific value of fuel- HCV&LCV- Dulong's formula -numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetanenumber- Alternative fuel-Ethanol and bio fuel-bio diesel.

**UNIT– IV**
**Modern Engineering Materials**

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural rein forced composites, properties and Engineering applications

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

Lubricants-Classification, Functions of lubricants, Mechanism, Properties of lubricating oils– Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.
Building materials- Portland Cement-constituents and manufacturing – Setting and Hardening of cement.

**UNIT -V**

**Surface Chemistry and Nano materials**

Introduction to surface chemistry, colloids, Micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of Nano metals and Metal oxides, stabilization of colloids and nano materials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (noderivation) applications of colloids and nano materials– catalysis, medicine, sensors, etc.

**Textbooks:**
1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai,2013.
2. PeterAtkins, Juliode Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:
1. H.F.W.Taylor, Cement Chemistry, 2/e, Thomas Telford Publications,1997.
2. D.J. Shaw,Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
3. Text book of Polymer Science, Fred W.BillmayerJr,3rdEdition

**WEB RESOURCES**

**UNIT –I**
**Water Technology :**
**https://nptel.ac.in/courses/105106119**

**UNIT - II**

**Electrochemistry and Applications:https://archive.nptel.ac.in/courses/103 /105/103105110/**

**UNIT - III**
**Polymers andFuel Chemistry**
https://archive.nptel.ac.in/content/storage2/courses/113104058/lecture1/1_7.htm

**UNIT – IV**
**Modern Engineering Materials:**
**https://archive.nptel.ac.in/courses/105/102/105102012/**
https://www.thelubricantstore.com/lubricant-properties

**UNIT -V**
**Surface Chemistry and Nano materials**
https://digimat.in/nptel/courses/video/103103154/L24.html

### I Year II Semester
### BASIC CIVIL AND MECHANICAL ENGINEERING
### (Common to CSE, CSE (AI), CE, EEE ME)

| Course Category | Engineering Science | Course Code | 24CM201T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

### PART-A : BASIC CIVIL ENGINEERING

| COURSE OBJECTIVES | |
|---|---|
| 1 | Get familiarized with the scope and importance of Civil Engineering sub-divisions |
| 2 | Introduce the preliminary concepts of surveying. |
| 3 | Acquire preliminary knowledge on Transportation and its importance in nation's economy. |
| 4 | Get familiarized with the importance of quality, conveyance and storage of water. |
| 5 | Introduction to basic civil engineering materials and construction techniques. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Enlist various basic characteristics and sub-divisions of Civil Engineering, pre-fabricated materials and technology to appreciate their role in ensuring better society. | K2 |
| CO2 | Illustrate the concepts of surveying and  basics of Foundation Engineering. | K3 |
| CO3 | Know the significance of various domains in transportation engineering and be acquitted with types of pavements.  Get an overview about Environmental Engineering and Water Resource Engineering. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 2 | - | - | - | - | - | - | - | - | - | - | - |
| CO2 | 1 | 1 | - | - | - | - | - | - | - | - | - | 1 |
| CO3 | 1 | 1 | 1 | - | - | 2 | - | - | 1 | - | - | 1 |

**COURSE CONTENT**

**UNIT I**
**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-Stones-Sand-Cement Concrete-Steel-Timber. Introduction to Prefabricated construction Techniques.

**UNIT II**
**Surveying :** Objectives of Surveying- Horizontal Measurements- Angular MeasurementsIntroduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.
**Foundations:** Types of foundations — Bearing capacity and settlement — Requirement of good foundations.

**UNIT III**
**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).

**TEXT BOOKS**
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, SatheeshGopi, 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.

**WEB RESOURCES**
1. https://nptel.ac.in/courses/105101087
2. https://nptel.ac.in/courses/105104101
3. https://nptel.ac.in/courses/105104103

## PART – B: BASIC MECHANICAL ENGINEERING

| COURSE OBJECTIVES | |
|---|---|
| 1 | Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries. |
| 2 | Explain different engineering materials and different manufacturing processes. |
| 3 | Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Understand the different manufacturing processes. | K2 |
| **CO2** | Explain the basics of thermal engineering and its applications. | K3 |
| **CO3** | Describe the working of different mechanical power transmission systems, power plants and basics of robotics and its applications. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes  (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | - | - | - | - | - | - | - | - | - | 2 | - |
| **CO2** | 3 | - | - | - | - | - | - | - | - | - | 2 | - |
| **CO3** | 3 | - | - | - | - | - | - | - | - | - | 2 | - |

**COURSE CONTENT**
**UNIT –I -**
**Introduction to Mechanical Engineering:** Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.
**Engineering Materials -** Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.
**UNIT - II**
**Manufacturing Processes:** Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.
**Thermal Engineering** – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.
**UNIT - III**
**Power plants** – working principle of Steam, Diesel, Hydro, Nuclear power plants.
**Mechanical Power Transmission -** Belt Drives, Chain, Rope drives, Gear Drives and their applications.
**Introduction to Robotics -** Joints & links, configurations, and applications of robotics.
(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)
**Textbooks:**
1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.
**Reference Books:**
1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I.
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.
**Web References:**
1. https://ocw.mit.edu/courses/2-000-how-and-why-machines-work-spring-2002/
2. https://ocw.mit.edu/courses/2-008-design-and-manufacturing-ii-spring-2004/
3. https://ocw.mit.edu/courses/2-12-introduction-to-robotics-fall-2005/

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering

**R23**

### I Year II Semester
### ENGINEERING MECHANICS
### (Common to CE and ME)

| Course Category | Professional Core | Course Code | 24ME202T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To get familiarized with different types of force systems. |
| 2 | To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces. |
| 3 | To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies. |
| 4 | To apply the Work-Energy method to particle motion. |
| 5 | To understand the kinematics and kinetics of translational and rotational motion of rigid bodies. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| CO1 | Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact. | K2 |
| CO2 | Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments. | K4 |
| CO3 | Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes. | K3 |
| CO4 | Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle. | K3 |
| CO5 | lve the problems involving the translational and rotational motion of rigid bodies. | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | - |
| CO2 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | - |
| CO3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | - |
| CO4 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | - |
| CO5 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 3 | - |

**COURSE CONTENT**

**UNIT I**

**Introduction to Engineering Mechanics**– Basic Concepts. Scope and Applications

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

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

**UNIT II**

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

**UNIT III**

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

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

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

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

**UNIT IV**

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

**UNIT V**

**Rigid body Motion:** Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

**Textbooks:**

1.Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., McGraw Hill Education 2017. 5th Edition.

2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , University press. 2020. First Edition.

3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

**Reference Books:**

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition.

2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.

3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.

4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press, 2014. Second Edition

5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition.

**Web References:**

1. http://nptel.ac.in/courses/122104015/
2. https://freevideolectures.com/course/2264/engineering-mechanics
3. https://ocw.mit.edu/courses/1-050-engineering-mechanics-i-fall-2007/

**I Year II Semester**
**ENGINEERING WORKSHOP**
**(Common to CSE, CSE (AI), CE, EEE ME)**

| Course Category | Engineering Science | | Course Code | 24ME203P |
|---|---|---|---|---|
| Course Type | Laboratory | | **L-T-P-C** | 0-0-3-1.5 |
| Prerequisites | | **Continuous Internal Assessment** | 30 | |
| | | **Semester End Examination** | 70 | |
| | | **Total Marks** | 100 | |

### COURSE OBJECTIVES

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

### COURSE OUTCOMES

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| **CO1** | Identify workshop tools and their operational capabilities. | K2 |
| **CO2** | Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding. | K3 |
| **CO3** | Apply knowledge in preparation of pipe joints and practice of Plumbing tools. | K3 |
| **CO4** | Apply basic electrical engineering knowledge for House Wiring Practice | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | - | 3 | 1 | 3 | - | - | - | - | 3 | - | - |
| **CO2** | 3 | - | 3 | 1 | 3 | - | - | - | - | 3 | - | - |
| **CO3** | 3 | - | 3 | 1 | 3 | - | - | - | - | 3 | - | - |
| **CO4** | 3 | - | 3 | 1 | 3 | - | - | - | - | 3 | - | - |

**COURSE CONTENT**

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

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler 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 same diameter and with reducer for different diameters.
**Note:** Minimum of 12 Experiments to be conducted from the above covering all the trades.

