

**SRI VASAVI INSTITUTE OF ENGINEERING & TECHNOLOGY****An Autonomous Institute**

(Approved by AICTE, New Delhi & Affiliated to JNTU Kakinada)
Accredited by NBA (Mech, ECE & CSE) & NAAC with 'A' Grade
Nandamuru, Pedana Mandal, Krishna Dist – 521369.

DEPARTMENT OF CIVIL ENGINEERING
COURSE STRUCTURE AND COURSE SYLLABUS

B.TECH. – I YEAR I SEMESTER (FOR GROUP-B BRANCHES)

S.No.	Category	Title	L/D	T	P	Credits
1	BS&H	Engineering Physics	3	0	0	3
2	BS&H	Linear Algebra & Calculus	3	0	0	3
3	Engineering Science	Basic Electrical & Electronics Engineering	3	0	0	3
4	Engineering Science	Engineering Graphics	1	0	4	3
5	Engineering Science	Introduction to Programming	3	0	0	3
6	Engineering Science	IT Workshop	0	0	2	1
7	BS&H	Engineering Physics Lab	0	0	2	1
8	Engineering Science	Electrical & Electronics Engineering Workshop	0	0	3	1.5
9	Engineering Science	Computer Programming Lab	0	0	3	1.5
10	BS&H	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
Total			13	00	15	20.5

B.Tech. – I Year II Semester (for Group-B Branches)

S.No.	Category	Title	L	T	P	Credits
1	BS&H	Communicative English	2	0	0	2
2	BS & H	Engineering Chemistry / Chemistry / Fundamental Chemistry	3	0	0	3
3	Engineering Science	Differential Equations & Vector Calculus	3	0	0	3
4	Engineering Science	Basic Civil & Mechanical Engineering	3	0	0	3
5	Professional Core	Engineering Mechanics/Network Analysis/ Data structures (Branch specific)	3	0	0	3
6	BS&H	Communicative English Lab	0	0	2	1
7	BS&H	Engineering Chemistry / Chemistry / Fundamental Chemistry Lab	0	0	2	1
8	Engineering Science	Engineering Workshop	0	0	3	1.5
9	Professional Core	Engineering Mechanics & Building Practices Lab	0	0	3	1.5
10		Health and wellness, Yoga and Sports	-	-	1	0.5
Total			14	00	11	19.5

L	T	P	C
3	0	0	3

ENGINEERING PHYSICS

(for Civil Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Analyze the intensity variation of light due to polarization, interference and diffraction. CO2: Familiarize with the basics of crystals and their structures.
CO3: Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.
CO4: Summarize various types of polarization of dielectrics and classify the magnetic materials.
CO5: Explain the basic concepts of Quantum Mechanics and the band theory of solids. CO6: Identify the type of semiconductor using Hall effect.

UNIT I Wave Optics**12Hours**

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

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT II Crystallography and X-ray diffraction**11Hours**

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**13Hours**

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 and

its Applications.

UNIT IV Quantum Mechanics and Free electron Theory**10Hours**

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

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

UNIT V Semiconductors**9Hours**

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

Textbooks:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
3. Engineering Physics – P.K.Palani Samy

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics – Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.2010
3. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

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

L	T	P	C
3	0	0	3

LINEAR ALGEBRA & CALCULUS

(for Civil Engineering)

Course Objectives:

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

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

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

CO2: Utilize mean value theorems to real life problems.

CO3: Familiarize with functions of several variables which is useful in optimization.

CO4: Learn important tools of calculus in higher dimensions.

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.

UNIT I Matrices

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

UNIT II Eigenvalues, Eigenvectors and Orthogonal Transformation

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

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.

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

UNIT V Multiple Integrals (Multi variable Calculus)

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

Textbooks:

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

Reference Books:

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

L	T	P	C
3	0	0	3

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

Course Objectives

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

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

CO1. Describe fundamental laws, operating principles of motors/generators, MC/MI instruments (L2)

CO2. Demonstrate the working of electrical machines, measuring instruments and power generation stations. (L2)

CO3. Apply mathematical tools and fundamental concepts to derive various equations related to electrical circuits and machines. (L3)

CO4. Calculate electrical load and electricity bill of residential and commercial buildings. (L4)

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I DC & AC Circuits

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

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

UNIT II Machines and Measuring Instruments

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

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

UNIT III Energy Resources, Electricity Bill & Safety Measures

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

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

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

Textbooks:

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

Reference Books:

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

Web Resources:

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

PART B: BASIC ELECTRONICS ENGINEERING**Course Objectives:**

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

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

- **CO1.** Student will be able to Understand Diode & Bipolar Junction Transistor (L1)
- **CO2.** Student will be able to Develop Power Supply. (L2)
- **CO3.** Student will be able to Understand electronic instructions (L1)
- **CO4.** Student will be able to Understand Combinational & Sequential Circuits. (L1)

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

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

Textbooks:

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

Reference Books:

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

End examination pattern:

- i) Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
- ii) In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
- iii) In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.

The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.

L	T	P	C
1	0	4	3

ENGINEERING GRAPHICS

(Common to All branches of Engineering)

Course Objectives:

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

Course Outcomes:

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

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

CO3: Understand and draw projection of solids in various positions in first quadrant.

CO4: Explain principles behind development of surfaces.

CO5: Prepare isometric and perspective sections of simple solids.

UNIT I

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

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

Scales: Plain scales, diagonal scales and vernier scales.

UNIT II

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

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

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

UNIT III

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

UNIT IV

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

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

UNIT V

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

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

Textbook:

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

Reference Books:

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

L	T	P	C
3	0	0	3

INTRODUCTION TO PROGRAMMING

(Common to All branches of Engineering)

Course Objectives:

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

Course Outcomes: A student after completion of the course will be able to

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

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

CO3: Implement various algorithms using the C programming language.

CO4: Understand more advanced features of C language.

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

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.

UNIT III Arrays and Strings

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

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 Lifetime of Variables, 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, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

Reference Books:

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

L	T	P	C
0	0	2	1

IT WORKSHOP

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

CO1: Demonstrate Hardware troubleshooting

CO2: Identify Hardware components and inter dependencies.

CO3: Describe usage of web browsers, email, news groups and discussion forums.

CO4: Design word documents and create presentations using different styles.

CO5: Prepare spreadsheets with calculations

SYLLABUS:

PC Hardware & Software Installation

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

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

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

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

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

Internet & World Wide Web

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

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

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

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

LaTeX and WORD

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

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

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

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

EXCEL

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

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

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

LOOKUP/VLOOKUP

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

POWER POINT

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

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

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

AI TOOLS – ChatGPT

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

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

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

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

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

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

REFERENCE BOOKS:

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

L	T	P	C
0	0	2	1

ENGINEERING PHYSICS LAB
(for Civil Engineering)

Course Objectives:

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

Course Outcomes: The students will be able to

CO1: Operate optical instruments like travelling microscope and spectrometer. CO2: Estimate the wavelengths of different colours using diffraction grating.

CO3: Plot the intensity of the magnetic field of circular coil carrying current with distance. CO4: Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.

CO5: Calculate the band gap of a given semiconductor. CO6: Identify the type of semiconductor using Hall effect.

List of Experiments:

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

10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

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

References:

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

Web Resources

- www.vlab.co.in
- <https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

L	T	P	C
0	0	3	1.5

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP**Course Objectives:**

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

Course Outcomes:

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

CO1. Measure voltage, current and power in an electrical circuit. (L3)

CO2. Measure of Resistance using Wheat stone bridge (L4)

CO3. Discover critical field resistance and critical speed of DC shunt generators. (L4)

CO4. Investigate the effect of reactive power and power factor in electrical loads. (L5)

Activities:

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

PART A: ELECTRICAL ENGINEERING LAB**List of experiments:**

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

Reference Books:

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

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB**Course Objectives:**

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

Course Outcomes: At the end of the course, the student will be able to
CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.

List of Experiments:

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

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

References:

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

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

L	T	P	C
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COMPUTER PROGRAMMING LAB

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

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

- CO1:** Read, understand, and trace the execution of programs written in C language.
- CO2:** Select the right control structure for solving the problem.
- CO3:** Develop C programs which utilize memory efficiently using programming constructs like pointers.
- CO4:** Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

SYLLABUS:

UNIT-I

WEEK 1

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

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

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

WEEK 2

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

Suggested Experiments /Activities:

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

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

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

WEEK 3

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

Suggested Experiments/Activities:**Tutorial 3:** Variable types and type conversions:**Lab 3:** Simple computational problems using arithmetic expressions.

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

UNIT-II**WEEK 4**

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

Suggested Experiments/Activities:**Tutorial 4:** Operators and the precedence and associativity:**Lab 4:** Simple computational problems using the operator's precedence and associativity

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

WEEK 5

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

Suggested Experiments/Activities:**Tutorial 5:** Branching and logical expressions:**Lab 5:** Problems involving if-then-else structures.

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

WEEK 6

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

Suggested Experiments/Activities:**Tutorial 6:** Loops, while and for loops**Lab 6:** Iterative problems e.g., the sum of series

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

UNIT-III

WEEK 7:

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

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

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

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems String operations, Bubble sort,

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

UNIT-IV

WEEK 9:

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

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

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

WEEK 10:

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

Suggested Experiments/Activities:

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

Lab10 : Bitfields, linked lists

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

- i) Create and display a singly linked list using self-referential structure.
- ii) Demonstrate the differences between structures and unions using a C program.
- iii) Write a C program to shift/rotate using bitfields.
- iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT-V

WEEK 11:

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

Suggested Experiments/Activities:

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

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

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

WEEK 12:

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

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

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

WEEK 13:

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

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

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

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

WEEK14:

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

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

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

TEXTBOOKS:

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

REFERENCE BOOKS:

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

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NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

Course Objectives:

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

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

CO1: Understand the importance of discipline, character and service motto.

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.

CO3: Explore human relationships by analyzing social problems.

CO4: Determine to extend their help for the fellow beings and downtrodden people.

CO5: Develop leadership skills and civic responsibilities.

UNIT I Orientation

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

Activities:

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

UNIT II Nature & Care

Activities:

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

UNIT III Community

Service Activities:

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

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, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
3. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

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

Evaluation Guidelines:

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

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COMMUNICATIVE ENGLISH (for Civil Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Understand the context, topic, and pieces of specific information from social or Transactional dialogues.

CO2: Apply grammatical structures to formulate sentences and correct word forms.

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

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

CO5: Create a coherent paragraph, essay, and resume.

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: Elon Musk

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

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

- Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
- Writing:** Summarizing, Note-making, paraphrasing
- Grammar:** Verbs - tenses; subject-verb agreement; Compound words, Collocations
- Vocabulary:** Compound words, Collocations

UNIT IV

Lesson: INSPIRATION: The Toys of Peace by Saki

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

UNIT V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

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

Textbooks:

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

Reference Books:

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

Web Resources:

GRAMMAR:

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

VOCABULARY

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

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ENGINEERING CHEMISTRY (for Civil Engineering)

Course Objectives:

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

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

CO1: Demonstrate the corrosion prevention methods and factors affecting corrosion.

CO2: Explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers.

CO3: Explain calorific values, octane number, refining of petroleum and cracking of oils.

CO4: Explain the setting and hardening of cement.

CO5: Summarize the concepts of colloids, micelle and nanomaterials.

UNIT I Water Technology

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

UNIT II Electrochemistry and Applications

Electrodes –electrochemical cell, Nernst equation, cell potential calculations.

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

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

UNIT III Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization.

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

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers.

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

UNIT IV Modern Engineering Materials

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced

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, Setting and Hardening of cement.

UNIT V Surface Chemistry and Nanomaterials

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

Textbooks:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Peter Atkins, Julio de 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-Heinemann, 1992.
- Textbook of Polymer Science, Fred W. Billmeyer Jr, 3rd Edition

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DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS (for Civil Engineering)

Course Objectives:

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

Course Outcomes: At the end of the course, the student will be able to CO1:

Solve the differential equations related to various engineering fields.

CO2: Identify solution methods for partial differential equations that model physical processes.

CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO4: Estimate the work done against a field, circulation and flux using vector calculus.

UNIT I Differential equations of first order and first degree

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: 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, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. 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, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V Vector integration

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

Textbooks:

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

Reference Books:

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

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BASIC CIVIL AND MECHANICAL ENGINEERING (Common to All branches of Engineering)

PART A: BASIC CIVIL ENGINEERING

Course Objectives:

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

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society, the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

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

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation, the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

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- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

UNIT II

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

UNIT III

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

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

Textbooks:

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

Reference Books:

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

PART B: BASIC MECHANICAL ENGINEERING

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

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

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

CO1: Understand the different manufacturing processes.

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

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

CO4: Describe the basics of robotics and its applications.

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

L	T	P	C
3	0	0	3

ENGINEERING MECHANICS

(Common to Civil, Mechanical Engineering & Allied branches)

Course Objectives:

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

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

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

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

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

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

CO5: Solve the problems involving the translational and rotational motion of rigid bodies.

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.

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 Moment 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 , Universitypress. 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

L	T	P	C
0	0	2	1

COMMUNICATIVE ENGLISH LAB
(for Civil Engineering)

Course Objectives:

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

Course Outcomes:

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

CO2: Apply communication skills through various language learning activities.

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

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives:

List of Topics:

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

Suggested Software:

- Walden Infotech
- Softx Communicative English lab software
- Young India Films

Reference Books:

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

2. <https://www.youtube.com/user/letstalkaccent/videos>
3. <https://www.youtube.com/c/EngLanguageClub/featured>
4. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
<https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp>

L	T	P	C
0	0	2	1

ENGINEERING CHEMISTRY LAB
(for Civil Engineering)

Course Objectives:

- To verify the fundamental concepts with experiments

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer materials.

CO3: Determine the physical properties like surface tension, adsorption and viscosity.

CO4: Estimate the Iron and Calcium in cement.

CO5: Calculate the hardness of water.