**Textbooks:**
1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, DhanpathRai& Co., 2015 & 2017.

**Reference Books:**
1. Elements of Workshop Technology, Vol. I by S. K. HajraChoudhury& 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.; AtulPrakashan, 2021-22.

**I Year II Semester**
**COMMUNICATIVE ENGLISH LABORATORY**
**(Common to CSE, CSE (AI), CE, EEE ME)**

| Course Category | Humanities | | Course Code | 24BE201P |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-0-2-1 |
| **Prerequisites** | LSRW Skills | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| | COURSE OBJECTIVES |
|---|---|
| 1 | 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. |
| 2 | The students will get trained in basic communication skills and also make them ready to face job interviews. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Understand the different aspects of the English language proficiency with emphasis on LSRW skills. | K2 |
| **CO2** | Apply communication skills through various language learning activities. | K3 |
| **CO3** | Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. | K4 |
| **CO4** | Evaluate and exhibit professionalism in participating in debates and group discussions. | K5 |
| **CO5** | Able to present ideas effectively and manage interviews confidently. | K4 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| **CO1** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **CO2** | - | - | - | - | - | - | - | - | - | 3 | - | - |
| **CO3** | - | - | - | - | - | - | - | - | - | 2 | - | - |
| **CO4** | - | - | - | - | - | - | - | - | - | 2 | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | 2 | - | - |

**COURSE CONTENT**

**UNIT - I**
Vowels & Consonants.
Neutralization/Accent Rules.

**UNIT - II**
Communication Skills & JAM.
Role Play or Conversational Practice.

**UNIT - III**
E-mail Writing.
Resume Writing, Cover letter, SOP.

**UNIT - IV**
Group Discussions-methods & practice.
Debates-Methods &Practice.

**UNIT - V**
PPT Presentations/ Poster Presentation.
Interviews Skills.

**Laboratory Manual Lab Book**
1. Strengthen Your Steps: A Multi-Model Course in Communication Skills published by Maruti Publications

**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$^{nd}$Ed),Kindle, 2013

**WEB RESOURCES**
**Spoken English:**
1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw
**Voice & Accent:**
1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA
**Suggested Software:**
1. Walden Infotech
2. Young India Films

**I Year II Semester**
**ENGINEERING MECHANICS AND BUILDING PRACTICES LABORATORY**
**(CE)**

| Course Category | Professional Core | | Course Code | 24CE201P |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | | **Continuous Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| COURSE OBJECTIVES | |
|---|---|
| **1** | Verify the Law of Parallelogram of Forces and Lami's theorem. |
| **2** | Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina |
| **3** | Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials. |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Find the coefficient of friction between two different surfaces and between the inclined plane and the roller. | K3 |
| **CO2** | validate Parallelogram Law of forces and Law of Moment using force polygon and bell crank lever. | K3 |
| **CO3** | find the Centre of gravity of different shaped Plane Lamina | K3 |
| **CO4** | Get acquainted with various alternative materials used as partial substitutes for natural ingredients of concrete | K3 |
| **CO5** | Learn about various tools and safety practices in the construction industry. | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 2 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO2** | 1 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO3** | 1 | 1 | - | - | - | - | - | - | - | - | - | - |
| **CO4** | - | - | - | - | 2 | - | - | - | - | - | - | - |
| **CO5** | - | - | - | - | - | - | - | - | - | - | - | - |

**COURSE CONTENT**

**Students have to perform any 10 of the following Experiments:**

1. To study various types of tools used in construction.

2. Forces in Pin Jointed Trusses

3. Experimental Proof of Lami's Theorem

4. Verification of Law of Parallelogram of Forces.

5. Determination of Center of Gravity of different shaped Plane Lamina.

6. Determination of coefficient of Static and Rolling Friction.

7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever.

8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.

9. Field-Visit to understand the Quality Testing - report.

10. Safety Practices in Construction industry

11. Study of Plumbing in buildings.

**References:**

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.

2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022.

3. Concrete Technology, Theory and Practice, 8e, by M. S. Shetty – S. Chand & Co.

4. Varghese. P.C, Building Construction, Second Edition PHI Learning ltd., 2016.

5. Elements of Environmental Engineering by K.N. Duggal, S. Chand & Company Ltd. New Delhi, 3 rd Edition 1996.

**I Year II Semester**
**ENGINEERING CHEMISTRY LABORATORY**
**(Common to CE and MECH)**

| Course Category | Basic Science | Course Code | 24BC202P |
|---|---|---|---|
| Course Type | Laboratory | L-T-P-C | 0-0-2-1 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| COURSE OBJECTIVES |
|---|
| Verify the fundamental concepts with experiments. |

**COURSE OUTCOMES**

| | Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|---|
| CO1 | Determine the cell constant and conductance of solutions. | K2 |
| CO2 | Prepare advanced polymer materials. | K2 |
| CO3 | Estimate the given amount of dissolved compounds in a solution by using volumetric analysis and preparation of Nano particles | K3 |
| CO4 | Estimate the Iron and Calcium in cement. | K3 |
| CO5 | Calculate the hardness of water. | K2 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

## List of Experiments:

1. Determination of Hardness of a ground water sample.

2. Estimation of $KMnO_4$ by using standared oxalic acid solution

3. Conductometric titration of strong acid vs. strong base

4. Preparation of a polymer (Bakelite)

5. Determination of percentage of Iron in Cement sample by colorimetry

6. P reparation of urea-formaldehyde resin

7. Preparation of nano materials by precipitation method.

8. Estimation of Ferrous Iron by Dichrometry.

9 Determination of percentage Moisture content in a coal sample

10. Determination of Viscosity of lubricating oil by Red wood Viscometer 1

11. Determination total alkalinity of given sample of water

12. Determination of Vitamin-C

## Reference:

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

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering

**R23**

### I Year II Semester
### HEALTH AND WELLNESS, YOGA AND SPORTS
### (Common to CSE, CSE (AI), CE, EEE ME)

| Course Category | Humanities | Course Code | 24MH201P |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 0-0-1-0.5 |
| Prerequisites | | Continuous Evaluation | 90 |
| | | Viva Voce | 10 |
| | | Total Marks | 100 |

### 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
| Upon successful 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 |

### Contribution of Course Outcomes towards achievement of Program Outcomes
### (1 – Low, 2 - Medium, 3 – High)

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

## COURSE CONTENT

**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 Asan as- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

**Activities:**
Yoga practices Asana, Kriya, Mudra, Bandha, Dhyana, SuryaNamaskar

**UNIT – III:** Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Common wealth games.

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

**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 Time table 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.

## II Year I Semester
## Numerical Techniques and Statistical Methods
(CIVIL)

| Course Category | Basic Sciences | | Course Code | 24BM301T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | Differentiation & integration, Permutations & combinations, Elementary Probability | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| COURSE OBJECTIVES | |
|---|---|
| 1 | To elucidate the different numerical methods to solve non linear algebraic equations |
| 2 | To disseminate the use of different numerical techniques for carrying out numerical integration. |
| 3 | To familiarize the students with the foundations of probability and statistical methods. |
| 4 | To equip the students to solve application problems in their disciplines |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Cognitive Level** |
| **CO1** | Evaluate the approximate roots of polynomial and transcendental equations by different algorithms. Apply Newton's forward & backward interpolation and Lagrange's formulae for equal and unequal intervals | K3 |
| **CO2** | Apply numerical integral techniques to different Engineering problems. Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations | K3 |
| **CO3** | Apply discrete and continuous probability distributions | K3 |
| **CO4** | Design the components of a classical hypothesis test | K3 |
| **CO5** | Infer the statistical inferential methods based on small and large sampling tests | K3 |

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO2** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO3** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO4** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |
| **CO5** | 3 | 3 | 2 | - | - | - | - | - | - | - | - | - |

**COURSE CONTENT**

**UNIT I**
**Iterative Methods:**
Introduction – Solutions of algebraic and transcendental equations : Bisection method–Secant method –Method of false position–Iteration method–Newton-Raphson method (One variable and simultaneous Equations)
**Interpolation :** Newton's forward and backward formulae for interpolation–Interpolation with unequal intervals – Lagrange's interpolation formula

**UNIT II**
**Numerical integration, Solution of ordinary differential equations with initial conditions:**
Trapezoidal rule– Simpson's $1/3^{rd}$ and $3/8^{th}$ rule– Solution of initial value problems by Taylor's series– Picard's method of successive approximations– Euler's method –Runge - Kutta method (second and fourth order) –Milne's Predictor and Corrector Method.

**UNIT III**

**Probability and Distributions:**
Baye's theorem – Random variables – Discrete and Continuous random variables–Distribution functions–Probability mass function, Probability density function and Cumulative distribution functions – Mathematical Expectation and Variance–Binomial, Poisson, Uniform and Normal distributions.

**UNIT IV**
**Sampling Theory:**
Introduction – Population and Samples – Sampling distribution of Means and Variance (definition only) –Point and Interval estimations – Maximum error of estimate – Central limit theorem (without proof) – Estimation using t,$\chi^2$ and F-distributions.
UNIT V

**Tests of Hypothesis:**
Introduction – Hypothesis– Null and Alternative Hypothesis– Type I and Type II errors –Level of significance– One tail and two-tail tests – Test of significance for large samples and Small Samples: Single and difference means – Single and two proportions – Student's t- test,F-test,$\chi^2$-test.

**TEXT BOOKS**
3. **B.S.Grewal,** Higher Engineering Mathematics, $44^{th}$ Edition, Khanna Publishers.
4. **Miller and Freund's**, Probability and Statistics for Engineers,7/e, Pearson,2008.

**REFERENCE BOOKS**
1. **Steven C.Chapra,** Applied Numerical Methods with MATLAB for Engineering and science, Tata Mc.Graw Hill Education.
2. **M.K.Jain, S.R.K.Iyengar and R.K.Jain,** Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
3. **Lawrence Turyn,** Advanced Engineering Mathematics, CRC Press.
4. **S.C.Gupta and V.K.Kapoor**, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
5. **Shron L.Myers, KeyingYe, Ronald EWalpole,** Probability and Statistics Engineers and the Scientists, $8^{th}$ Edition, Pearson 2007.
6. **Jayl.Devore,** Probability and Statistics for Engineering and the Sciences, $8^{th}$ Edition, Cengage.

**WEB RESOURCES**
1. https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving
2. https://en.wikipedia.org/wiki/Numerical_integration
3. https://en.wikipedia.org/wiki/Probability_distribution
4. https://en.wikipedia.org/wiki/Sampling_(statistics)
5. https://en.wikipedia.org/wiki/Statistical_hypothesis_test

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
## Department of Civil Engineering

**R23**

## II Year I Semester
### UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY
### and ETHICAL HUMAN CONDUCT
### (Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY)

| Course Category | HSMC | | Course Code | 24HM301T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 2-1-0-3 |
| Prerequisites | | | Internal Assessment | 30 |
| | | | Semester End Examination | 70 |
| | | | Total Marks | 100 |

| COURSE OUTCOMES | | |
|---|---|---|
| **Upon successful completion of the course, the student will be able to:** | | **Blooms Taxonomy Level** |
| CO1 | Understand the significance of value inputs in a classroom and start applying them in their life and profession | K1 |
| CO2 | Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc. | K2 |
| CO3 | Understand the role of a human being in ensuring harmony in Family And Society. | K1 |
| CO4 | Appraise the role of a human being in ensuring harmony in Nature/Existence. | K2 |
| CO5 | Distinguish between ethical and unethical practices to actualize a harmonious environment wherever they work. | K2 |

| Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| CO1 | | | | | | 3 | | | | | | |
| CO2 | | | | | | 3 | | | 3 | 3 | | 3 |
| CO3 | | | | | | 3 | | 2 | | | | 3 |
| CO4 | | | | | | 3 | 3 | | | | | |
| CO5 | | | | | | 3 | | 3 | | | | |

**COURSE CONTENT**

**UNIT – I Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity -the basic human aspirations, Happiness and Prosperity- Current Scenario, Method to Fulfill the Basic Human Aspirations.
**Practice Sessions:** PS1 Sharing about Oneself , PS2 Exploring Human Consciousness, PS3 Exploring Natural Acceptance

**UNIT – II Harmony in Human Being:** Understanding Human being as the Co-existence of the self and the body, Distinguishing between the Needs of the self and the body, The body as an Instrument of the self, Understanding Harmony in the self, Harmony of the self with the body, Programme to ensure self - regulation and Health
**Practice Sessions:** PS4 Exploring the difference of Needs of self and body, PS5 Exploring Sources of Imagination in the self, PS6 Exploring Harmony of self with the body

**UNIT – III Harmony in the Family and Society:** Harmony in the family - the Basic Unit of Human Interaction, 'Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation, Other Feelings, Justice in Human – to - Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.
**Practice Sessions:** PS7 Exploring the Feeling of Trust, PS8 Exploring the Feeling of Respect,
PS9 Exploring Systems to fulfil Human Goal

**UNIT – IV Harmony in the Nature/Existence:** Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual fulfillment among the Four Orders of Nature, Realizing Existence as Co- existence at All Levels, The Holistic Perception of Harmony in Existence
**Practice Sessions:** PS10 Exploring the Four Orders of Nature, PS11 Exploring Co-existence in Existence

**UNIT – V Implications of the Holistic Understanding - a Look at Professional Ethics:** Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models -Typical Case Studies, Strategies for Transition towards Value- based Life and Profession.
**Practice Sessions:** PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education, PS14 Exploring Steps of Transition towards Universal Human Order

**Text books and Teachers Manual**
1. A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 - R R Gaur, R Asthana, G P Bagaria
2. Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2 - R R Gaur, R Asthana, G P Bagaria

**Reference Books**
1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth- by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal

**Web References:**
1. https://fdp-si.aicte-india.org
2. https://www.youtube.com/playlist?list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz

**II Year – I Semester**
**SURVEYING**

| Course Category | Engineering Science | | Course Code | 24CE301T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | | **Continuous Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| Course Objectives: | |
|---|---|
| 1. | Know the principle and methods of surveying and measuring of horizontal and vertical- distances and angles |
| 2. | Identification of source of errors, rectification methods and surveying principles to determine areas and volumes |
| 3. | Know surveying principles to determine areas and volumes |
| 4. | Setting out curves and use modern surveying equipments for accurate results |
| 5. | Know the basics of Photogrammetric Surveying |

## Course Outcomes:

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| CO 1 | Illustrate the fundamentals in linear and compass survey | **K2** |
| CO 2 | Identify the source of errors and rectification methods | **K2** |
| CO 3 | Apply surveying principles to determine areas and volumes | **K3** |
| CO 4 | Ability to set out curves and utilize modern surveying equipment. | **K3** |
| CO 5 | Apply the basics of Photogrammetry Surveying in field | **K3** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 3 | 3 | - | 2 | 1 | 3 | - | 3 | 3 | 3 | - | 1 | 1 | 1 | - |
| **CO2** | 3 | 2 | - | 2 | 2 | 2 | - | 2 | 2 | 2 | - | 2 | 2 | 1 | - |
| **CO3** | 3 | 1 | - | 1 | 1 | 1 | - | 1 | 2 | 2 | - | 2 | 3 | 1 | 1 |
| **CO4** | 3 | 3 | - | 3 | 3 | 1 | - | 1 | 1 | 1 | - | 2 | 1 | 2 | 1 |
| **CO5** | 3 | 1 | - | 3 | 3 | 1 | - | 1 | 1 | 1 | - | 2 | 3 | 2 | 1 |

## COURSE CONTENT

### UNIT - I
**Introduction and Basic Concepts:** Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Compass, leveling and Plane table surveying.
**Linear distances-** Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.
**Prismatic Compass**- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – systems and W.C.B and Q.B systems of locating bearings.

### UNIT - II
**Leveling-** Types of levels, methods of levelling, and Determination of levels, Effect ofCurvature of Earth and Refraction.
**Contouring-** Characteristics and uses of Contours, methods of contour surveying.
**Areas -** Determination of areas consisting of irregular boundary and regular boundary.
**Volumes -**Determination of volume of earth work in cutting and embankments for level section, capacity of reservoirs.