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method
3. Determination of Strength of an acid in Pb-Acid battery
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Estimation of Calcium in port land Cement
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

Reference:

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

L	T	P	C
0	0	3	1.5

ENGINEERING WORKSHOP (Common to All branches of Engineering)

Course Objectives:

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

Course Outcomes:

CO1: Identify workshop tools and their operational capabilities.

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

SYLLABUS

- Demonstration:** Safety practices and precautions to be observed in workshop.
- Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
 - Half – Lap joint
 - Mortise and Tenon joint
 - Corner Dovetail joint or Bridle joint
- Sheet Metal Working:** Familiarity with different types of tools used in sheet metal working. Developments of following sheet metal job from GI sheets.
 - Tapered tray
 - Conical funnel
 - Elbow pipe
 - Brazing
- Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
 - V-fit
 - Dovetail fit
 - Semi-circular fit
 - Bicycle tire puncture and change of two-wheeler tyre
- Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the following connections.
 - Parallel and series
 - Two-way switch
 - Godown lighting
 - Tube light
 - Three phase motor
 - Soldering of wires
- Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
- Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
- Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
- Basic repairs of Two-wheeler vehicle** – Demonstration of working of two-wheeler vehicle and its repairs.

Textbooks:

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

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakasan, 2021-22

L	T	P	C
0	0	3	1.5

ENGINEERING MECHANICS & BUILDING PRACTICES LAB
(Civil Engineering & allied branches)

Course Objectives: The students completing the course are expected to

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

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

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

CO2: Verify Law of Parallelogram of forces and Law of Moment using force polygon and bellcrank lever.

CO3: Determine the Centre of gravity different configurations and

CO4: Understand the Quality Testing and Assessment Procedures and principles of Non-Destructive Testing.

CO5: Exposure to safety practices in the construction industry.

The following experiments need to be performed using both Hardware and simulation Software.

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 Centroid of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV
12. Study of Plumbing in buildings.

References:

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGrawHill Education.
2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022
3. Non-Destructive Testing for concrete-Method of test- IS 13311(Part- 2) : 1992

L	T	P	C
0	0	1	0.5

HEALTH AND WELLNESS, YOGA AND SPORTS FOR II SEMESTER

Course Objectives:

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

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

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

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

CO5: Develop Positive Personality

UNIT I

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

Activities:

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

UNIT II

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

Activities:

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

UNIT III

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

Activities:

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

Reference Books:

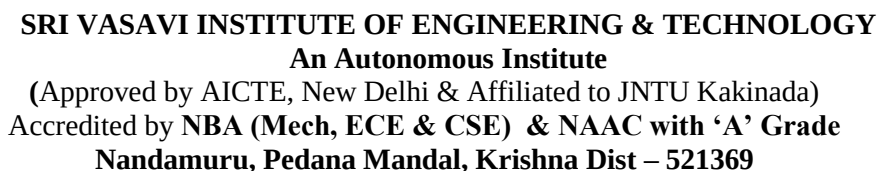
1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide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

General Guidelines:

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

Evaluation Guidelines:

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



S.NO.	CATEGORY	SUBJECT CODE	TITLE	L	T	P	CREDITS
1	Management Course-I	B23SH41	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science / Basic Science	B23CE41	Engineering Geology	3	0	0	3
3	Professional Core	B23CE42	Concrete Technology	3	0	0	3
4	Professional Core	B23CE43	Structural Analysis	3	0	0	3
5	Professional Core	B23CE44	Hydraulics & Hydraulic Machinery	3	0	0	3
6	Professional Core	B23CE47	Concrete Technology Lab	0	0	3	1.5
7	Professional Core	B23CE48	Engineering Geology lab	0	0	3	1.5
8	Skill Enhancement course	B23CE49	Remote Sensing & Geographical Information Systems	0	1	2	2
9	Engineering Science	B23CC41	Design Thinking & Innovation	1	0	2	2
Total				15	1	10	21
10	Mandatory course	B23CE45	Building materials and Construction	3	0	0	-
11	Audit Course	B23CC43	Environmental Science	2	0	0	-
		Mandatory Community Service Project Internship of 08 weeks duration during summer vacation					



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DEPARTMENT OF CIVIL ENGINEERING

II YEAR - I SEMESTER



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L	T	P	C
3	0	0	3

II Year I Semester

NUMERICAL TECHNIQUES AND STATISTICAL METHODS

Course Objectives:

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

Course Outcomes:

1. 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 (L3)
2. 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 (L3)
3. Apply discrete and continuous probability distributions (L3)
4. Design the components of a classical hypothesis test (L6)
5. Infer the statistical inferential methods based on small and large sampling tests (L4)

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 $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ 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.



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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 , z^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, z^2 -test.

Textbooks:

1. **B.S.Grewal**, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. **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, Keying Ye, Ronald E Walpole**, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson 2007.
6. **Jay I. Devore**, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.



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II Year I Semester

L	T	P	C
2	1	0	3

**UNIVERSAL HUMAN VALUES –
UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT**

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and professions as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:

- Define the terms like Natural Acceptance, Happiness and Prosperity (L1, L2)
- Identify one's self, and one's surroundings (family, society nature) (L1, L2)
- Apply what they have learnt to their own self in different day-to-day settings in real life (L3)
- Relate human values with human relationship and human society. (L4)
- Justify the need for universal human values and harmonious existence (L5)
- Develop as socially and ecologically responsible engineers (L3, L6)

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1- hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I

Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself Lecture 3: self-exploration as the Process for Value Education

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario Lecture 6: Method to Fulfill the Basic Human Aspirations Tutorial 3: Practice Session PS3 Exploring Natural Acceptance



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UNIT II

Harmony in the Human Being (6 lectures and 3 tutorials for practice session) Lecture 7: Understanding Human being as the Co-existence of the self and the body. Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body. Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self. Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III

Harmony in the Family and Society (6 lectures and 3 tutorials for practice session) Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust. Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect. Lecture 16: Other Feelings, Justice in Human-to-Human Relationship. Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfill Human Goal

UNIT IV

Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session) Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature. Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V

Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values. Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order



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Practice Sessions for UNIT I – Introduction to Value Education PS1Sharing about Oneself
PS2 Exploring Human Consciousness PS3Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being PS4Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self PS6Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society PS7Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfill Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence) PS10Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look atProfessional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

a. The Textbook

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

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria, *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

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
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)



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Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>
4. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>
6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview



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II Year – I Semester

SURVEYING

L	T	P	C
3	0	0	3

Course Objectives:

The objectives of this course are to:

1. Know the principle and methods of surveying and measuring of horizontal and vertical- distances and angles
2. Identification of source of errors and rectification methods
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:

Course will enable the student to:

CO	STATEMENT	Blooms level
CO 1	Apply the principle and methods of surveying and measuring of horizontal and vertical- distances and angles	L2
CO 2	Identify the source of errors and rectification methods	L3
CO 3	Apply surveying principles to determine areas and volumes	L2
CO 4	Setting out curves and using modern surveying equipments	L3
CO 5	Apply the basics of Photogrammetry Surveying in field	L4

Course Articulation Matrix:

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

Syllabus:

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.



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UNIT - II

Leveling- Types of levels, methods of leveling, and Determination of levels, Effect of Curvature 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. Duggal S K, Surveying (Vol – 1 & 2) , Tata McGraw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.
2. C Venkatramaiah , Textbook of Surveying ,Universities Press 1st Edition, 2011.

Reference Books:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying (Vol – 1), Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying (Vol – 2), Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Surveying (Vol – 3), Laxmi Publications (P) ltd., New Delhi 16th 2023.



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4. Chandra A M, Plane Surveying and Higher Surveying, New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition, 2015.
5. N.Basak, Surveying and Levelling, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2014.
6. Arora K R, Surveying (Vol 1, 2 & 3), 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



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II Year – I Semester

L	T	P	C
3	0	0	3

STRENGTH OF MATERIALS

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 and loading 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:

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

CO	STATEMENT	Blooms level
CO 1	To understand the basic materials behavior under the influence of different External loading conditions and the support conditions.	L2
CO 2	To draw the diagrams indicating the variation of the key performance features like axial forces, bending moment and shear forces in structural members.	L3
CO 3	To acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams	L2
CO 4	To analyze the deflections due to various loading conditions.	L3
CO 5	To assess stresses across section of the thin, thick cylinders and columns to arrive at optimum sections to withstand the internal pressure using Lamé's Equation	L4

Course Articulation Matrix:

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

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,



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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 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:

Columns & Struts: 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's – 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. Lamé's theory for thick cylinders, Derivation of Lamé's formulae, distribution of hoop and radial stresses across the thickness, compound cylinders- distribution of stresses

TEXTBOOKS:

1. R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, A Textbook of Strength of Materials, New Delhi 7th edition 2022.
2. E P Popov, Mechanics of Solids, Prentice Hall, 2nd Edition, 2015.
3. B. S. Basavarajaiah and P. Mahadevappa, Strength of Materials, Universities Press 3rd Edition, 2010
4. J.K. Gupta and S.K. Gupta, Strength of Materials, Cengage publications 2nd edition, 2024

REFERENCES:

1. R. K. Bansal, Strength of Materials, Lakshmi Publications, 16th Edition, 2022
2. L.S Srinath, Advanced Mechanics of Solids, McGraw Hill Education, 2017, 3rd Edition
3. T.D.Gunneswara Rao and MudimbyAndal, Strength of Materials - Fundamentals and Applications, Cambridge University Press, 2018, 1st Edition
4. Beer and Johnston, Mechanics of Materials, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).
5. E P Popov, Mechanics of Solids, Prentice Hall, 2nd Edition, 2015.
6. S.S.Ratan, Strength of Materials, Tata McGrill Publications 3rd Edition, 2016.



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II Year – I Semester

L	T	P	C
3	0	0	3

FLUID MECHANICS

Course Objectives:

1. To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques 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 and channels
4. To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5. To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

Course Outcomes:

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

CO	STATEMENT	Blooms level
CO1	Understand the principles of fluid statics, kinematics and dynamics	L2
CO2	Apply the laws of fluid statics and concepts of buoyancy	L3
CO3	Understand the fundamentals of fluid kinematics and differentiate types of fluid flows	L2
CO4	Apply the Principle of conservation of energy for flow measurement.	L3
CO5	Analyse the losses in pipes and discharge through pipe network.	L4

Course Articulation Matrix:

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

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's 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



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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. Hydraulics and Fluid Mechanics, P. M. Modi and S. M. Seth, Standard Book House 22nd edition 2019.
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
3. Theory and Applications of Fluid Mechanics, K. Subrahmanya, Tata McGraw Hill, 2nd edition 2018 edition.

Reference Books:

1. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
2. Frank M. White, Henry Xue, Fluid Mechanics, 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. S K Som, Gautam Biswas, S Chakraborty ,Introduction to Fluid Mechanics & Fluid Machines, Tata McGraw Hill, 3rd edition 2011

Online Learning Resources:

<https://archive.nptel.ac.in/courses/112/105/112105269/>

<https://nptel.ac.in/courses/112104118>

<https://nptel.ac.in/courses/105103192>



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II Year I Semester

L	T	P	C
0	0	3	1.5

SURVEYING LAB

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 surveying activities
4. Know modern equipment such as total station
5. Draft field notes from survey data

Course Outcomes:

Upon the successful

Completion of this course, the students will able to:

1. Handle various linear and angular measuring instruments
2. Measure the linear and angular measurements
3. Calculate the area and volume by interpreting the data obtained from surveying activities
4. Handle modern equipment such as total station
5. Prepare field notes from survey data

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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 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



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II Year I Semester

L	T	P	C
0	0	3	1.5

STRENGTH OF MATERIALS LAB

Course objectives: By the end of this course student will be able to

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
6. To determine the load-deflection parameters for springs

Course Outcomes:

1. Conduct tensile strength test and draw stress-strain diagrams for ductile metals
2. Perform bending test and determine load-deflection curve of steel/wood
3. Able to conduct torsion test and determine torsion parameters
4. Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths
5. Able to conduct tests on closely coiled and open coiled springs and calculate deflections

Course Articulation Matrix:

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

LIST OF EXPERIMENTS:

1. Tension test on mild steel bar
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test on mild steel bar.
6. Hardness test- Rockwell, Brinell methods.
7. Compression test on Open coiled springs
8. Tension test on Closely coiled springs
9. Compression test on Wood/Brick
10. Izod / Charpy Impact test on metals
11. Shear test on metals
12. Continuous beam – deflection test.



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II Year I Semester

L	T	P	C
0	1	2	2

BUILDING PLANNING AND DRAWING

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 this course the students will be able to:

1. Plan various buildings as per the building by-laws.
2. Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.
3. Draw signs and bonds
4. Draw different building units
5. Learn the skills of drawing building elements and plan the buildings as per requirements.

Course Articulation Matrix:

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.



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Text Books:

1. Gurcharan Singh and Jagdish Singh, Planning, designing and Scheduling.
2. M. Chakraborti, Building planning and drawing.
3. M G Shah, C M Kale and S Y Patki, Building drawing, Tata McGraw Hill, New Delhi.

Reference Books:

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



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DEPARTMENT OF CIVIL ENGINEERING

II YEAR - II SEMESTER



L	T	P	C
2	0	0	2

II Year II Semester

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To know the various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

- Define the concepts related to Managerial Economics, financial accounting and management.
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Develop the accounting statements and evaluate the financial performance of business entity.

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- ISO-quants and ISO-costs, MRTS -Cobb-Douglas Production Function – Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis -Cost concepts and Cost behaviour- Break-Even Analysis (BEA) -Determination of Break- Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Analysis.

UNIT-III

Business Organizations and Markets: Introduction –Nature, meaning, significance, functions and advantages. 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



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UNIT-IV

Capital Budgeting: Introduction – Nature, meaning, significance, functions and advantages. 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 Method , Accounting Rate of Return(ARR) Net Present Value(NPV)Internal Rate Return(IRR) Method (sample problems)

UNIT-V

Financial Accounting and Analysis: Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions-Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).Financial Analysis-Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheswari: Managerial Economics, SultanChand, 2013.

Reference Books:

1. Managerial Economics: Principles And Worldwide Applications, 9E (Adaptation) by Dominick Salvatore and Siddhartha Rastogi
2. Managerial Economics: Principles and Worldwide Applications by Dominick Salvatore



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II Year II Semester

L	T	P	C
3	0	0	3

ENGINEERING GEOLOGY

Course Learning Objectives:

The objective of this course is:

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

1. Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.
2. Identify and understand the properties of Minerals and Rocks.
3. Understand the concepts of Groundwater and its geophysical methods.
4. Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard Zonation.
5. Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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

SYLLABUS:

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 belts, 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.N. ChennaKesavulu, Engineering Geology Laxmi Publications . 2nd Edn 2014.
2. Parbin Singh, Engineering & General Geology, Katson educational series 8th 2023



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REFERENCES:

1. Subinoy Gangopadhyay ,Engineering Geology,Oxford University press 1st edition, 2012.
2. D. Venkat Reddy, Engineering Geology ,Vikas Publishing, 2nd Edn , 2017,
3. Alan E, Geology for Engineers and Environmental Society, Kehew, 3rd edn., 2013) Pearson publications.
4. K.S.Valdiya, Environmental Geology (2013) 2nd ed., McGraw Hill Publications.

Web Materials:

1. <http://nptel.iitm.ac.in/video.php?subjectId=105105106>
2. <http://nptel.iitm.ac.in/video.php?courseId=1055&p=1>
4. <http://nptel.iitm.ac.in/video.php?courseId=1055&p=3>
5. <http://nptel.iitm.ac.in/video.php?courseId=1055&p=4>

II Year II Semester

L	T	P	C
3	0	0	3

CONCRETE TECHNOLOGY

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

- CO1 Familiarise the basic ingredients of concrete and their role in the production of concrete and its behavior in the field.
- CO2 Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method.
- CO3 Evaluate the ingredients of concrete through lab test results. Realize the importance of quality of concrete
- CO4 Understand the behavior of concrete in various environments.
- CO5 Familiarize the basic concepts of special concrete and their production and applications.

CO	STATEMENT	Blooms level
CO1	Familiarise the basic ingredients of concrete and their role in the production of concrete and its behavior in the field	L2
CO2	Test the fresh concrete properties and the hardened concrete properties. Understand the basic concepts of concrete. Design the concrete mix by BIS method.	L5
CO3	Evaluate the ingredients of concrete through lab test results. Realize the importance of quality of concrete	L5
CO4	Understand the behavior of concrete in various environments	L2
CO5	Familiarize the basic concepts of special concrete and their production and applications.	L2

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	2	2	-	-	-	-	-	2	-	-
CO2	3	2	-	-	-	2	2	-	-	-	-	-	2	-	-
CO3	2	3	-	3	-	2	2	-	-	-	-	-	2	-	-
CO4	3	2	-	-	-	2	2	-	-	-	-	-	2	-	-
CO5	2	-	3	-	-	2	2	-	-	-	-	-	2	-	-



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Detailed Syllabus:

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

References

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

II Year – II Semester

L	T	P	C
3	0	0	3

STRUCTURAL ANALYSIS

Course Learning Objectives

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

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

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

1. Apply energy theorems to analyze trusses
2. analyze indeterminate structures by using Castigliano's-II theorem
3. Analysis of fixed and continuous beams
4. Analyze continuous beams and portal frames by using slope-deflection method
5. Analyze continuous beams and portal frames by using Moment – distribution method

Course will enable the student to:

CO	STATEMENT	Blooms Level
CO 1	Apply energy theorems to analyze trusses	L3
CO 2	analyze indeterminate structures by using Castigliano's-II theorem	L4
CO 3	Analysis of fixed and continuous beams	L4
CO 4	Analyze continuous beams and portal frames by using slope-deflection method.	L4
CO 5	Analyze continuous beams and portal frames by using Moment – distribution method	L4

Course Articulation Matrix:

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

UNIT – I

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.

UNIT - II

Analysis Of Indeterminate Structures: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with up to two degrees of internal and external indeterminacies – Castigliano's –II theorem.

UNIT - III

Fixed 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.

Continuous Beams: Introduction, Application to continuous beams.



UNIT - IV

Slope-Deflection Method: Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports - Analysis of single storey -portal frames without sway.

UNIT - V

Moment Distribution Method: Introduction to moment distribution method- Application to continuous beams with and without settlement of supports-Analysis of single storey portal frames without sway, with sway.

Textbooks:

1. V.N.Vazirani & M.M.Ratwani, Analysis of Structures –Vol-I&II , Khanna Publications, New Delhi.
2. C.S.Reddy, Basic Structural Analysis, Tata McGraw Hill Publishers. 3rd edition 2017.

Reference Books:

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

II Year II Semester

L	T	P	C
3	0	0	3

HYDRAULICS AND HYRAULIC MACHINERY

Pre-requisite: Fluid Mechanics

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:

On Completion of the course, the students will be able to:

COs	STATEMENTS	Blooms level
CO1	Understand the characteristics of laminar and turbulent flows.	L2
CO2	Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels.	L3
CO3	Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows.	L3
CO4	Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine	L5
CO5	Understand the principles, losses and its efficiencies of centrifugal pumps	L2

Course Articulation Matrix:

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

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. Frank M. White, Henry Xue, Fluid Mechanics, 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. S K Som, Gautam Biswas, S Chakraborty ,Introduction to Fluid Mechanics & Fluid Machines , 3rd edition 2011

Online Learning Resources:

<https://nptel.ac.in/courses/105105203>
<https://archive.nptel.ac.in/courses/112/106/112106300/>
<https://archive.nptel.ac.in/courses/112/103/112103249/>



II Year II Semester

L	T	P	C
0	0	3	1.5

CONCRETE TECHNOLOGY LABORATORY

Course Learning Objectives

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

To test basic properties of ingredients of concrete fresh and hardened concrete properties

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

CO1 Outline importance of testing cement and its properties

CO2 Assess different properties of Aggregates

CO3 Assess fresh concrete properties and their relevance to hardened concrete

CO4 Assess hardened concrete properties

Course Articulation Matrix:

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

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
- Modulus of rupture, Modulus of elasticity and Poisson's Ratio
- Split tensile strength of concrete.
- Demonstration of Non-Destructive testing on concrete (Rebound Hammer)



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II Year II Semester

L	T	P	C
0	0	3	1.5

ENGINEERING GEOLOGY LABORATORY

Course Learning Objectives:

The objective of this course is:

- To identify the Megascopic types of Ore minerals & Rock forming minerals.
- To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection

Course Outcomes:

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

1. Identify Megascopic minerals & their properties.
2. Identify Megascopic rocks & their properties.
3. Identify the site parameters such as contour, slope & aspect for topography.
4. Know the occurrence of materials using the strike & dip problems.

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
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, Mica group & 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 Porphery, Basalt, etc.
 - b. Sedimentary rocks – Sand stone, Ferruginous 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.



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LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including Igneous, Sedimentary And Metamorphic 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. M T Mauthesha Reddy, Applied Engineering Geology Practicals, New Age International Publishers, 2nd Edition.
2. Tony Waltham, Foundations of Engineering Geology,, Spon Press, 3rd edition, 2009.



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II Year II Semester

L	T	P	C
0	1	2	2

REMOTE SENSING AND GIS

Course Learning Objectives:

The course is designed to

- Introduce the basic principles of Remote Sensing and GIS techniques and its application to Civil Engineering.
- Learn various types of sensors and platforms and understand the principles of spatial analysis techniques in GIS.
- Introduce GIS software to understand the process of digitization, creation of thematic map from toposheets and maps.

Course outcomes

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

1. Acquire knowledge about concepts of remote sensing, sensors and their characteristics.
2. Familiarize with data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS.
3. Digitize and create thematic map and extract important features to calculate geometry.
4. Perform surface analysis over Contour to develop digital elevation model.
5. Use GIS software to perform simple analysis in water resources and transportation engineering.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	1	1	-	-	2	-	-	-	-	2	1	-	1
CO2	2	-	1	1	-	-	2	-	-	-	-	2	1	-	1
CO3	1	2	2	1	2	2	3	-	2	2	1	3	1	-	2
CO4	1	2	2	1	2	2	3	-	2	2	1	3	2	-	2
CO5	1	2	2	1	2	2	3	-	2	2	1	3	2	-	2

1- Slightly; 2- Moderately; 3- Substantially

SYLLABUS:

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.



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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 path analysis.

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 :Geo-referencing 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-geo-morphological 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>



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II Year II Semester

L	T	P	C
1	0	2	2

DESIGN THINKING & INNOVATION

Course Objectives: The objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

Course Outcomes:

CO	STATEMENT	Blooms level
CO1	Define the concepts related to design thinking.	L1
CO2	Explain the fundamentals of Design Thinking and innovation.	L2
CO3	Apply the design thinking techniques for solving problems in various sectors.	L3
CO4	Analyse to work in a multidisciplinary environment.	L4
CO5	Evaluate the value of creativity.	L5

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

design

Activity: Every student presents their idea in three minutes, Every student can present

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

the

and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring impact and value of creativity.

Debate

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, 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.



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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.

Online Learning 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



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II Year II Semester

L	T	P	C
3	0	0	-

BUILDING MATERIALS AND CONSTRUCTION

Objectives of the course:

- Initiating the student with the knowledge of basic building materials and their properties.
- Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
- The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
- Imparting the students with the techniques of formwork and scaffolding.
- The students should be exposed to classification of aggregates, moisture content of the aggregate.

Course outcome:

Upon the successful completion of the course:

- The student should be able to identify different building materials and their importance in building construction.
- The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
- The student should have learnt the importance of building components and finishings.
- The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.

CO	STATEMENT	Blooms level
CO 1	The student should be able to identify different building materials and their importance in building construction	L2
CO 2	The student is expected to differentiate brick masonry, stone masonry construction	L2
CO 3	The student is expected use of lime and cement in various constructions	L3
CO 4	The student should have learnt the importance of building components and finishings.	L2
CO 5	The student is expected to know the classification of aggregates, sieve analysis and moisture content usually required in building construction.	L3

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	-	-	-	2	-	3	-	-	-	-	-	2	-	-
CO3	-	-	2	-	-	3	-	-	-	-	-	-	-	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	-	3	2	-	-	-	-	-	-	-	3	-	-



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UNIT.I : STONES, BRICKS AND TILES

Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile – manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials – their quality.

UNIT. II 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. III: 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. IV: 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.V : 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.

AGGEGATES

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 Aggregate- Bulking of sand – Sieve analysis.

TEXT BOOKS:

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

References:

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



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II Year II Semester

L	T	P	C
2	0	0	--

ENVIRONMENTAL SCIENCE

Course Objectives:

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
- To save earth from the inventions by the engineers.

Course Outcomes:

CO	STATEMENT	Blooms level
CO1	Grasp multi disciplinary nature of environmental studies and various renewable and non-renewable resources.	L2
CO2	Understand flow and bio-geo- chemical cycles and ecological pyramids.	L2
CO3	Understand various causes of pollution and solid waste management and related preventive measures.	L2
CO4	Understand the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.	L2
CO5	Illustrate the causes of population explosion, value education and welfare programmes.	L3

UNIT – I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- a. Forest ecosystem.
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)



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Biodiversity and Its Conservation : Introduction and Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

Environmental Pollution: Definition, Cause, effects and control measures of:

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

Social Issues And The Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

Textbooks:

1. Erach Bharucha, Text book of Environmental Studies for Undergraduate Courses, Universities Press (India) Private Limited, 2019.
2. Palaniswamy, Environmental Studies, 2/e, Pearson education, 2014.
3. S.Azeem Unnisa, Environmental Studies, Academic Publishing Company, 2021.
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, SciTech Publications (India), Pvt. Ltd, 2010.



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Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, Textbook of Environmental Science, 2/e, Cengage Publications, 2012.
2. M.Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS Publication, 2014.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, 2006.
4. J. Glynn Henry and Gary W. Heinke, Environmental Sciences and Engineering, Prentice Hall of India Private limited, 1988.
5. G.R. Chatwal, A Text Book of Environmental Studies, Himalaya Publishing House, 2018.
6. Gilbert M. Masters and Wendell P. Ela, Introduction to Environmental Engineering and Science, 1/e, Prentice Hall of India Private limited, 1991.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc23_hs155/preview
- https://www.edx.org/learn/environmental-science/rice-university-ap-r-environmental-science-part-3-pollution-and-resources?index=product&objectID=course-3a6da9f2-d84c-4773-8388-1b2f8f6a75f2&webview=false&campaign=AP%C2%AE+Environmental+Science++Part+3%3A+Pollution+and+Resources&source=edX&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Flearn%2Fenvironmental-science
- <http://ecoursesonline.iasri.res.in/Courses/Environmental%20Science-I/Data%20Files/pdf/lec07.pdf>
- <https://www.youtube.com/watch?v=5QxxaVfgQ3k>



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DEPARTMENT OF CIVIL ENGINEERING

III YEAR - I SEMESTER



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III Year I Semester

L	T	P	C
3	0	0	3

DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Familiarize Students with different types of design philosophies.
2. Equip student with concepts of design of flexural members.
3. Understand Concepts of shear, bond and torsion.
4. Familiarize students with different types of compressions members and Design.
5. Understand different types of footings and their design.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Work on different types of design philosophies	L2
CO2	Carryout analysis and design of flexural members and detailing	L6
CO3	Design structures subjected to shear, bond and torsion.	L6
CO4	Design different type of compression members and footings	L6
CO5	Design and detail different types of slabs.	L6

CO-PO Mapping:

Co/Po	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3	3	-	-	3	2	3	-	2	-	-
CO2	3	3	3	3	3	3	-	-	3	2	3	-	2	-	-
CO3	3	3	3	3	3	3	-	-	3	2	3	-	2	-	-
CO4	3	3	3	3	3	3	-	-	3	2	3	-	2	-	-
CO5	3	3	3	3	3	3	-	-	3	2	3	-	2	-	-

UNIT –I

Introduction: Working stress method Design codes and handbooks, loading standards – Dead, live, wind and earthquake loads, elastic theory, design constants, modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly and doubly reinforced beams.