### UNIT - III
**Theodolite Surveying:** Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.
**Traversing:** Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

### UNIT - IV
**Curves:** Types of curves and their necessity, elements of simple, compound, reverse curves. Introduction to Tacheometric Surveying.
**Modern Surveying Methods:** Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LiDAR Survey(Light Detection And Ranging).

### UNIT - V
**Photogrammetry Surveying:**
Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo-plotting instruments, mosaics, map substitutes.

**Text Books:**
1. Surveying (Vol – 1 & 2) by Duggal S K,Tata McGraw Hill Publishing Co.Ltd. New Delhi, 5th edition, 2019.
2. Textbook of Surveying by C Venkatramaiah , Universities Press 1st Edition, 2011.

**Reference Books:**
1. Surveying (Vol – 1), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol – 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. Surveying (Vol – 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying‖ by Chandra A M, New age InternationalPvt. Ltd.,Publishers, New Delhi, 3rd Edition, 2015.
5. Surveying and Levelling by N.Basak Tata McGraw Hill Publishing Co. Ltd. NewDelhi, 4th edition, 2014.
6. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th,2015.

**Web Resources:**
https://koha.srmap.edu.in/cgi-bin/koha/opac-detail.pl?biblionumber=11522&shelfbrowse_itemnumber=23066

**II Year – I Semester**
**STRENGTH OF MATERIALS**

| Course Category | Professional Core | | Course Code | 24CE302T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| Course Learning Objectives: | |
|---|---|
| 1. | To impart Fundamental concepts of Strength of Material and Principles of Elasticity and Plasticity Stress |
| 2. | To impart concepts of shear force and bending moment on various types of beams andloading conditions |
| 3. | To impart concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections. |
| 4. | To the concepts above will be utilized in measuring deflections in beams under various loading and support conditions. |
| 5. | To classify cylinders and columns based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure |

**Course Outcomes:**

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| CO 1 | Recognize the basic materials behavior under the influence of different external loading conditions and the support conditions. | **K2** |
| CO 2 | Draw the diagrams indicating the variation of the key performance features like axial forces, bending moment and shear forces in structural members. | **K2** |
| CO 3 | Acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams | **K2** |
| CO 4 | Analyze the deflections due to various loading conditions. | **K4** |
| CO 5 | Assess stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to withstand the internal pressure using Lame's equation | **K4** |

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 3 | 2 | - | 2 | - | - | - | - | - | 2 | 1 | 3 | 3 | 1 | 1 |
| **CO2** | 2 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | 2 | 3 | 1 | 1 |
| **CO3** | 2 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 2 | 3 | 2 | 1 |
| **CO4** | 1 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 1 | 3 | 2 | 1 |
| **CO5** | 2 | 1 | - | 2 | - | - | - | - | - | 1 | 1 | 2 | 3 | 2 | 1 |

**COURSE CONTENT**

**UNIT — I:**
**Simple Stresses and Strains:** Elasticity and plasticity — Types of stresses and strains — Hooke's law — Factor of safety, Poisson's ratio - Relationship between Elastic constants — Bars of varying section — stresses in composite bars.

**UNIT — II:**
**Shear Force and Bending Moment:** Definition of beam — Types of beams — Concept of shear force and bending moment — Point of contra flexure — Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

**UNIT — III:**
**Flexural and Shear Stresses:**
**Flexural Stresses:** Theory of simple bending — Assumptions — Derivation of bending equation, Neutral axis — Determination of bending stresses — section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections — Design of simple beams
**Shear Stresses:** Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections.
**Torsion** – circular shafts only.

**UNIT — IV:**
**Deflection of Beams:** Double integration and Macaulay's methods — Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads. Mohr's theorems — Moment area method — application to simple cases of cantilever.

**UNIT — V:**
Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.
**Thin and Thick cylindrical** shells — Derivation of formula for longitudinal and circumferential stresses — hoop, longitudinal and volumetric strains — changes in diameter, and volume of thin cylinders. Lames theory for thick cylinders, Derivation of Lames formulae, distribution of hoop and radial stresses across the thickness, compound cylinders- distribution of stresses

**TEXTBOOKS:**
1. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010
3. Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition, 2024

**REFERENCES:**
1. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rdEdition
2. Strength of Materials - Fundamentals andApplications, T.D.Gunneswara Rao and Mudim by Andal, Cambridge University Press, 2018, 1st Edition.
3. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8thEdition (SI Units).
4. Mechanics of Solids — E P Popov, Prentice Hall, 2nd Edition, 2015.
5. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SIUnits S. Chand & Co, NewDelhi 7th edition 2022.
6. Strength of Materials by S.S.Ratan Tata McGrill Publications 3rd Edition , 2016.

**Web Resources:**
1. https://rb.gy/k17kns
2. https://rb.gy/yiyyip

## II Year – I Semester
### FLUID MECHANICS

| Course Category | Professional Core | | Course Code | 24CE303T |
|---|---|---|---|---|
| Course Type | Theory | | L-T-P-C | 3-0-0-3 |
| Prerequisites | | | Continuous Internal Assessment | 30 |
| | | | Semester End Examination | 70 |
| | | | Total Marks | 100 |

| Course Objectives: | |
|---|---|
| 1. | To explain basics of statics, kinematics and dynamics of fluids and various measuringtechniques of hydrostatic forces on objects. |
| 2. | To impart ability to solve engineering problems in fluid mechanics |
| 3. | To enable the students measure quantities of fluid flowing in pipes, tanks andchannels |
| 4. | To teach integral forms of fundamental laws of fluid mechanics to predict relevantpressures, velocities and forces. |
| 5. | To strengthen the students with fundamentals useful in application-intensive coursesdealing with hydraulics, hydraulic machinery and hydrology in future courses. |

## Course Outcomes:

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| CO1 | Identify the principles of fluid statics, kinematics and dynamics | K2 |
| CO2 | Apply the laws of fluid statics and concepts of buoyancy | K3 |
| CO3 | Recognize the fundamentals of fluid kinematics and differentiate types of fluid flows | K2 |
| CO4 | Apply the Principle of conservation of energy for flow measurement. | K3 |
| CO5 | Analyse the losses in pipes and discharge through pipe network. | K4 |

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 3 | 1 | - | - | - | 2 | - | - | 1 | - | 1 | 1 | 3 | 1 | 1 |
| CO2 | 3 | 3 | - | - | - | 2 | - | - | 3 | - | 3 | 3 | 3 | 1 | 1 |
| CO3 | 3 | 1 | - | - | - | 3 | - | - | 1 | - | 1 | 1 | 3 | 2 | 2 |
| CO4 | 3 | 2 | - | - | - | 1 | - | - | 2 | - | 2 | 2 | 3 | 2 | 2 |
| CO5 | 3 | 3 | - | - | - | 2 | - | - | 3 | - | 3 | 3 | 3 | 2 | 2 |

**COURSE CONTENT**

### UNIT - I
**Basic concepts and definitions:** Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility

### UNIT – II
**Fluid statics:** Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies

### UNIT - III
**Fluid kinematics:**
Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three - Dimensional continuity equations in Cartesian coordinates.