Limit State Design: Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance.



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UNIT-II

Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T)- Effective width of flange –Behavior- Analysis and Design.

UNIT-III

Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion for L Beam – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

Limit state design for serviceability: Deflection, cracking and code provision

UNIT-IV

Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending – Braced and un-braced columns – I S Code provisions.

Footings: Different types of footings – Design of isolated footings, Square footings – Rectangular footings – circular footing – spread & sloped footings - subjected to axial loads.

UNIT-V

Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS Coefficients (conventional), design of waist-slab staircase.

NOTE: All the designs to be taught in Limit State Method. Drawing classes must be conducted every week and the Following plates should be prepared by the students.

- Reinforcement detailing of T-beams, L-beams and continuous beams and cantilevers.
- Reinforcement detailing of columns and isolated footings.
- Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:

1. A.K. Jain, 'Limit State Design'
2. S.Unni krishna Pillai & Dev das Menon, 'Reinforced Concrete Structures', Tata Mc.Graw Hill, New Delhi.

REFERENCES:

1. N. Krishna Raju, 'Design of concrete structures'
2. Park and Pauley, John Wiley and Sons, 'Reinforced Concrete Structures'



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IS Codes:

- 1) IS - 456-2000 -PLAIN AND REINFORCED CONCRETE - CODE OF PRACTICE
(Permitted to use in examination hall)**
- 2) IS – 875 - CODE OF PRACTICE FOR DESIGN LOADS (OTHER THAN
EARTHQUAKE) FOR BUILDINGS AND STRUCTURES**
- 3) SP-16 - DESIGN AIDS FOR REINFORCED CONCRETE TO IS 456:1978**



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III Year-I Semester

L	T	P	C
3	0	0	3

ENGINEERING HYDROLOGY

Course Learning Objectives:

The objective of this course is to:

1. Understand hydrologic cycle and its relevance to Civil engineering.
2. Learn physical processes and their interactions in hydrology.
3. Learn measurement and estimation of the components of hydrologic cycle.
4. Have an overview and understanding of Hydrographs.
5. Learn flood frequency analysis, design flood and flood routing methods.
6. Study the concepts of groundwater movement and well hydraulics.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology	L3
CO2	Develop Unit hydrograph, Intensity-Duration-Frequency to design hydraulic structures	L3
CO3	Be able to develop design storms and carry out frequency analysis	L4
CO4	Be able to estimate flood magnitude and carry out flood routing	L3
CO5	Be able to determine aquifer parameters and yield of wells	L3

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	2	3	-	-	-	-	2	3	2	-
CO2	3	3	3	3	3	-	2	-	-	-	-	2	3	3	-
CO3	3	3	2	3	2	-	3	-	-	-	-	2	3	2	-
CO4	3	3	3	3	3	2	3	-	-	-	-	2	3	3	-
CO5	3	2	2	3	2	-	2	-	-	-	-	3	3	3	-

UNIT - I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation: Types and forms, measurement, introduction to radar measurement of rain fall, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm



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UNIT-II

Abstractions: Initial abstractions, **Evaporation:** factors affecting, measurement, estimation, reduction, **Evapotranspiration:** factors affecting, measurement, estimation, control, **Infiltration:** factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT-III

Runoff: Factors affecting runoff, components, empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, dimensionless unit hydrograph, synthetic unit hydrograph, introduction to IUH.

UNIT-IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.

Flood Routing: Hydrologic routing, channel and reservoir routing-Muskingum and Puls methods of routing.

UNIT-V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of an open well-recuperation test.

TEXT BOOKS:

1. **Subramanya.K** 'Engineering Hydrology', Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. **Jayarami Reddy** 'Engineering Hydrology', P.Laxmi Publications Pvt. Ltd., (2013), New Delhi
3. **Chow V.T., D.R Maidment and L.W. Mays** 'Applied hydrology', Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
4. **Ojha C.S.P, R. Berndtsson and P. Bhunya** 'Engineering Hydrology', Oxford University Press, (2010).

REFERENCES:

1. **Mays L.W**, 'Water Resources Engineering', Wiley India Pvt. Ltd, (2013).
2. **Raghunath. H.M**, 'Hydrology', New Age International Publishers, (2010)



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3. **Ponce V.M**, 'Engineering Hydrology – Principles and Practice', Prentice Hall International, (1994)
4. **Patra K.C**, 'Hydrology and Water Resources Engineering', Narosa Publications, (2011).



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III Year I Semester

L	T	P	C
3	0	0	3

GEOTECHNICAL ENGINEERING– I

Course Learning Objectives:

The objective of this course is:

1. To enable the student to determine the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the discharge of water through soils.
3. To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils, determine the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Understand soil formation, its index properties and classification.	L2
CO2	Understand soil moisture and flow of water through soils and its effects.	L2
CO3	Understand stress distribution in soils.	L2
CO4	Understand Compressibility characteristics under partially saturated and fully saturated conditions.	L2
CO5	Understand shear strength of soil at different loading & drainage conditions for different soils	L2

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	2	2	1	1	-	-	-	-	-	-	-	-
CO3	3	3	2	2	2	1	1	-	-	-	-	-	-	-	-
CO4	3	2	2	2	2	1	1	-	-	-	-	-	-	-	-
CO5	3	3	2	2	2	1	1	-	-	-	-	-	-	-	-

UNIT – I

Introduction: Soil formation – Structure of Soils – Texture of Soils – Three phase system and phase relationships.

Index Properties and Classification Tests of Soils: Index properties – Density Index - Grain size analysis – Sieve and Hydrometer methods – Consistency of Clay Soils – Activity of Clays – Thixotropy of clays - soil Classification – Unified soil classification and I.S. Soil classification.



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UNIT – II

Soil moisture and Capillarity: Soil moisture and modes of occurrence – Total, Neutral and Effective Pressures – Capillary Rise in soils.

Permeability: Flow of water through soils – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems.

UNIT –III

Seepage and Flow Nets: Flow net for one-dimensional flow – two-dimensional flow – Basic equation for Seepage – Flow nets & Characteristics and Uses – Quicksand condition –Seepage forces

Stress Distribution in Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– New mark's influence chart – 2:1 stress distribution method. - Pressure Blubs.

UNIT – IV

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT – V

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – total and effective shear strength parameters– Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions – stress paths.

TEXT BOOKS:

1. **Dr. K.R. Arora**, 'Soil Mechanics and Foundation Engineering, Standard Publishers and Distributors, New Delhi.
2. **GopalRanjan and A.S.R.Rao**, 'Basic and Applied Soil Mechanics', New Age International Publishers.
3. **V.N.S.Murthy**, 'Soil Mechanics and Foundation Engineering', CBS publishers
4. **C. Venkataramaiah**, 'Geotechnical Engineering', New Age International Publishers

REFERENCES:

1. **D.W.Taylor.**, Wiley, 'Fundamentals of Soil Mechanics'
2. **Holtz and Kovacs**, 'An introduction to Geotechnical Engineering', Prentice Hall
3. **BrajaM.Das**, 'Principles of Geotechnical Engineering', Cengage Learning.



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III Year I Semester

L	T	P	C
3	0	0	3

ADVANCED STRUCTURAL ANALYSIS

Course Learning Objectives:

The objective of this course is to:

1. Introduce the behavior and analysis of arches (three-hinged and two-hinged) under various loading and support conditions.
2. Equip students with approximate methods for analyzing multi-storey building frames subjected to lateral and gravity loads.
3. Familiarize students with the principles of cable structures and suspension bridges, including their structural behavior and analysis.
4. Enable students to perform structural analysis using Kani's method for indeterminate beams and portal frames.
5. Introduce matrix methods (flexibility and stiffness) for the analysis of indeterminate structures including support settlements.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Analyze three-hinged and two-hinged arches under various load conditions, including the effects of temperature and support elevation differences.	L4
CO2	Apply approximate methods such as portal, cantilever, and substitute frame methods for analysing multi-storey frames under lateral and gravity loads.	L3
CO3	Understand and analyze cable structures and suspension bridges, including stiffening girders under different loading systems.	L2 & L4
CO4	Perform structural analysis using Kani's method for continuous beams and portal frames, considering support settlements and side sway.	L4
CO5	Apply flexibility and stiffness matrix methods for the analysis of continuous beams and indeterminate structures up to three degrees of freedom.	L3

CO-PO Mapping:

Co/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	3	-	2	-	-	-	-	2	3	2	-
CO2	3	3	3	3	3	-	2	-	-	-	-	2	3	3	-
CO3	3	3	2	3	2	-	2	-	-	-	-	2	3	3	-
CO4	3	3	3	3	3	-	2	-	-	-	-	2	3	3	-
CO5	3	3	3	3	3	-	2	-	-	-	-	2	3	3	-

UNIT-I

Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Hinges with supports at different levels.



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Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, Tied arches – Fixed arches – (No analytical question)

UNIT-II

Approximate Methods of Analyses: Application to building frames. (i) Portal Method (ii) Cantilever Method (iii) Substitute frame method for approximate analysis of multi-storey frames subjected to gravity loads and lateral loads. Shear force and bending moment diagrams - Elastic curve.

UNIT-III

Cable Structures and Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

UNIT-IV

Kani's Method: Analysis of continuous beams –including settlement of supports and single bay portal frames with and without side sway. Shear force and bending moment diagrams - Elastic curve.

UNIT-V

Introduction to Flexibility and Stiffness matrix methods: Analyses of using 'system approach' up to three degree of indeterminacy– Analysis of continuous beams including settlement of supports using flexibility and stiffness methods

TEXTBOOKS:

1. **R.C. Hibbeler**, 'Pearson, by Structural Analysis', New Delhi.
2. **V. N. Vazirani and M. M. Ratwani**, 'Analysis of Structures- Vol. I and II ', S.Unnikrishna Pillai & Devdas Menon, Khanna Publishers, New Delhi.

REFERENCES:

1. **H.J.Shah and S.B.Junnarkar**, 'Mechanics of Structures Vol – II ', Charotar Publishing House Pvt.Ltd
2. **Devdas Menon**, 'Structural Analysis', Narosa Publishing Housing Pvt. Ltd.
3. **G.S.Pandit and S.P. Gupta**, 'Structural Analysis: A Matrix Approach', McGraw Hill Pvt. Ltd.



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III Year – I Semester

L	T	P	C
3	0	0	3

ARCHITECTURE AND TOWN PLANNING

Course Learning Objectives:

The objectives of this course are:

1. Initiating the students to different architectures of the world. The distinctions between the eastern and western architecture styles are focused.
2. The salient features of Egyptian, Greek, Roman, and Indian Vedic, Indus valley civilization, Buddhist, Hindu and Indo-Sarsanic Architecture are introduced.
3. Architectural design concepts, principles of planning and composition are imparted.
4. Enabling the student to understand town planning from ancient times to modern times.
5. To impart the concepts of town planning standards, landscaping and expansion of towns.

Course Outcomes:

Upon the successful completion of this course, the student should be able to:

CO	CO STATEMENT	TAXONOMY
CO1	Distinguish architectural styles of eastern and western world.	L4
CO2	Understand the importance of Orders of architecture	L2
CO3	Compose spaces of buildings using design concepts, planning principles	L6
CO4	Understand the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities	L2
CO5	Understand the importance of modern and standards town planning	L2

CO-PO Mapping:

Co/Po	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	1	1	2	1	1	1	1	1	1	2	1	1
CO2	3	1	1	1	1	2	1	1	1	1	1	1	2	1	1
CO3	2	2	3	2	3	2	2	1	2	2	1	2	3	2	1
CO4	2	2	2	2	3	2	3	2	2	2	1	2	3	2	1
CO5	2	2	2	2	2	3	3	2	2	2	1	2	3	2	1



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UNIT-I

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures- Orders.
Indian Architecture: Vedic age, Indus valley civilization.

Temples of Religions: Buddhist period: Stambas, Stupas, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhubaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.

UNIT-II

Principles of Planning: Principles of planning a residence-site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors.

Post-classic Architecture: Introduction of post-classic architecture-contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wright, Walter Groping.

UNIT-III

Historical Back Ground of Town Planning: Town planning in India –Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjo- Daro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT-IV

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning- Neighborhood Planning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation-planning regulations and limitations.

UNIT-V

Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns-garden cities, satellite towns-floating towns-skyscrapers-pyramidal cities.

TEXT BOOKS:

1. **G.K.Hiraskar**, 'The great ages of World Architecture'
2. **Y.S.Sane**, 'Planning and Design of Buildings by Section of Architecture'
3. **G.K. Krishnamurthy, S.V.Ravindra** 'Professional Practice', PHI Learning, New Delhi.
4. **Percy Brown**, 'Indian Architecture-Vol. I & II', Taraporevala Publications, Bombay.
5. **G.K.Haraskar**, 'Fundamentals of Town Planning'



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REFERENCES:

1. **Hepler, Cengage Learning**, 'Drafting and Design for Architecture'
2. **John Patten Guthrie**, 'Architect's Portable Hand book' –McGraw Hill International Publications.
3. **R.S.Deshpande**, 'Modern Ideal Homes for India'
4. **A.J.Brown and H.M.Sherrard**, 'Town and County Planning'
5. **Federik Glibbard**, 'Town Design', Architectural press, London.



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III Year I Semester

L	T	P	C
3	0	0	3

CONSTRUCTION TECHNOLOGY & MANAGEMENT

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student, the concept of project management including network drawing and monitoring
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery
3. To introduce the importance of safety in construction projects

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Explain the importance of construction planning, networking and monitoring in construction projects.	L2
CO2	Analyze the cost of a construction project and Identify the optimum and crash cost of the project	L4
CO3	Describe the functioning of various earth-moving equipment.	L2
CO4	Explain the methods of production of aggregate products, mixing and placing of concrete.	L2
CO5	Apply the gained knowledge to project management and construction techniques.	L3

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	-	2	2	-	-	-	-	-	-	-	-
CO2	3	2	2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	3	-	-	-	2	2	3	2	-	-	-
CO4	3	3	3	2	3	-	-	-	2	2	3	2	-	-	-
CO5	3	2	2	-	2	2	3	3		2	2	2	-	-	-

UNIT-I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method



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UNIT-II

Project evaluation and review technique—cost analysis updating crashing for optimum cost—crashing for optimum resources—allocation of resources introduction to software's for construction management, project management using PRIMAVERA (or) equivalent.

UNIT-III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

Hoisting and earth work equipment—hoists—cranes—tractors—bulldozers—graders—scrapers—draglines—clam shell buckets

UNIT-IV

Concreting equipment— concrete mixers— Batching plants, mobile using plants like “Ajax”etc. mixing and placing of concrete – consolidating and finishing.

UNIT-V

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering. BIM for Civil Engineers (Building Information Modelling)

TEXT BOOKS:

1. **Peurifoy, Schexnayder and Shapira**, 'Construction Planning, Equipment and Methods' Tata McGraw hill.
2. **Kumar NeerajJha** 'Construction Project Management Theory and Practice', Pearson, 2011.
3. **SubirK.Sarkar and SubhajitSarasvati** 'Construction Technology', Oxford University press

REFERENCES:

1. **Peter Fewings**, 'Construction Project Management-An Integrated Approach', Taylor and Francis Group,
2. **Trefor Williams** 'Construction Management Emerging Trends and Technologies', Cengage learning



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III Year I Semester

L	T	P	C
3	0	0	3

ENTREPRENEURSHIP

Course Learning Objectives:

The objective of this course is to enable the students to:

- 1.To develop and strengthen entrepreneurial quality and motivation in students.
- 2.To impart basic entrepreneurial skills and understandings to run a business efficiently and effectively

Course Outcomes:

Upon the successful completion of this course:

CO	CO STATEMENT	TAXONOMY
CO1	Study the concept of entrepreneurship, knowledge and skills of entrepreneur.	L2
CO2	Get the awareness on business environment	L1 & L2
CO3	Get the awareness on industrial policies	L1 & L2
CO4	Gain the competency on preparing business plan	L3 & L6
CO5	Study the impact of launching small business and understand resource planning for start up	L2

CO-PO Mapping:

Co/Po	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	2	-	2	-	2	2	2	-	-	-
CO2	2	-	-	-	-	3	2	-	-	-	2	-	-	-	-
CO3	1	-	-	-	-	3	2	2	-	-	2	-	-	-	-
CO4	3	-	3	-	-	2	-	-	-	2	2	2	-	-	-
CO5	2	-	3	-	-	3	2	-	-	-	2	2	-	-	-

UNIT-I

ENTREPRENEURIAL COMPETENCE :Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.

UNIT-II

ENTREPRENEURIAL ENVIRONMENT

Business Environment – Role of Family and Society – Entrepreneurship Development Training and Other Support Organisational Services.

UNIT-III:

INDUSTRIAL POLICIES: Central and State Government Industrial Policies and Regulations - International Business.



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UNIT-IV :

BUSINESS PLAN PREPARATION: Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

UNIT- V:

LAUNCHING OF SMALL BUSINESS: Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Venture capital, IT start ups. Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units- Effective Management of small Business.

TEXT BOOKS

1. **Hisrich**, 'Entrepreneurship', Tata McGraw Hill, New Delhi, 2001.
2. **S.S.Khanka**, 'Entrepreneurial Development', S. Chand and Company Limited, New Delhi, 2001.

REFERENCES

1. **Mathew Manimala**, 'Entrepreneurship Theory at the Crossroads', Paradigms & Praxis, Biztrantra, 2nd Edition, 2005
2. **Prasanna Chandra**, 'Projects – Planning, Analysis, Selection, Implementation and Reviews', Tata McGraw-Hill, 1996.
3. **P.Saravanavel**, 'Entrepreneurial Development, Ess Pee kay Publishing House', Chennai - 1997.
4. **Arya Kumar**, Entrepreneurship. Pearson. 2012
5. **Donald F Kuratko, T.V Rao**, 'Entrepreneurship: A South Asian perspective. Cengage Learning. 2012



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III Year I Semester

L	T	P	C
3	0	0	3

GREEN BUILDINGS

Course Learning Objectives:

The objective of this course is:

1. Understand the Fundamentals of Green Building Concepts
2. Familiarize with Green Building Standards and Rating Systems
3. Learn Energy-Efficient Building Design Techniques
4. Understand Eco-friendly HVAC and Lighting Design
5. Explore Sustainable Material Use and Indoor Environmental Quality

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Explain the basic concepts, definitions, and significance of green buildings, including sustainable features and materials.	L2
CO2	Illustrate the practices, strategies, and rating systems adopted by the Indian Green Building Council (IGBC) and other rating agencies to promote sustainable development in residential and commercial buildings.	L2
CO3	Analyze energy conservation techniques and identify energy-saving approaches in green building design including the use of renewable energy and on-site sources.	L4
CO4	Evaluate HVAC system components, lighting systems, and eco-friendly power solutions used in green buildings to enhance energy efficiency and indoor comfort.	L5
CO5	Apply principles of material conservation and indoor air quality (IAQ) to enhance occupational health and sustainability in green construction practices.	L3

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	2	-	-	1	-	1	-	-	-
CO2	3	2	-	-	2	2	3	-	-	1	-	2	-	-	-
CO3	3	3	2	-	2	2	3	-	-	-	-	2	-	-	-
CO4	2	2	3	2	2	-	3	-	-	-	-	2	-	-	-
CO5	3	3	2	2	1	2	3	-	2	2	2	2	-	-	-

UNIT – I:

Introduction: What is Green Building, Why to go for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building, Important Sustainable features for Green Building



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UNIT – II:

Green Building Concepts And Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

UNIT-III:

Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Eco friendly captive power generation for factory, Building requirement,

UNIT- IV:

Air Conditioning Introduction, CII Godrej Green business Centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection, pump selection, Selection of cooling towers, Selection of air handling units, Pre cooling of fresh air, Interior lighting system, Key feature of the building. Eco-friendly captive power generation for factory, Building requirement.

UNIT –V:

Material Conservation Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indoor air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

TEXT BOOKS:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Tomwoolley and Samkimings, 'Green Building Hand Book', 2009.

REFERENCES:

1. Trish riley, 'Complete Guide to Green Buildings'
2. Kent Peterson, 'Standard for the design for High Performance Green Buildings', 2009



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III Year I Semester

L	T	P	C
3	0	0	3

CONSTRUCTION TECHNOLOGY & MANAGEMENT

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student, the concept of project management including network drawing and monitoring
2. To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery
3. To introduce the importance of safety in construction projects

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Explain the importance of construction planning, networking and monitoring in construction projects.	L2
CO2	Analyze the cost of a construction project and Identify the optimum and crash cost of the project	L4
CO3	Describe the functioning of various earth-moving equipment.	L2
CO4	Explain the methods of production of aggregate products, mixing and placing of concrete.	L2
CO5	Apply the gained knowledge to project management and construction techniques.	L3

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	2	-	-	2	2	-	-	-	-	-	-	-	-
CO2	3	2	2	2	3	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	3	-	-	-	2	2	3	2	-	-	-
CO4	3	3	3	2	3	-	-	-	2	2	3	2	-	-	-
CO5	3	2	2	-	2	2	3	3	-	2	2	2	-	-	-

UNIT-I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling – monitoring – bar charts – milestone charts – critical path method



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UNIT-II

Project evaluation and review technique—cost analysis updating crashing for optimum cost—crashing for optimum resources—allocation of resources introduction to software's for construction management, project management using PRIMAVERA (or) equivalent.

UNIT-III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

Hoisting and earth work equipment—hoists—cranes—tractors—bulldozers—graders—scrapers—draglines—clam shell buckets

UNIT-IV

Concreting equipment— concrete mixers— Batching plants, mobile using plants like “Ajax” etc. mixing and placing of concrete – consolidating and finishing.

UNIT-V

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering. BIM for Civil Engineers (Building Information Modelling)

TEXT BOOKS:

1. **Peurifoy, Schexnayder and Shapira**, 'Construction Planning, Equipment and Methods' Tata McGraw hill.
2. **Kumar Neeraj Jha** 'Construction Project Management Theory and Practice', Pearson, 2011.
3. **Subir K. Sarkar and Subhajit Sarasvati** 'Construction Technology', Oxford University press

REFERENCES:

1. **Peter Fewings**, 'Construction Project Management-An Integrated Approach', Taylor and Francis Group.
2. **Trefor Williams** 'Construction Management Emerging Trends and Technologies', Cengage learning



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III Year-I Semester

L	T	P	C
3	0	0	3

CLIMATE CHANGE IMPACT ON ECO SYSTEM

Course Learning Objectives:

The objective of this course is to:

1. Understand the components of the climate system, the structure of the atmosphere, and temperature dynamics.
2. Comprehend the hydrologic cycle, global and local water balance, and the processes that govern water movement.
3. Analyze climate variables such as precipitation, humidity, monsoon, and wind circulation.
4. Evaluate the occurrence and impact of climate variability including extreme events like floods and droughts.
5. Understand the science behind climate change, its causes, and modeling techniques using global and regional models.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Differentiate between weather, climate, and climate change, and explain atmospheric structure and temperature dynamics	L2
CO2	Analyze the global water cycle, construct water balance models, and interpret hydrological processes.	L4
CO3	Identify and explain the variables affecting precipitation, wind patterns, and atmospheric stability.	L2
CO4	Assess the occurrence, indicators, and impacts of climate variability and extremes such as floods, droughts, and heat waves.	L5
CO5	Interpret climate change models, scenarios (IPCC), and downscaling techniques to analyze future climate conditions	L4

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	1	3	-	1	-	1	3	-	-	-
CO2	3	2	1	2	1	1	2	-	-	1	1	2	-	1	-
CO3	3	2	2	2	2	2	3	-	-	2	2	2	-	1	-
CO4	3	2	1	2	1	2	2	-	-	1	1	1	-	-	-
CO5	3	3	2	3	3	2	3	2	2	3	3	2	-	-	-



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UNIT I:

Climate System; Climate, weather and Climate Change; Overview of Earth's Atmosphere; Vertical Structure of Atmosphere; Radiation and Temperature; Laws of Radiation; Heat-Balance of Earth Atmosphere System; Random Temperature Variation; Modelling Vertical Variation in Air Temperature; Temporal Variation of Air temperature; Temperature Change in Soil; Thermal Time and Temperature Extremes.

UNIT II:

Hydrologic Cycle: Introduction; Global water balance; Cycling of water on land, a simple water balance model;

UNIT III:

Climate Variables affecting Precipitation: Precipitation and Weather, Humidity, Vapor Pressure, Forms of Precipitation, Types of Precipitation; Cloud; Atmospheric Stability; Monsoon; Wind Pattern in India; Global Wind Circulation; Evaporation and Transpiration, Processes of Vadose Zone, Surface Runoff, Streamflow

UNIT IV:

Climate Variability: Floods, Droughts, Drought Indicators, Heat waves, Climate Extremes.

UNIT V:

Climate Change: Introduction; Causes of Climate Change; Modeling of Climate Change, Global Climate Models, General Circulation Models, Downscaling; IPCC Scenarios

TEXT BOOKS:

1. **Subramanya.K** 'Engineering Hydrology', Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. **Jayarami Reddy** 'Engineering Hydrology', P.Laxmi -Publications Pvt. Ltd., (2013), New Delhi

REFERENCES:

1. **Thomas E. Lovejoy & Lee Hannah** , "Climate Change and Biodiversity"-Publisher: Yale University Press
2. **Andrew Dessler** , "Introduction to Modern Climate Change"-Publisher: Cambridge University Press



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III Year I Semester

L	T	P	C
0	0	3	1.5

GEOTECHNICAL ENGINEERING LAB

Learning Objectives:

The objective of this course is

1. To determine the index properties for soil classification– Grain size distribution & Atterberg's limits.
2. To determine the engineering properties–Permeability, Compaction, consolidation, shear strength parameters & CBR value.
3. To find the degree of swelling by DFS test.
4. To impart knowledge of determination of index properties required for classification of soils.
5. To teach how to determine compaction characteristics and consolidation behaviour from relevant lab tests; to determine permeability of soils.
6. To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Determine index properties of soil and classify them.	L3
CO2	Determine permeability of soils.	L3
CO3	Determine Compaction, Consolidation and shear strength characteristics.	L3

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	1	-	-	-	-	-	-	-	-	-
CO2	3	3	1	2	1	1	-	-	-	-	-	-	-	-	-
CO3	3	3	2	2	2	2	-	-	-	-	-	-	-	-	-

LIST OF EXPERIMENTS:

1. Specific gravity, G and Grain size analysis by sieving
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Permeability of soil-Constant and Variable head tests
5. Compaction test
6. Direct Shear test
7. Triaxial Compression test



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8. Unconfined Compression test
9. Vane Shear test
10. Differential freeswell (DFS)
11. Field Plate Load Test demo
12. Demonstration on Field California Bearing Ratio (CBR) Test
13. Consolidation test (to be demonstrated)

SVIET



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III Year – I Semester

L	T	P	C
0	0	3	1.5

FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Learning Objectives:

The objective of this course is

1. Demonstrate fundamental hydraulic principles such as Bernoulli's theorem and flow measurement techniques.
2. Develop practical skills in calibrating flow measuring devices like venturi meters, orifice meters, and notches.
3. Analyze energy losses in pipe lines due to friction, bends, expansions, and contractions.
4. Enable students to evaluate coefficients of discharge and flow through small openings and mouthpieces.
5. Understand the working principles of Pelton and Francis turbines. Explain the working mechanism of centrifugal and reciprocating pumps

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Verify Bernoulli's theorem and calibrate hydraulic measuring devices like Venturi and orifice meters	L3
CO2	Determine discharge coefficients for orifices, mouth pieces, and notches under various flow conditions	L3
CO3	Analyze energy losses in pipes due to friction, bends, expansions, and contractions using standard experimental setups	L4
CO4	Analyze the force exerted by a jet on different types of vanes, Conduct a performance test on a Pelton wheel, Francis turbine and determine its efficiency.	L4
CO5	Carry out an efficiency test on a centrifugal pump and reciprocating pump and assess its performance.	L5

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	-	2	2	1	-	-	1	1	2	1	-
CO2	3	3	2	1	-	2	2	1	-	-	1	1	2	1	-
CO3	3	3	3	2	1	3	3	2	-	-	2	2	3	2	-
CO4	3	3	2	2	1	3	3	2	-	-	2	2	3	2	-
CO5	3	3	2	2	1	3	3	2	-	-	2	2	3	2	-



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List of Experiments:

1. Verification of Bernoulli's equation.
2. Calibration of Venturi meter.
3. Calibration of orifice meter.
4. Determination of coefficient of discharge of a small orifice by constant head method
5. Determination of coefficient of discharge of an external cylindrical mouth piece by variable head method.
6. Calibration of a contracted rectangular notch.
7. Calibration of a triangular notch.
8. Determination of friction factor of the pipe material.
9. Determination of coefficient of loss of head due to a sudden expansion/ contraction in a pipeline.
10. Determination of coefficient of head loss due to a bend in pipe line.
11. Impact of jet on vanes
12. Performance test on Pelton wheel turbine or Francis turbine
13. Efficiency test on centrifugal pump or reciprocating pump.