### UNIT - IV
**Fluid Dynamics:** Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – Derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

### UNIT - V
**Analysis Of Pipe Flow:** Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

**Textbooks:**
1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018

**Reference Books:**
1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11<sup>th</sup> edition, 2024.
2. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9<sup>th</sup> edition ,2022.
4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery,Oxford University Press, 2010.
5. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3<sup>rd</sup> edition 2011

**Online Learning Resources:**
1. https://archive.nptel.ac.in/courses/112/105/112105269/
2. https://nptel.ac.in/courses/112104118
3. https://nptel.ac.in/courses/105103192

**II YEAR I SEM**
**SURVEYING LAB**

| Course Category | Professional Core | Course Code | 24CE301P |
|---|---|---|---|
| Course Type | Laboratory | L-T-P-C | 0-0-3-1.5 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| Course Objectives: **By the end of this course student will be able to** | |
|---|---|
| 1. | Know about various linear and angular measuring instruments |
| 2. | Take Measurements in the linear and angular view |
| 3. | Determine the area and volume by interpreting the data obtained from surveyingactivities |
| 4. | Know modern equipment such as total station |
| 5. | Draft field notes from survey data |

Course Outcomes:

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** Handle various linear and angular measuring instruments | **K3** |
| **CO2** Measure the linear and angular measurements | **K3** |
| **CO3** Calculate the area and volume by interpreting the data obtained from surveying activities | **K2** |
| **CO4** Handle modern equipment such as total station | **K3** |
| **CO5** Prepare field notes from survey data | **K2** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO 1 | 2 | 2 | - | 2 | 1 | - | - | - | 3 | 2 | 2 | 2 | 2 | - | - |
| CO 2 | 2 | 2 | - | 2 | 1 | - | - | - | 3 | 3 | 3 | 2 | 2 | - | - |
| CO 3 | 2 | 2 | - | 2 | 1 | - | - | - | 3 | 2 | 2 | 2 | 2 | - | - |
| CO 4 | 1 | 2 | | | 3 | | | | 3 | 2 | 2 | 1 | 1 | | 1 |
| CO 5 | 2 | 1 | | | - | | | | 3 | 2 | 2 | 1 | 1 | | 1 |

**List of Field Works:**

1. Chain survey of road profile with offsets in case of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey ;finding the area of a given boundary by the method of Radiation
4. Fly levelling : Height of the instrument method (differential leveling)
5. Fly levelling: rise and fall method.
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two in accessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of area perimeter using total station.
10. Determination of distance between two inaccessible point by using total station.
11. Setting out a curve
12. Determining the levels of contours.

**Note: Any 10 experiments are to be conducted among**

**TEXT BOOKS**

1. Surveying (Vol No.1, 2 &3) by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd, New Delhi.
2. Text book od Surveying by C. Venkataramaiah, University Press, India (P) Limited.

**REFERENCE BOOKS**

1. Text book of Surveying by S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Text book of Surveying by Arora (Vol No. 1&2), Standard Book House, Delhi.
3. Advance Surveying by Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.

**WEB RESOURCES**

1. https://lecturenotes.in/notes/2827-note-for-surveying-1-s-1-by-swadhina-priyadarsini
2. https://nptel.ac.in/courses/105107122/1
3. https://nptel.ac.in/courses/105107158

**PRAGATI ENGINEERING COLLEGE: SURAMPALEM**

**(Autonomous)**

**Department of Civil Engineering**

**R23**

**II YEAR I SEM**

**STRENGTH OF MATERIALS LAB**

| Course Category | Professional Core | | Course Code | 24CE302P |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | | **Continuous Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| Course objectives: By the end of this course student will be able | |
|---|---|
| 1. | To determine the tensile strength and yield parameters of mild steel |
| 2. | To find out flexural strengths of Steel/Wood specimens and measure deflections |
| 3. | To determine the torsion parameters of mild steel bar |
| 4. | To determine the hardness numbers, impact and shear strengths of metals. |
| 5. | To determine the load-deflection parameters for springs |

**Course Outcomes:**

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** Conduct tensile strength test and draw stress-strain diagrams for ductile metals | **K2** |
| **CO2** Perform bending test and determine load-deflection curve of steel/wood | **K3** |
| **CO3** Able to conduct torsion test and determine torsion parameters | **K2** |
| **CO4** Perform hardness, impact and shear strength tests and calculate hardness numbers,impact and shear strengths | **K3** |
| **CO5** Tests on closely coiled and open coiled springs and calculatedeflections | **K3** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO 1 | 2 | 2 | - | 2 | 1 | - | - | - | 3 | 2 | 2 | 2 | 2 | - | - |
| CO 2 | 2 | 2 | - | 2 | 1 | - | - | - | 3 | 3 | 3 | 2 | 2 | - | - |
| CO 3 | 2 | 2 | - | 2 | 1 | - | - | - | 3 | 2 | 2 | 2 | 2 | - | - |
| CO 4 | 1 | 2 | | | 3 | | | | 3 | 2 | 2 | 1 | 1 | | - |
| CO 5 | 2 | 1 | | | - | | | | 3 | 2 | 2 | 1 | 1 | | - |

**LIST OF EXPERIMENTS:**

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
6. Hardness test.
7. Compression test on Open coiled springs
8. Tension test on Closely coiled springs
9. Compression test on wood/ concrete
10. Izod / Charpy Impact test on metals
11. Shear test on metals
12. Use of electrical resistance strain gauges.
13. Continuous beam – deflection test.

**TEXT BOOKS**

1. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi
2. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition,Universities Press.

**REFERENCE BOOKS**

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.

**WEB RESOURCES**

1. www.nptel.ac.in/courses
2. https://theconstructor.org

**II YEAR I SEM**
**BUILDING PLANNING AND DRAWING**

| Course Category | Skill Enhancement Course | Course Code | 24CE301S |
|---|---|---|---|
| Course Type | | L-T-P-C | 0-1-2-2 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| Course Objectives: | |
|---|---|
| 1. | Initiating the student to different building bye-laws and regulations. |
| 2. | Imparting the planning aspects of residential buildings and public buildings. |
| 3. | Giving training exercises on various signs and bonds. |
| 4. | Giving training exercises on different building units. |
| 5. | Imparting the skills and methods of planning of various buildings. |

Course Outcomes:

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** Plan various buildings as per the building by-laws. | **K3** |
| **CO2** Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings. | **K3** |
| **CO3** Draw signs and bonds | **K2** |
| **CO4** Draw different building units | **K3** |
| **CO5** Learn the skills of drawing building elements and plan the buildings as per requirements | **K3** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| CO1 | 1 | 1 | 2 | - | - | 3 | 3 | 2 | - | 2 | 2 | 2 | 3 | - | 2 |
| CO2 | 1 | 1 | 2 | - | - | 3 | 2 | - | - | 2 | 1 | 1 | - | - | - |
| CO3 | 1 | 1 | 2 | - | - | 3 | 3 | 2 | - | 2 | 2 | 2 | 3 | 1 | 1 |
| CO4 | 1 | 1 | 2 | - | - | 3 | 3 | 2 | - | 2 | 2 | 2 | 3 | 1 | 1 |
| CO5 | 1 | 1 | 2 | - | - | 3 | 3 | 2 | - | 2 | 2 | 2 | 3 | 1 | 1 |

**Syllabus:**
1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Detailing & Drawing of Ventilators &Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

**Text Books:**
1. Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh
2. Building planning and drawing by M. Chakraborti.
3. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, NewDelhi.

**Reference Books:**
1. National Building Code 2016 (Volume- I & II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications,New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers,New Delhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi,and Chennai
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGrawHill Education (P)India Ltd. New Delhi.

**II Year II Semester**
**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**
**(Common to CE, EEE, ECE, CSE, and CSE(CYBER SECURITY))**

| Course Category | Management Course - I | | Course Code | 24HM401T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 2 -0 -0-2 |
| **Prerequisites** | | | **Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| Course Outcomes | Blooms Taxonomy Level |
|---|---|
| **Upon successful completion of the course, the student will be able to** | |
| **CO 1** Understand of the concepts of managerial economics and demand in managerial decision making and predicting demand for goods and services | K1 |
| **CO 2** Assess the functional relation among production, cost of production, cost concepts and Break-Even Analysis. | K3 |
| **CO 3** Classify market structures for price and output decisions and Appraise the forms of business organizations and trade cycles in economic growth. | K1 |
| **CO 4** Apply capital budgeting techniques in financial decision making | K3 |
| **CO 5** Make use of the final accounting statements and analysis in financial decision making | K3 |

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

**Unit – I**

**Managerial Economics:** Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

**Unit – II**

**Production and Cost Analysis:** Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

**Unit – III**

**Business Organizations and Markets:** Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic - Competition– Oligopoly-Price-Output Determination - Pricing Methods and Strategies

**Unit – IV**

**Capital Budgeting**: Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects - Pay Back Period Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

**Unit – V**

**Financial Accounting and Analysis:** Introduction - Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

**Textbooks:**
1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

**Reference Books** :
1. Suma Damodaran - Managerial Economics - Oxford - 2011.
2. Vanitha Agarwal - Managerial Economics - Pearson Publications- 2011.
3.V.Maheswari - Financial Accounting- Vikas Publications - 2018
4. S. A. Siddiqui & A. S. Siddiqui - Managerial Economics and Financial Analysis - New Age International Publishers – 2012