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III Year I Semester

L	T	P	C
0	1	2	2

ESTIMATION, SPECIFICATION AND CONTRACTS

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

Course Outcomes:

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

CO	Course Outcome	Bloom's Level
CO1	Understand various types of contracts, conditions, valuation methods, and digital procurement tools.	L2
CO2	Apply standard units and estimation methods to compute quantities for different components of buildings.	L3
CO3	Analyze cost components using rate analysis, and prepare bar bending schedules for earthworks and structures.	L4
CO4	Prepare detailed estimates using the individual wall method for various types of buildings.	L3
CO5	Evaluate building estimates using the centre line method and estimation software tools.	L5

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	1	-	-	-	-	-	2	-	2	1	-
CO2	3	3	2	-	1	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	2	-	-	-	-	-	2	-	3	1	-
CO4	3	2	3	-	1	-	-	-	-	-	1	-	3	1	-
CO5	3	2	3	-	3	-	-	-	-	-	3	-	3	3	-

UNIT-I

Contracts–Types of contracts–Contract Documents–Conditions of contract, Valuation of buildings- concepts of e-procurement and reverse auctions. Standard specifications for different items of building construction.

UNIT-II

General items of work in Building–Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.



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UNIT-III

Rate Analysis– Working out data for various items of work over head and contingent charges.
Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

UNIT-IV

Detailed Estimation of Buildings using individual wall method for single, double and four roomed buildings.

UNIT-V

Detailed Estimation of Buildings using centre line method for single, double and four roomed buildings. Standard software's like building estimator etc.

TEXT BOOKS:

1. **B.N. Dutta**, 'Estimating and Costing', UBS publishers, 2000.
2. **B.S.Patil**, 'Civil Engineering Contracts and Estimates', Universities Press (India) Pvt. Ltd., Hyd.
3. **Rajiv Gupta**, 'Construction Planning and Technology', CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. **G.S. Birdie**, 'Estimating and Costing'

REFERENCES:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS 1200 (Parts I to XXV-1974 / Method of Measurement of Building & Civil Engg Works-B.I.S.)
3. **M.Chakraborti**, 'Estimation, Costing and Specifications', Laxmi publications
4. National Building Code



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III Year I Semester

L	T	P	C
0	0	2	1

TINKERING LAB

The aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course Objectives:

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

CO No.	Course Outcome	Taxonomy
CO1	Apply creativity and innovation to design functional electronic/mechanical models.	L3
CO2	Demonstrate hands-on proficiency in using prototyping tools and embedded platforms.	L3
CO3	Collaborate in teams to build and test prototypes solving real-world problems.	L4
CO4	Develop interdisciplinary solutions using sensors, actuators, and software tools.	L6
CO5	Apply problem-solving and critical thinking for designing practical applications.	L5
CO6	Exhibit entrepreneurial mind-set through innovative project development.	L6

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	3	-	-	-	2	2	-	2	3	3
CO2	2	2	3	2	3	-	-	-	2	1	-	2	3	3
CO3	2	2	3	2	3	-	-	-	3	2	1	2	2	2
CO4	2	3	3	3	3	-	-	-	2	2	1	3	3	3
CO5	3	3	3	3	3	-	-	-	2	2	1	3	3	3
CO6	2	2	3	2	2	2	1	1	3	2	3	3	2	2

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.



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List of experiments:

- 1) Make your own parallel and series circuits using breadboard for any application of your choice.
- 2) Demonstrate a traffic light circuit using breadboard.
- 3) Build and demonstrate automatic Street Light using LDR.
- 4) Simulate the Arduino LED blinking activity in Tinkercad.
- 5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
- 6) Interfacing IR Sensor and Servo Motor with Arduino.
- 7) Blink LED using ESP32.
- 8) LDR Interfacing with ESP32.
- 9) Control an LED using Mobile App.
- 10) Design and 3D print a Walking Robot
- 11) Design and 3D Print a Rocket.
- 12) Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote place in your computer dashboard.
- 13) Demonstrate all the steps in design thinking to redesign a motor bike.

Students need to refer to the following links:

- 1) <https://aim.gov.in/pdf/equipment-manual-pdf.pdf>
- 2) <https://atl.aim.gov.in/ATL-Equipment-Manual/>
- 3) <https://aim.gov.in/pdf/Level-1.pdf>
- 4) <https://aim.gov.in/pdf/Level-2.pdf>
- 5) <https://aim.gov.in/pdf/Level-3.pdf>

Course Outcomes: The students will be able to experiment, innovate, and solve real-world challenges.



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III YEAR II- SEMESTER



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III Year II Semester

L	T	P	C
3	0	0	3

DESIGN AND DRAWING OF STEEL STRUCTURES

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of connections and relevant IS codes
2. Equip student with the concepts of designing flexural members
3. Understand design concepts of tension and compression members in trusses
4. Familiarize students with different types of columns and column bases and their design
5. Familiarize students with Plate girder and Gantry Girder and their design

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Analyze and design steel structural members with relevant IS codes	L4
CO2	Carryout analysis and design of flexural members and detailing	L4
CO3	Design compression members of different types with connection detailing	L6
CO4	Design Plate Girder and Gantry Girder with connection detailing	L6
CO5	Produce the drawings pertaining to different components of steel structures	L3

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	1	1	2	1	1	1	1	-	-	-
CO2	3	3	3	2	1	1	1	2	1	1	1	1	-	-	-
CO3	3	3	3	2	1	1	1	2	1	1	1	1	-	-	-
CO4	3	3	3	2	1	1	1	2	1	1	1	1	-	-	-
CO5	2	2	2	3	1	1	1	3	1	1	1	1	-	-	-

UNIT – I

Connections:

Riveted connections – definition, rivet strength and capacity, Bolted Connections- Introduction, Behaviour of bolted joints Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements.



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Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT – II

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams-Design of built up beams.

UNIT –III

Tension Members and compression members: Effective length of members, slenderness ratio-permissible stresses. Design compression members subjected to axial and eccentric loading. Design of members subjected to direct tension and bending.

Roof Trusses: Different types of roof trusses – Design loads – Load combinations as per IS Code Recommendations, structural details –Design of purlins, members and joints.

UNIT – IV

Design of Columns: Built up compression members – Design of lacings and battens.

Design of Column Foundations: Design of slab base and gusseted base.

UNIT – V

Design of Plate Girder: Design consideration – IS Code Recommendations Design of plate girder-Welded – stiffeners.

NOTE: Welding connections should be used in Units II – V. Drawing classes must be conducted every week and the students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusseted base

Plate 5 Detailing of steel roof trusses including joint details.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.



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TEXTBOOKS:

1. **S.K. Duggal**, 'Design of steel structures', Tata Mcgraw Hill, and New Delhi
2. **Ramachandra**, 'Design of Steel Structures', Vol – 1, Universities Press.
3. **K.S.SAI RAM**, - 'Design Of Steel Structures'

REFERENCES:

1. **SarwarAlamRaz**, 'Structural Design in Steel', New Age International Publishers, NewDelhi
2. **P. Dayaratnam**, 'Design of Steel Structures'; S. Chand Publishers
3. **M. Raghupathi**, 'Design of Steel Structures', Tata Mc. Graw-Hill
4. **N. Krishna Raju**, 'Structural Design and Drawing'; University Press
5. **N.Subramanian**, 'Steel Structures Design and Practice', Oxford University Press
6. **IS -800: 2007** - GENERAL CONSTRUCTION IN STEEL — CODE OF PRACTICE
7. **R AGOR**, STEEL TABLES, BIRLA publications Pvt.ltd



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III Year – II Semester

L	T	P	C
3	0	0	3

HIGHWAY ENGINEERING

Course Learning Objectives:

The objectives of this course are:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements
3. To acquire design principles of Intersections

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Understand the principles of highway planning, classifications, and alignment, including the historical development of road networks in India.	L2
CO2	Apply geometric design standards for highways, including sight distances, horizontal and vertical alignment, and super elevation	L3
CO3	Analyze traffic characteristics and perform traffic studies; design intersections and traffic signals using IRC and Webster methods	L4
CO4	Evaluate the properties and testing methods of highway construction materials such as soils, aggregates, and bitumen; perform mix design using the Marshall method	L5
CO5	Design flexible and rigid pavements using CBR, IRC, Burmister, and mechanistic methods, considering stresses and IRC guidelines.	L6

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1	2	1	1	1	1	1	1	1	3	1	1
CO2	3	3	3	1	2	1	1	1	1	1	1	1	3	1	1
CO3	3	3	3	1	2	1	1	1	1	1	1	1	3	1	1
CO4	3	3	3	1	2	1	1	1	1	1	1	1	3	1	1
CO5	3	3	3	1	2	1	1	1	1	1	1	1	3	1	1

UNIT – I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans— First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment-Engineering Surveys – Drawings and Reports.



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UNIT – II

Highway Geometric Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves- Design of Vertical Alignment- Gradients- Vertical curves.

UNIT – III

Traffic Engineering: Basic Parameters of Traffic- Volume, Speed and Density- Traffic Volume Studies; Speed studies – spot speed and speed & delay studies; Parking Studies; Road Accidents- Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals – Webster Method – IRC Method.

UNIT – IV

Highway Materials: Sub grade soil: classification – Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Introduction to Geosynthetics, Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design

UNIT – V

Design of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors

Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.

Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

TEXTBOOKS:

1. Khanna S.K., Justo C.E.G and Veeraragavan A, Nem Chand Bros., Roorkee, Highway Engineering,
2. Kadiyali L, Traffic Engineering and Transportation Planning, R, Khanna Publishers, New Delhi.



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REFERENCES:

1. **Kadiyali L**, Principles of Highway Engineering, R,Khanna Publishers, NewDelhi
2. **Partha Chakraborty and Animesh Das**, Principles of Transportation Engineering, PHI Learning Private Limited, Delhi

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III Year II Semester

L	T	P	C
3	0	0	3

GEOTECHNICAL ENGINEERING– II

Course Learning Objectives:

The objective of this course is:

1. To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
2. To enable the student to compute immediate and consolidation settlements of shallow foundations.
3. To impart the principles of important field tests such as SPT and Plate bearing test.
4. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Explain the need for soil exploration and describe various methods including boring, sampling, and field testing techniques	L2
CO2	Analyze the stability of earth slopes and compute earth pressure using different theories and graphical methods	L4
CO3	Determine bearing capacity of shallow foundations using Terzaghi's theory and IS code recommendations.	L3
CO4	Evaluate foundation settlements using N-values and plate load test data and assess allowable limits.	L5
CO5	Compare different types of deep foundations and assess the load-carrying capacity and design considerations for piles and wells.	L5

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	–	2	–	–	–	–	–	–	–	1	–	–	–
CO2	3	3	2	3	2	–	1	–	–	–	–	1	–	–	–
CO3	3	3	3	3	2	–	1	–	–	–	–	1	–	–	–
CO4	3	3	2	3	2	–	1	–	–	–	–	1	–	–	–
CO5	3	3	3	2	2	–	2	–	–	–	–	1	–	–	–

SYLLABUS:

UNIT–I

Soil Exploration: Need –Methods of soil exploration – Boring and Sampling methods – Field tests– Penetration Tests –Pressure meter –planning of Program and preparation of soil investigation report.



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UNIT- II

Earth And Earth-Retaining Structures: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments- different conditions. Rankine's & Coulomb's theory of earth pressure – Cullman's graphical method –earth pressures in layered soils.

UNIT-III

Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity Factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods.

UNIT-IV

Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT -V

Deep Foundations:

Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

Well Foundations: Types – Different shapes of well – Types of cussions – Components of well - functions – forces acting on well foundations - Design Criteria – Determination of staining thickness and plug - construction and Sinking of wells – Tilt and shift.

TEXT BOOKS:

1. **Das, B.M,** 'Principles of Foundation Engineering' - (2011) –6th edition (Indian edition) Cengage learning
2. **Gopal Ranjan & ASR Rao,** 'Basic and Applied Soil Mechanics', New Age International Pvt. Ltd, (2004).
3. **Arora,** Soil mechanics & foundation engineering

REFERENCES:

1. **Bowles, J.E., (1988),** Foundation Analysis and Design', 4th Edition, McGraw-Hill Publishing Company, New York.
2. **N.N.SOM & S.C.DAS PHI,** 'Theory and Practice of Foundation Design', Learning Private limited.



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III Year II Semester

L	T	P	C
3	0	0	3

PRESTRESSED CONCRETE

Course Learning Objectives:

The objective of this course is:

- Familiarize Students with concepts of prestressing
- Equip student with different systems and devices used in prestressing
- Understand the different losses of prestress including short and long term losses
- Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Understand the different methods of prestressing	L2
CO2	Estimate effective prestress including the short and long term losses	L3
CO3	Analyze and design prestressed concrete beams under flexure	L4
CO4	Analyze and design prestressed concrete beams under shear	L4
CO5	Understand the relevant IS Code provisions for prestressed concrete	L2

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CO2	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—
CO3	3	3	3	2	—	—	—	—	—	—	2	—	—	—	—
CO4	3	3	3	2	—	—	—	—	—	—	2	—	—	—	—
CO5	2	—	2	—	—	—	—	—	—	—	—	1	—	—	—

SYLLABUS:

UNIT-I

Basic concepts of Prestressing- Advantages and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Cover Requirements.



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UNIT-II

Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section- pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-III

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation stress in steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design

UNIT-IV

Design for Flexural resistance- Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing Deflection- Prediction of short term and long term deflections.

UNIT-V

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.
Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

TEXT BOOKS:

- 1.N. Krishna Raju, Prestressed Concrete, Tata McGraw hill
- 2.S. Ramamrutham, Prestressed Concrete

REFERENCES:

- 1.P. Dayaratnam, Prestressed Concrete
- 2.T. Y. Lin & Burns, Prestressed Concrete, Wiley Publications



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III Year II Semester

L	T	P	C
3	0	0	3

REPAIR AND REHABILITATION OF STRUCTURES

Course Learning Objectives:

The objective of this course is to:

1. Understand material selection for structural repair and rehabilitation, including the use of Admixtures, fibers, and wraps, and learn non-destructive evaluation (NDE) techniques for assessing structural condition.
2. Learn strengthening and stabilization techniques for beams, columns, and structural connections with a focus on design considerations and crack control.
3. Explore bonded installation techniques using FRP and steel plates, and understand debonding Mechanisms in structural reinforcement systems.
4. Examine the design and application of various special concretes such as fiber-reinforced concrete, light weight concrete, and fly ash concrete for improved durability and performance.
5. Gain knowledge of high-performance concretes, including their development, properties, and types such as self-consolidating concrete, for advanced construction applications.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Recognize the mechanisms of degradation of concrete structures and to design durable Concrete structure	L2
CO2	Conduct field monitoring and non- destructive evaluation of concrete structures.	L3
CO3	Design and suggest repair strategies for deteriorated concrete structures including Repairing with composites	L6
CO4	Understand the methods of strengthening methods for concrete structures	L2
CO5	Study the impact of launching small business and understand resource planning for start up	L2

CO-PO Mapping:

Co/Po	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	-	2	2	1	-	-	2	3	2	2	-	-
CO2	2	3	2	2	2	1	-	-	-	1	2	2	-	2	-
CO3	3	3	3	-	2	2	-	-	1	2	3	2	2	2	-
CO4	3	2	3	-	1	2	-	-	1	2	3	2	2	2	-
CO5	2	1	2	-	-	2	2	1	1	2	3	3	-	2	-

UNIT: I

Materials for repair and rehabilitation-Admixtures-types of admixtures-purposes of using Admixtures-chemical composition-Natural admixtures-Fibers-wraps-Glass and Carbon fiber wraps-Steel Plates-Non-destructive evaluation: Importance-Concrete behaviour under corrosion, disintegrated mechanisms- moisture effects and thermal effects –Visual investigation- Acoustical emission methods-Corrosion activity measurement- chloride content–Depth of carbonation-Impact echo methods-Ultra sound pulse velocity methods- pull out tests.



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UNIT-II

Strengthening and stabilization-Techniques-design considerations-Beam shear capacity strengthens- Shear Transfer strengthening-stress reduction techniques- Column strengthening flexural strengthening-Connection stabilization and strengthening, Crack stabilization.

UNIT: III

Bonded installation techniques- Externally bonded FRP-Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms- intermediate crack debonding- CDC debonding plate end de bonding-strengthening of floor of structures post grout tests. Introduction to Liquefaction & its effects & applications, Retrofitting techniques

UNIT: IV

Fiber reinforced concrete-Properties of constituent materials-Mix proportions, mixing and casting methods- Mechanical properties of fiber reinforced concrete-applications of fiber reinforced concretes- Lightweight concrete-properties of light weight concrete-No fines concrete-design of light weight concrete-Fly ash concrete-Introduction-classification of fly ash-properties and reaction mechanism of fly ash-Properties of fly ash concrete in fresh state and hardened state- Durability of fly ash concretes

UNIT: V

High performance concretes-Introduction-Development of high-performance concretes- Materials of high-performance concretes-Properties of high-performance concretes-Self Consolidating concrete properties-qualifications.

TEXT BOOKS

1. **P.C. Varghese**, 'Maintenance Repair Rehabilitation & Minor works of Buildings', PHI Publications
2. **P.I. Modi, C.N. Patel**, 'Repair and Rehabilitation of Concrete Structures', PHI Publications.
3. **B. Vidiyelli**, 'Rehabilitation of Concrete Structures, Standard Publishers Distributors
4. **V.K. Raina**, 'Concrete Bridge Practice Construction Maintenance & Rehabilitation', Shroff Publishers and Distributors.

REFERENCES

1. **M.S. Shetty, S Chand**, 'Concrete Technology Theory and Practice'
2. **Peter H Emmons**, 'Concrete Repair and Maintenance'
3. **Santa Kumar A.R**, 'Concrete Chemical Theory and Applications', Indian Society for Construction Engineering and Technology, Madras
4. **CPWD**, 'Hand book on Repair and Rehabilitation of RC Building', Delhi



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III Year – II Semester

L	T	P	C
3	0	0	3

VALUATION AND QUANTITY SURVEY

Course Learning Objectives:

The objective of this course is to:

1. Understand and define key terms in estimation, quantity surveying, and contract documents.
2. Utilize CPWD DAR/DSR data effectively to extract relevant information for construction activities
3. Develop accurate Bill of Quantities (BoQ) for diverse construction works such as buildings, earthwork, sanitary, and water supply.
4. Key terms such as depreciation, obsolescence, and appreciation in the context of property valuation.
5. Prepare comprehensive valuation reports based on the selected method for buildings of varying complexities

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Define basic terms related to estimation, quantity surveying and contract document. Interpret the item of work from drawings and explain its general specification and unit of measurement	L2
CO2	Make use of given data from CPWD DAR/DSR for calculating the unit rate of different items of work associated with building Construction	L3
CO3	Develop detailed measurement (including BBS) and BOQ of a various work like buildings, earth work for road, sanitary and water supply work	L6
CO4	Explain various basic terms related to valuation of land and Building	L2
CO5	Develop valuation of buildings using different methods of valuation	L6

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	-	-	-	-	1	-	-	2	-	-
CO2	2	2	3	-	3	-	-	-	-	2	-	-	3	1	-
CO3	2	2	3	2	3	-	-	-	-	2	-	-	3	2	-
CO4	2	-	-	-	1	-	-	-	-	1	-	-	1	-	-
CO5	2	2	3	2	2	-	-	-	-	2	-	-	3	2	-



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UNIT - I

Introduction- Quantity Surveying- Basic principles, Role/responsibility of Quantity surveyor at various stages of construction. Estimate-Details required, Type of estimate, purposes. Contingencies, Work-charge establishment, Tools and Plant, centage charge, Day work, Prime cost, Provisional sum & provisional Quantity, Overhead charges, Cost index, Contract documents (Brief description only) Bill of Quantity – Typical format – use Item of works- Identify various item of work from the drawings – units of measurement of various materials and works (focus may give to RCC residential building) General rule & method of measurement with reference to Indian Standard Specifications- IS1200.

UNIT - II

Introduction to the use of CPWD schedule of rates as per latest DSR and Analysis of rate as per latest DAR. Specifications – General specification of all items of a residential building. Detailed specification (CPWD specifications) of major item of work like Earth work excavation in foundation, masonry, Reinforced cement concrete, finishing of building work Analysis of rates for Earth work in excavation for foundation, mortars, reinforced cement concrete Works, finishing work, masonry work, stone works, flooring with reference to latest DSR and latest DAR (Data should be given).

UNIT - III

Detailed Estimate- Preparation of detailed measurement using Centre line method & Short wall long wall (separate wall) method for RCC single storied building (Flat roof) including stair cabin- Residential/office/school building. BOQ preparation of a single storied RCC building work. Material quantity calculation of the items of work (Rubble, Brick work, Concrete work, Plastering) in detailed estimate prepared for building work. (Data for unit quantity should be provided from DAR)

UNIT - IV.

Bar Bending Schedule- Preparation of BBS of RCC beams, slabs, Column footings, Retaining wall. Road estimation- Estimation of earthwork from longitudinal section- metalled road. Estimation of sanitary and water supply work - Water tank, Septic tank, Manhole (*No Detailed estimate needed- concept of item of work, its general specification and unit of measurement*). (Valuation – purpose, factor affecting, introduction to terms- Value, Cost, Price, kinds of values Income- Gross income, net income, outgoings, annuity, sinking fund, Year's purchase, Depreciation, obsolescence -Free hold and leasehold properties.)

UNIT - V

Methods of calculating depreciation – straight line method – constant percentage method, sinking fund method and quantity survey method.

Methods of valuation – rental method, direct comparison of capital cost, valuation based on profit, depreciation method. Various method of valuation of land (Brief description only)



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TEXT BOOKS

1. **B.N.Dutta**, Estimation and costing in civil engineering, UBS publishers
2. **Rangwala**, Estimation Costing and Valuation, Charotar publishing house pvt.ltd
3. **Dr. S. Seetha Raman, M.Chinna swami**, Estimation and quantity surveying, Anuradha publications Chennai.
4. **M Chakraborty**, Estimating, Costing, Specification and valuation, published by the author, 21 B, Babanda Road, Calcutta 26

REFERENCES

1. **BS Patil**, Civil Engineering contracts and estimates, university press
2. **VN Vazirani & S P Chandola**, Civil Engineering Estimation and Costing Khanna Publishers
3. **IS 1200-1968**; Methods of measurement of building & civil engineering works
4. **CPWD DAR 2018** and **DSR 2018** or latest - Delhi schedule of rates, Analysis of rates AND Specifications
5. CPWD Specifications Vol 1 & 2 (2019 or latest edition)



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III Year II Semester

L	T	P	C
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FINITE ELEMENT METHOD

Course Learning Objectives:

The objective of this course is:

1. To introduce the basic principles of the stiffness method and variational approaches for structural analysis.
2. To develop finite element formulations for truss elements using stiffness matrices and approximation techniques.
3. To analyze beam elements under various loading and support conditions using finite element concepts and Galerkin's method.
4. To formulate and solve plane stress, plane strain, and axisymmetric problems using constant strain triangle (CST) and linear strain triangle (LST) elements.
5. To understand isoperimetric formulation, numerical integration, and issues related to element performance such as mesh instabilities and stress computation.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Develop finite element formulations of one degree of freedom problems and solve them	L6
CO2	Understand any Finite Elements of ware to perform stress, thermal and modal analysis	L2
CO3	Compute the stiffness matrices of different elements and system	L3
CO4	Interpret displacements, strains and stress resultants	L5
CO5	Analyze planar structural systems using finite element modeling	L4

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	-	-	-	-	-	-	2	-	-	-
CO2	2	2			3	-	-	-	-	-	-	2	-	-	-
CO3	3	2	2		2	-	-	-	-	-	-	-	-	-	-
CO4	2	3		3	2	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	1	1	-	2	-	-	-



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UNIT I

Introduction: Review of stiffness method-Principle of Stationary potential energy-Potential energy of an elastic body-Rayleigh-Ritz method of functional approximation- variational approaches- weighted residual methods

UNIT II

Finite Element formulation of truss element: Stiffness matrix-properties of stiffness matrix –Selection of approximate displacement functions-solution of a plane truss-transformation matrix and stiffness matrix for a 3-D truss- Inclined and skewed supports-Galerkin's method for 1-D truss- Computation of stress in a truss element.

UNIT III

Finite element formulation of Beam elements: Beam stiffness-assemble age of beam stiffen matrix- Examples of beam analysis for concentrated and distributed loading-Galerkin's method – 2 D arbitrarily oriented beam element-inclined and skewed supports-rigid plane frame examples

UNIT IV

Finite element formulation for plane stress, plane strain and axi symmetric problems-Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces-Finite Element solution for plane stress and axi-symmetric problems-comparison of CST and LST elements- convergence of solution-interpretation of stresses

UNIT V

Iso-parametric Formulation: Iso-parametric bar element- plane bilinear Iso-parametric element – quadratic plane element-shape functions, evaluation of stiffness matrix, consistent modal load vector- Gauss quadrature-appropriate order of quadrature-element and mesh instabilities-spurious zero energy modes, stress computation-patch test.

TEXTBOOKS

1. Daryl L.Logan, 'A first course in the Finite Element Method', Thomson Publications.
2. Robert D.Cook, David S. Malkus, Michael E. Plesha and Robert J. Witt, 'Concepts and applications of Finite Element Analysis', John Wiley & Sons Publications.