**Web References:** https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market
https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
https://www.slideshare.net/ashu1983/financial-accounting

**II Year II Semester**
**ENGINEERING GEOLOGY**

| Course Category | Engineering Science | Course Code | 24CE401T |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 3-0-0-3 |
| Prerequisites | | Continuous Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| | Course Objectives: |
|---|---|
| 1. | To know the importance of Engineering Geology to the Civil Engineering. |
| 2. | To enable the students understand what minerals and rocks are and their formation and identification. |
| 3. | To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures. |
| 4. | To enable the student realize its importance and applications of Engineering Geology in Civil Engineering constructions. |
| 5. | Concepts of Groundwater and its geophysical methods. |

**Course Outcomes**:

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** | Classify the significance of geological agents on Earth surface and its significance in Civil Engineering | **K2** |
| **CO2** | Identify and understand the properties of Minerals and Rocks. | **K3** |
| **CO3** | Identify the concepts of Groundwater and its geophysical methods. | **K2** |
| **CO4** | Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation. | **K3** |
| **CO5** | Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels. | **K4** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 3 | - | - | - | - | - | - | - | - | - | - | 1 | 2 | - | - |
| **CO2** | 2 | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO3** | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 1 | - | - |
| **CO4** | 3 | 3 | 3 | 2 | 3 | - | 2 | - | - | - | 2 | 2 | 2 | 2 | - |
| **CO5** | 3 | 3 | 2 | 2 | 3 | - | 2 | - | - | - | 2 | 2 | 2 | 2 | - |

**COURSE CONTENT**

**UNIT-I:**
**Introduction:** Branches of Geology, Importance of Geology in Civil Engineering with case studies, Weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

**UNIT-II**
**Mineralogy And Petrology:** Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite. Classification, structures ,textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

**UNIT-III**
**Structural Geology:** Strike , Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

**UNIT-IV**
**Ground Water:** Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.
**Earthquakes and Land Slides:** Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.
**Geophysics:** Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

**UNIT-V**
**Geology of Dams, Reservoirs and Tunnels:** Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

**TEXT BOOKS:**
1. Engineering Geology by N. ChennaKesavulu, Laxmi Publications . 2$^{nd}$Edn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8$^{th}$ 2023

**REFERENCES:**
1. Engineering Geology by SubinoyGangopadhay Oxford University press 1$^{st}$ edition,2012.
2. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2$^{nd}$Edn , 2017,
3. Geology for Engineers and Environmental Society' Alan E Kehew, 3rd edn., 2013)Pearson publications.
4. Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications.

**Web Materials:**
1. https://www.classcentral.com
2. https://www.poriyaan.in
3. https://www.academia.edu

**II Year II Semester**
**CONCRETE TECHNOLOGY**

| Course Category | Professional Core | | Course Code | 24CE402T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | | **Continuous Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

### Course Objectives
**Upon successful completion of this course, the student will be able to**

| | |
|---|---|
| 1. | Learn materials and their properties used in the production of concrete |
| 2. | Learn the behavior of concrete at fresh stage |
| 3. | Learn the behavior of concrete at hardened stage |
| 4. | Learn the influence of elasticity, creep and shrinkage on concrete |
| 5. | Learn the mix design methodology and special concretes |

### Course Outcomes:

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** explain the basic ingredients of concrete and their role in the production ofconcrete and its behaviour in the field. | **K2** |
| **CO2** Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method. | **K3** |
| **CO3** Evaluate the ingredients of concrete through lab test results. Realize the importance of quality of concrete. | **K5** |
| **CO4** Understand the behaviour of concrete in various environments. | **K3** |
| **CO5** explore the basic concepts of special concrete and their production and applications. | **K2** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 3 | 2 | - | 2 | - | - | - | - | - | 2 | 1 | 3 | 3 | 1 | 1 |
| **CO2** | 2 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | 2 | 3 | 1 | 1 |
| **CO3** | 2 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 2 | 3 | 2 | 1 |
| **CO4** | 1 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 1 | 3 | 2 | 1 |
| **CO5** | 2 | 1 | - | 2 | - | - | - | - | - | 1 | 1 | 2 | 3 | 2 | 1 |

## COURSE CONTENT

**UNIT- I CEMENTS:** Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume

**AGGREGATES:** Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substances – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates Maximum aggregate size- Quality of mixing water

**UNIT- II FRESH CONCRETE:** Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete

**UNIT- III HARDENED CONCRETE:** Water / Cement ratio – Abram's Law – Gel/space ratio - Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete:Compression test – Tension test – Factors affecting strength – Flexure test –Splitting test – Non-destructive testing methods – Codal provisions for NDT.

**UNIT- IV ELASTICITY, CREEP & SHRINKAGE** – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

**UNIT- V MIX DESIGN AND SPECIAL CONCRETES:** Ready mixed concrete, Fibre reinforced concrete – Different types of fibres – Factors affecting properties of FRC, High performance concrete – Self consolidating concrete, Self healing concrete.
Factors in the choice of mix proportions –Quality control of concrete- Statistical methods- Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method

### TEXT BOOKS
1. Properties of Concrete by A.M. Neville – PEARSON – 4th edition
2. Concrete Technology by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5th edition 2013.
3. Concrete Technology by Job Thomas, Cengagae Publications, 1st edition, 2015.

### References
1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGrawHill 4th edition 2014
2. Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.
3. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004
4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.

### Web Materials:
1.https://rb.gy/3r3dl0

**II Year – II Semester**
**STRUCTURAL ANLAYSIS**

| Course Category | Professional Core | Course Code | 24CE403T |
|---|---|---|---|
| **Course Type** | Theory | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | | **Continuous Internal Assessment**<br>**Semester End Examination**<br>**Total Marks** | 30<br>70<br>100 |

| Course Learning Objectives |
|---|
| **Upon successful completion of this course, the student will be able to** |

| | |
|---|---|
| 1. | Analysis of fixed and continuous beams |
| 2. | Learn the analysis of indeterminate structures |
| 3. | Learn about slope-deflection method |
| 4. | Learn about Moment – distribution method |
| 5. | Learn energy theorems |

**Course Outcomes:**

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** Analysis of fixed and continuous beams Apply energy theorems to analyze trusses | **K3** |
| **CO2** Analyze indeterminate structures by using Castigliano's–II theorem | **K4** |
| **CO3** Analyze continuous beams and portal frames by using slope-deflection method | **K4** |
| **CO4** Analyze continuous beams and portal frames by using Moment – distribution method | **K4** |
| **CO5** Apply energy theorems to analyze trusses | **K4** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes :<br>(1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 3 | 2 | - | 2 | - | - | - | - | - | 2 | 1 | 3 | 3 | 1 | 1 |
| **CO2** | 2 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | 2 | 3 | 1 | 1 |
| **CO3** | 2 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 2 | 3 | 2 | 1 |
| **CO4** | 1 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 1 | 3 | 2 | 1 |
| **CO5** | 2 | 1 | - | 2 | - | - | - | - | - | 1 | 1 | 2 | 3 | 2 | 1 |

**COURSE CONTENT**

**UNIT – I**
**FIXED BEAMS & CONTINUOUS BEAMS :** Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

**UNIT - II**
**ANALYSIS OF INDETERMINATE STRUCTURES:** Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's–II theorem.

**UNIT - III**
**SLOPE-DEFLECTION METHOD:** Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.

**UNIT - IV**
**MOMENT DISTRIBUTION METHOD:** Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.

**UNIT – V**
**ENERGY THEOREMS:** Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem Deflections of simple beams and pin jointed trusses.

**Textbooks:**
1. Analysis of Structures – Vol-I&II by V.N.Vazirani &M.M.Ratwani, KhannaPublications, New Delhi.
2. Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers. 3rd edition2017.

**Reference Books:**
1. Structural analysis by Aslam Kassimali Cengage publications 6th edition 2020.
2. Structural analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.PPerumal– Laxmi publications. 3rd 2016.
3. Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
4. Structural Analysis – D.S.Prakasarao -Univeristy press.
5. Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, New Delhi.

**Web Materials:**
1. https://rb.gy/3od4w0
2. **https://rb.gy/c5rjv0**

## II Year II Semester
### HYDRAULICS AND HYRAULIC MACHINERY

| Course Category | Professional Core | | Course Code | 24CE404T |
|---|---|---|---|---|
| **Course Type** | Theory | | **L-T-P-C** | 3-0-0-3 |
| **Prerequisites** | Fluid Mechanics | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| Course Objectives: | |
|---|---|
| 1. | To Introduce concepts of laminar and turbulent flows |
| 2. | To teach principles of uniform flows through open channel. |
| 3. | To teach principles of non-uniform flows through open channel. |
| 4. | To impart knowledge on design of turbines. |
| 5. | To impart knowledge on design of pumps |

### Course Outcomes:

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** Explore the characteristics of laminar and turbulent flows. | **K2** |
| **CO2** Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels. | **K3** |
| **CO3** Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows. | **K3** |
| **CO4** Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine | **K5** |
| **CO5** Identify the principles, losses and its efficiencies of centrifugal pumps | **K2** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 3 | 2 | - | - | - | 2 | - | - | - | - | 2 | - | 3 | 1 | 1 |
| **CO2** | 3 | 3 | - | - | - | 3 | - | - | - | - | 3 | - | 3 | 1 | 1 |
| **CO3** | 3 | 3 | - | - | - | 3 | - | - | - | - | 3 | - | 3 | 1 | 1 |
| **CO4** | 3 | 3 | - | - | - | 3 | - | - | - | - | 3 | - | 3 | 2 | 2 |
| **CO5** | 3 | 2 | - | - | - | 2 | - | - | - | - | 2 | - | 3 | 2 | 2 |

## COURSE CONTENT

### UNIT – I
**Laminar & Turbulent flow in pipes:** Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

### UNIT - II
**Uniform flow in Open Channels:** Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors

### UNIT - III
**Non-Uniform flow in Open Channels:** Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

### UNIT - IV
**Impact of Jets:** Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

### UNIT – V
**Pumps:** Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies

### TEXT BOOKS: -
1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018

### Reference Books:
1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition , 2022.
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
4. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty 3rd edition 2011

### Online Learning Resources:
1. https://nptel.ac.in/courses/105105203
2. https://archive.nptel.ac.in/courses/112/106/112106300/
3. https://archive.nptel.ac.in/ courses/112/103/112103249/

## II Year II Semester
## CONCRETE TECHNOLOGY LABORATORY

| Course Category | Professional Core | Course Code | 24CE402P |
|---|---|---|---|
| **Course Type** | Laboratory | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

**Course Objectives**

**Upon successful completion of this course, the student will be able to**

1. Test basic properties of ingredients of concrete fresh and hardened concrete properties

**Course Outcomes:**

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| **CO1** | Outline importance of testing cement and its properties | **K2** |
| **CO2** | Assess different properties of Aggregates | **K3** |
| **CO3** | Assess fresh concrete properties and their relevance to hardened concrete | **K3** |
| **CO4** | Assess hardened concrete properties | **K5** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 3 | 2 | - | 2 | - | - | - | - | - | 2 | 1 | 3 | 3 | 1 | 1 |
| **CO2** | 2 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | 2 | 3 | 1 | 1 |
| **CO3** | 2 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 2 | 3 | 2 | 1 |
| **CO4** | 1 | 2 | - | 1 | - | - | - | - | - | 2 | 1 | 1 | 3 | 2 | 1 |

**Detailed Syllabus:**

**1.Tests on Cement**
   Normal Consistency and Fineness of cement.
   Initial setting time and Final setting time of cement.
   Specific gravity and soundness of cement.
   Compressive strength of cement.

**2.Tests on Fine Aggregates**
   Grading and fineness modulus of Fine aggregate by sieve analysis.
   Specific gravity of fine aggregate
   Water absorption and Bulking of sand

**3.Tests on Coarse Aggregates**
   Grading of Coarse aggregate by sieve analysis.
   Specific gravity of coarse aggregate.
   Water absorption of Coarse aggregates.

**4.Tests on fresh Concrete**
   Workability of concrete by compaction factor method
   Workability of concrete by slump test
   Workability of concrete by Vee-bee test.

**5. Tests on Hardened Concrete**
   Compressive strength of cement concrete and Modulus of rupture
   Young's Modulus and Poisson's Ratio
   Split tensile strength of concrete.
   Non-Destructive testing on concrete (for demonstration)

**TEXT BOOKS**
1. Concrete Technology by M.S. Shetty – S. Chand & Co.
2. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons

**REFERENCE BOOKS**
1. Concrete Manual by M.L. Gambhir, Dhanpat Rai & Sons
2. Highway Material Testing manual, Khanna, Justo and Veeraraghavan, Nemchand Brothers

**R23**

## II Year II Semester
### ENGINEERING GEOLOGY LABORATORY

| Course Category | Professional Core | | Course Code | 24CE401P |
|---|---|---|---|---|
| **Course Type** | Laboratory | | **L-T-P-C** | 0-0-3-1.5 |
| **Prerequisites** | | **Continuous Internal Assessment** | | 30 |
| | | **Semester End Examination** | | 70 |
| | | **Total Marks** | | 100 |

| | **Course Objectives:** |
|---|---|
| 1. | To identify the Megascopic types of Ore minerals & Rock forming minerals. |
| 2. | To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks. |
| 3. | To identify the topography of the site & material selection |

**Course Outcomes**:

| Upon successful completion of the course, the student will be able to: | Cognitive Level |
|---|---|
| **CO1** Identify Megascopic minerals & their properties | **K2** |
| **CO2** Identify Megascopic rocks & their properties. | **K3** |
| **CO3** Identify the site parameters such as contour, slope & aspect for topography. | **K3** |
| **CO4** Know the occurrence of materials using the strike & dip problems. | **K3** |

### K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO1** | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | |
| **CO2** | 1 | 1 | - | - | - | - | - | - | - | - | - | - | - | - | |
| **CO3** | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 1 | - | 1 | 1 | |
| **CO4** | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | |

## LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
   a) Rock forming minerals – Quartz group, Feldspar group, Garnet group, Micagroup & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b) Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite,Chromite, etc…

2. Megascopic description and identification of rocks.
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale,Laterite, Conglamorate, etc.
   c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite Biotiteschist, Marble, Khondalite, etc.

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.

4. Simple Structural Geology problems.
5. Bore hole data
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology& Structural Geology.

## LAB EXAMINATION PATTERN:
   1. Description and identification of FOUR minerals
   2. Description and identification of FOUR (including igneous, sedimentary andmetamorphic rocks)
   3. ONE Question on Interpretation of a Geological map along with a geological section.
   4. TWO Questions on Simple strike and Dip problems.
   5. Bore hole problems.
   6. Project report on geology.

## REFERENCES:
1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.
2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.

## II Year II Semester
### REMOTE SENSING AND GIS

| Course Category | Skill Enhancement Course | Course Code | 24CE401S |
|---|---|---|---|
| **Course Type** | | **L-T-P-C** | 0-1-2-2 |
| **Prerequisites** | | **Continuous Internal Assessment** | 30 |
| | | **Semester End Examination** | 70 |
| | | **Total Marks** | 100 |

| **Course Learning Objectives:** | |
|---|---|
| The course is designed to | |
| 1. | Introduce the basic principles of Remote Sensing and GIS techniques and itsapplication to Civil Engineering. |
| 2. | Learn various types of sensors and platforms and understand the principles of spatialanalysis techniques in GIS. |
| 3. | Introduce GIS software to understand the process of digitization, creation of thematicmap from Topo sheets and maps. |

**Course outcomes**

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| **CO1** | Acquire knowledge about concepts of remote sensing, sensors and their characteristics | **K2** |
| **CO2** | Explore with data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS. | **K3** |
| **CO3** | Digitize and create thematic map and extract important features to calculate geometry. | **K3** |
| **CO4** | Perform surface analysis over Contour to develop digital elevation model. | **K3** |
| **CO5** | Use GIS software to perform simple analysis in water resources and transportation engineering | **K3** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO 10** | **PO 11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO 1** | 2 | | 1 | 1 | | | 2 | | | | | 2 | 1 | | 1 |
| **CO 2** | 2 | | 1 | 1 | | | 2 | | | | | 2 | 1 | | 1 |
| **CO 3** | 1 | 2 | 2 | 1 | 2 | 2 | 3 | | 2 | 2 | 1 | 3 | 1 | | 2 |
| **CO 4** | 1 | 2 | 2 | 1 | 2 | 2 | 3 | | 2 | 2 | 1 | 3 | 2 | | 2 |
| **CO 5** | 1 | 2 | 2 | 1 | 2 | 2 | 3 | | 2 | 2 | 1 | 3 | 2 | | 2 |

**COURSE CONTENT**

**UNIT – I**
**Introduction to Remote sensing:** History of Remote Sensing, Electromagnetic Radiation, Electromagnetic Spectrum, Energy Interaction with Atmosphere, Energy Interaction with the Earth Surfaces - Characteristics of Remote Sensing Systems, Sensor Resolutions, Advantages & Limitations - Platforms: Types of Sensors, Airborne Remote Sensing, Spaceborne Remote Sensing - IRS, LANDSAT, SPOT & Recent satellite.

**UNIT – II**
**Digital Image analysis:** Digital Image Characteristics, Digital Image Data Formats, Band Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ) - Visual Interpretation Elements, Preprocessing, Enhancement, Classification, Supervised classification, Unsupervised classification.

**UNIT – III**
**Introduction to Geographic Information System:** Principles, Components and Applications of GIS - Map projections, Spatial Data Structures, Raster and Vector Data Formats, Data Inputs, Data Manipulation, Data Retrieval, Data Analysis - Spatial data analysis: Overlay Function-Vector Overlay Operations, Raster Overlay Operations, Arithmetic Operators, Comparison and Logical Operators, Conditional Expressions - Network Analysis: Components of network, Transportation network - Optimum pathanalysis.

**TEXT BOOKS:**
1. BasudebBhatta (2021). 'Remote sensing and GIS', 3rdedn., Oxford University Press.
2. S. Kumar, (2016) 'Basics of Remote sensing & GIS', Laxmi Publications.
3. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2022) 'Remote Sensing and Image Interpretation', 7thedn., Wiley India Pvt. Ltd.
4. Demers, M.N, (2013) 'Fundamentals of Geographic Information Systems', 4thedn., Wiley India Pvt. Ltd.

**List of Experiments:**
Expt. 1 : Georeferencing a Toposheet or Map
Expt. 2 : Digitization and Attribute table creation.
Expt. 3 : Creation of Thematic Map
Expt. 4 : Calculation of Feature geometry – Length, Area & Perimeter.
Expt. 5 : Contour map – developing TIN & DEM from Contour.
Expt. 6 : Stream network – Stream ordering map.
Expt. 7 : Watershed - calculate Hydro-geomorphological parameters.
Expt. 8 : Transportation Network Map – Route analysis.

**GIS SOFTWARE**: QGIS / ArcGIS
**Textbook for Practical**
1. QGIS User Guide
2. ArcGIS User Manual by ESRI

**REFERENCES:**
1. Schowengerdt, R. A (2006) 'Remote Sensing', Elsevier publishers.
2. Burrough P A and R.A. McDonnell, (1998) 'Principals of Geographical Information Systems', Oxford University Press.
3. George Joseph (2013) 'Fundamentals of Remote Sensing', Universities Press.

**Web references:**
1. https://nptel.ac.in/courses/10510319

# PRAGATI ENGINEERING COLLEGE: SURAMPALEM
## (Autonomous)
### Department of Civil Engineering

**R23**

### II Year II Semester
### DESIGN THINKING & INNOVATION
### (Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY))

| Course Category | BS&H | Course Code | 24HM401P |
|---|---|---|---|
| Course Type | Theory | L-T-P-C | 1 -0 -2-2 |
| Prerequisites | | Internal Assessment | 30 |
| | | Semester End Examination | 70 |
| | | Total Marks | 100 |

| Course Outcomes<br>Upon successful completion of the course, the student will be able to | | Blooms Taxonomy Level |
|---|---|---|
| CO 1 | Define the concepts related to design thinking. | K1 |
| CO 2 | Explain the fundamentals of Design Thinking and innovation. | K2 |
| CO 3 | Apply the design thinking techniques for solving problems in various sectors. | K3 |
| CO 4 | Analyze to work in a multidisciplinary environment. | K4 |
| CO 5 | Evaluate the value of creativity. | K5 |

**Contribution of Course Outcomes towards achievement of Program Outcomes**
**(1 – Low, 2 - Medium, 3 – High)**

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

**COURSE CONTENT**

**UNIT – I     Introduction to Design Thinking**
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

**UNIT - II     Design Thinking Process**
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development
**Activity:** Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

**UNIT - III     Innovation**
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.
**Activity:** Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

**UNIT - IV     Product Design**
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.
**Activity:** Importance of modeling, how to set specifications, Explaining their own product design.

**UNIT – V     Design Thinking in Business Processes**
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.
**Activity:** How to market our own product, about maintenance, Reliability and plan for startup.

**Textbooks:**
1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

**Reference Books:**
1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

**Web Resources:**
- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

**II Year II Semester**
**BUILDING MATERIALS AND CONSTRUCTIONS**

| Course Category | Mandatory Course | | Course Code | 24CE405T |
|---|---|---|---|---|
| **Course Type** | | | **L-T-P-C** | 3-0-0-0 |
| **Prerequisites** | | | **Continuous Internal Assessment** | 30 |
| | | | **Semester End Examination** | 70 |
| | | | **Total Marks** | 100 |

| **Course Learning Objectives:** | |
|---|---|
| The course is designed to | |
| 1. | To develop the building walls and foundations and how they are useful for buildings. |
| 2. | In these mainly we know about building arches, roofs, doors, windows and ventilators and how they are given for buildings. |
| 3. | To develop the form work and finishing work which is used for buildings and to solve the defects of building properties which are able to know with material |
| 4. | Painting is also taken for a beautiful looking structure for the good manner. |
| 5. | These courses explain about the material which we want to use and how we want to use and how to give a good building for using purpose |

**Course outcomes**

| Upon successful completion of the course, the student will be able to: | | Cognitive Level |
|---|---|---|
| **CO1** | Identify relevant type of construction materials for the given type of building. | **K2** |
| **CO2** | Use the relevant type of special purpose construction materials in the given situation. | **K3** |
| **CO3** | Undertake the given type of building construction activity for the given component of building structure. | **K3** |
| **CO4** | Design the relevant means of communication for the given building structure. | **K3** |
| **CO5** | Use the relevant type of material for finishing purpose in the given situation. | **K3** |

**K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.**

| Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2 - Medium, 3 – High) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO 10 | PO 11 | PO12 | PSO1 | PSO2 | PSO3 |
| **CO 1** | 2 | | 1 | 1 | | | 2 | | | | | 2 | 1 | | 1 |
| **CO 2** | 2 | | 1 | 1 | | | 2 | | | | | 2 | 1 | | 1 |
| **CO 3** | 1 | 2 | 2 | 1 | 2 | 2 | 3 | | 2 | 2 | 1 | 3 | 1 | | 2 |
| **CO 4** | 1 | 2 | 2 | 1 | 2 | 2 | 3 | | 2 | 2 | 1 | 3 | 2 | | 2 |
| **CO 5** | 1 | 2 | 2 | 1 | 2 | 2 | 3 | | 2 | 2 | 1 | 3 | 2 | | 2 |

**COURSE CONTENT**

**UNIT I Masonry:** Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. WOOD: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiver – Reinforced Plastics, Steel, Aluminium.

**UNIT II: LIME AND CEMENT** Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Cement: Portland cement-Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

**UNIT III: BUILDING COMPONENTS** Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

**UNIT IV : FINISHINGS** Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering – Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.

**UNIT V: AGGREGATES** Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of AggregateBulking of sand – Sieve analysis.

**Text Books:**
1. Building Materials by S.S. Bhavikatti, Vices publications House private ltd.
2. Building Construction by S.S. Bhavikatti, Vices publications House private ltd.
3. Building Materials by B.C. Punmia, Laxmi Publications private ltd.
4. Building Construction by B.C. Punmia, Laxmi Publications (p) ltd.

**References:**
1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C.Verghese, PHI learning (P) ltd.
3. Building Materials by M.L.Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction by P.C.Verghese, PHI Learning (P) Ltd.