REFERENCES

1. Tirupati R. Chandrupatla and Ashok D. Belegundu, 'Introduction to Finite Elements in Engineering', PHI publications.
2. Wail N. AI-Rifaie and Ashok K. Govil, 'Finite Element Methods (For Structural Engineers)', New Age International(P)Limited



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III Year – II Semester

L	T	P	C
3	0	0	3

BRIDGE ENGINEERING

Course Learning Objectives:

The objective of this course is to:

1. Familiarize students with different types of Bridges and IRC standards
2. Equip student with the concepts and design of Slab Bridges, T Beam Bridges, Box Culverts
3. Understand concepts of design of Plate Girder Bridges
4. Familiarize with different methods of inspection of bridges and their maintenance

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Explain different types of Bridges with diagrams and Loading standards.	L2
CO2	Carryout analysis and design of Slab bridges and suggest structural detailing	L4
CO3	Carryout analysis and design of T Beam bridges and suggest structural detailing	L4
CO4	Carryout analysis and design of Plate girder bridges and suggest structural detailing	L4
CO5	Organize for attending inspections and maintenance of bridges and prepare reports.	L5

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	2	-
CO2	3	3	3	2	2	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	2	2	-	-	-	-	-	-	-	3	3	-
CO4	3	3	3	2	2	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	2	2	2	2	-	2	3	2	3	3	3	-

UNIT-I

General Introduction to types of Bridges- (Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts) - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading



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UNIT-II

Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs-dispersion length-Design of interior panel of slab-Guyon's-Massonet Method-Hendry-Jaeger Methods- Courbon's theory- Pigeaud's method

UNIT-III

T-Beam bridges- Analysis and design of various elements of bridge-Design of deck slab, longitudinal girders, Secondary beams- Reinforcement detailing

UNIT-IV

Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.

UNIT-V

Box Culverts: Loading-Analysis and Design-Reinforcement detailing.

Inspection and Maintenance of Bridges: Procedures and methods for inspection-Testing of bridges- Maintenance of Sub Structures and Super structures-Maintenance of bearings- Maintenance Schedules.

TEXTBOOK

1. **Johnson Victor D**, 'Essentials of Bridge Engineering '
2. **T.R. Jagadeesh**, M.A. Jayaram, PHI, 'Design of Bridge Structures'
3. **B. C.Punmai**, Jain & Jain, Lakshmi Publications, 'Design of RC Structures'

REFERENCES

1. **Aswini, Vazirani, Ratwani**, 'Design of Concrete Bridges'
2. **B.C.Punmai, Jain & Jain**, 'Design of Steel Structures', Lakshmi Publications.
3. **Krishna Raju**, 'Design of Bridges'



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III Year II Semester

L	T	P	C
3	0	0	3

WATER RESOURCES ENGINEERING

Course Learning Objectives:

The objective of this course is to:

1. Learn the types of irrigation systems.
2. Understand the concepts of planning and design of irrigation systems.
3. Study the relationships among soil, water and plant and their significance in planning an irrigation system.
4. Understand design principles of erodible and non-erodible canals.
5. Know the principles of design of weirs on permeable foundations.
6. Know the concepts for analysis and design of storage head works.
7. Learn design principles of canal structures.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Estimate irrigation water requirements.	L4
CO2	Design irrigation canals	L6
CO3	Design irrigation canal structures	L6
CO4	Plan and design diversion head works	L6
CO5	Analyze stability of gravity and earth dams & Design hydraulic ogee spillways	L5 & L6

CO-PO Mapping:

Co/ Po	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	3	2	-	2	-	-
CO2	3	2	-	-	1	-	-	-	-	3	2	-	2	-	-
CO3	2	-	2	-	2	3	2	-	-	2	2	2	2	2	-
CO4	1	-	2	-	2	3	2	-	-	2	2	2	2	2	-
CO5	2	-	2	1	3	2	2	-	-	2	2	2	2	3	-

UNIT-I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.



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UNIT-II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT- III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall. (Description only)

Regulators: Head and cross regulators, design principles (Description only)

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage. (Description only)

Outlets: Types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

UNIT-IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis.

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates.

TEXT BOOKS

1. Punmia B C, P.B.B Lal, A.K. Jain and A.K. Jain (2009), 'Irrigation and Waterpower Engineering', Laxmi Publications Pvt. Ltd., New Delhi
2. Asawa G L (2013), 'Irrigation and Water Resources Engineering', New Age International Publishers
3. Raghunath H.M (2012), 'Irrigation Engineering' Wiley India.
4. Modi P N (2011), 'Irrigation Water Resources and Waterpower Engineering', Standard Book House, New Delhi

REFERENCES

1. Mays L.W (2013), 'Water Resources Engineering' Wiley India Pvt. Ltd, New Delhi.
2. Sharma R.K. and Sharma, T. K (2012), S. Chand, 'Irrigation Engineering'
3. Satyanarayana Murthy Challa (2008), 'Water Resources Engineering' New Age International Publishers.



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III YEAR –II Semester

L	T	P	C
3	0	0	3

DISASTER MANAGEMENT

Course Learning Objectives:

The objective of this course is to:

1. Develop an understanding of why and how the modern disaster manager is involved with pre- disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the 'relief system' and the 'disaster victim.'
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Understand the tools of post-disaster management.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Affirm the usefulness of integrating management principles in disaster mitigation work	L2
CO2	Distinguish between the different approaches needed to manage pre- during and post-disaster periods	L2
CO3	Explain the process of risk management	L2
CO4	Relate to risk transfer	L3
CO5	Explain the process of multi-sectional issues, education and community preparedness	L2

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	-	-	3	3	2	-	2	-	2	2	-	-
CO2	2	3	2	-	-	3	3	2	-	2	-	2	2	-	-
CO3	3	3	3	2	-	3	2	2	-	2	-	3	3	-	-
CO4	2	3	2	-	-	2	2	2	-	-	-	3	2	-	-
CO5	2	2	2	-	-	3	3	3	3	3	2	3	3	2	-



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UNIT-I

Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: Vegetal Cover floods, droughts – Earthquakes – landslides – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

UNIT-II

Man Made Disaster and Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism -threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management.

UNIT-III

Risk and Vulnerability: Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition – Financial management of disaster – related losses.

UNIT-IV

Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS.

UNIT-V

Multi-sectional Issues, Education and Community Preparedness: Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction- Education in disaster risk reduction- Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

TEXT BOOKS

- 1.**S.Vaidyanathan** , An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards – CBS Publishers & Distributors Pvt.Ltd.
- 2.**RB Singh** ,Natural Hazards & Disaster Management, Vulnerability and Mitigation - Rawat Publications
- 3.**Tushar Bhattacharya**, 'Disaster Science & Management', Tata McGraw Hill Education Pvt. Ltd., NewDelhi.
- 4.**Jagbir Singh**, 'Disaster Management – Future Challenges and Opportunities', I K International Publishing House Pvt.Ltd.



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REFERENCE BOOKS

1. **H K Gupta**, 'Disaster Management' edited, Universities press.
2. **Rajib shah & R R Krishnamurthy**, 'Disaster Management – Global Challenges and Local Solutions', Universities press.

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III Year II Semester

L	T	P	C
3	0	0	3

SUSTAINABILITY IN ENGINEERING PRACTICES

Course Learning Objectives:

The objective of this course is:

1. Understand the Principles of Sustainable Development
2. Identify and Analyze Local and Global Environmental Issues
3. Learn and Apply Tools for Environmental Assessment and Management
4. Understand Sustainable Built Environments and Urban Systems
5. Explore Renewable Energy Resources and Green Technologies

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Explain sustainable development and different environmental agreements and protocols	L2
CO2	Discuss real time activities causing environmental issues and different methods to use renewable energy resources	L2
CO3	Explain local and global environmental issues	L2
CO4	Differentiate between carbon emissions for regular and sustainable cities and explain different practices to move industries towards sustainability	L2
CO5	Discuss different renewable energy resources and explain methods to implement green technology	L2

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	-	-	-	2	3	3	-	1	-	1	-	-	-
CO2	3	3	2	-	-	2	3	2	-	-	-	2	-	-	-
CO3	3	2	2	3	3	-	3	-	-	-	-	2	-	-	-
CO4	3	2	3	2	2	3	3	-	2	2	2	2	-	-	-
CO5	3	2	2	-	2	-	3	2	-	-	2	2	-	-	-

UNIT-I

Introduction to Sustainable Engineering- Sustainable development, concepts of sustainable development: three pillar model, egg of sustainability model, Atkisson's pyramid model, prism model, principles of sustainable development, sustainable engineering, threats for sustainability.

Environmental Ethics and Legislations – Environmental ethics and education, multilateral environmental agreements and protocols, enforcement of environmental laws in India – The Water Act, The Air Act, The Environment Act.



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UNIT-II

Local Environmental Issues- Solid waste, impact of solid waste on natural resources, zero waste concept and three R concept, waste to energy technology :thermo-chemical conversion, biochemical conversion.

Global Environmental Issues- Resource degradation: deterioration of water resources, land degradation, air pollution, climate change and global warming, ozone layer depletion, carbon footprint, carbon trading.

UNIT-III

Tools for Sustainability - Environmental management System (EMS), concept of ISO14000, life cycle assessment (LCA): basic components, advantages, disadvantages, case study. Environmental impact assessment (EIA), environmental auditing, bio mimicking, case studies.

UNIT-IV

Sustainable Habitat - Concept of green building, green building materials, green building certification and rating: green rating for integrated habitat assessment(GRIHA), leadership in energy and environmental design (LEED) rating, energy efficient buildings, sustainable cities, sustainable transport, sustainable pavements, case studies in sustainability engineering: Green building, sustainable city, sustainable transport system.

Sustainable Industrialization and Urbanization – Sustainable urbanization, industrialization, material selection, pollution prevention, industrial ecology, industrial symbiosis, poverty reduction.

UNIT-V

Renewable energy resources- Conventional and non- conventional forms of energy, solar energy, fuel cells, wind energy, small hydro plants, bio-gas systems, biofuels, energy from ocean, geo-thermal energy, conservation of energy.

Green technology and Green Business: Sustainable business, green technology, green energy, green construction, green transportation, green chemistry, green computing

TEXT BOOKS:

- 1.**Dr. K.R. Arora**, 'Soil Mechanics and Foundation Engineering, Standard Publishers and Distributors, New Delhi.
- 2.**GopalRanjan and A.S.R.Rao**, 'Basic and Applied Soil Mechanics', New Age International Publishers.
- 3.**V.N.S.Murthy**, 'Soil Mechanics and Foundation Engineering', CBS publishers
- 4.**C. Venkataramaiah**, 'Geotechnical Engineering', New Age International Publishers

REFERENCES:

- 1.**D.W.Taylor.**, Wiley, 'Fundamentals of Soil Mechanics'
- 2.**Holtz and Kovacs**, 'An introduction to Geotechnical Engineering', Prentice Hall
- 3.**BrajaM.Das**, 'Principles of Geotechnical Engineering', Cengage Learning.



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III Year II Semester

L	T	P	C
3	0	0	3

WATER SUPPLY SYSTEMS

Course Learning Objectives:

The objective of this course is:

1. Understand the Role of Water in Human and Environmental Systems
2. Identify and Classify Different Sources of Water
3. Interpret the Concepts of Dual Water Supply and Related Health Implications
4. Analyze Water Distribution Methods
5. Evaluate Water Requirements and Wastewater Characteristics in Industry

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Outline of the various facets of water usage in daily life	L1
CO2	Explain the origin of Natural waters and also to synthesize it for regular use	L2
CO3	Discuss the utilization of non-potable water	L2
CO4	Describe water supply system from a reservoir	L2
CO5	Explain the characteristics of wastewater	L2

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	2	3	-	-	-	-	-	-	2	-
CO2	3	2	-	-	-	-	3	-	-	-	-	2	-	2	-
CO3	2	-	-	-	-	2	3	-	-	-	-	2	-	2	-
CO4	2	2	3	-	2	-	-	-	1	1	-	-	-	2	-
CO5	3	-	-	2	2	-	3	-	-	-	-	2	-	2	-

UNIT-I

Water and life: Necessity of water – Domestic demand – Public demand – Irrigation – Transportation – Sanitation – Dilution of waste waters – Dust palliative – Recreation – Fire protection.

UNIT-II

Sources of water: Surface sources – Ground sources – Water from atmosphere – Desalination – Recycling of waste water – Recharging of aquifers.



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UNIT-III

Dual supply of water: Potable and non-potable water – Protected water – Grey water – Black water – Water borne diseases – water related diseases – Sewage Irrigation.

UNIT-IV

Distribution of water: Based on topography – Gravity distribution – Direct pumping – Combined pumping and gravity flow. Service Reservoirs – Continuous supply – Intermittent supply – Networks of distribution– Emergency water supply as in case of fire accidents – Valves, hydrants and meters.

UNIT-V

Industrial water: Location of Industry with reference to surface sources of water – Quality of water required for industrial operations – characteristics of waste water produced – Standards for letting industrial effluents into sources of water.

TEXT BOOKS:

1. **K.N. Duggal**, 'Elements of Environmental Engineering', 7th Edition, S. Chand Publishers, 2010.
2. **Hammer and Hammer**, 'Water and wastewater Technology', 4th Edition, Prentice hall of India, 2003.
3. **Howard S. Peavy, Donald R. Rowe, and George Tchobanoglous**, 'Environmental Engineering', 1st Edition McGraw –Hill Publications, Civil Engineering Series, 1985.

REFERENCES:

1. **B.C.Punmia**, 'Water Supply Engineering', Vol. 1, 'Waste water Engineering Vol. II', 2nd Edition, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.
2. **Fair, Geyer and Okun**, 'Water and Waste Water Engineering', 3rd Edition, Wiley, 2010.
3. **Metcalf and Eddy**, 'Waste Water Engineering', 3rd Edition, Tata McGraw Hill, 2008.



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III Year II Semester

L	T	P	C
0	0	3	1.5

HIGHWAY ENGINEERING LAB

Course Learning Objectives:

The objectives of this course are:

1. To test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bituminous mix
4. To carry out surveys for traffic volume, speed and parking.

Course outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Test aggregates and judge the suitability of materials for the road construction	L5
CO2	Test the given bitumen samples and judge their suitability for the road construction.	L5
CO3	Obtain the optimum bitumen content for Bituminous Concrete	L4
CO4	Determine the traffic volume, speed and parking characteristics	L3
CO5	Draw highway cross sections and intersections	L6

CO-PO Mapping:

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	3	2	-	-	-	-	2	3	-	-
CO2	3	3	2	-	-	3	2	-	-	-	-	2	3	-	-
CO3	3	3	3	-	-	3	3	-	-	-	-	3	3	-	-
CO4	3	3	2	-	2	3	2	-	-	-	-	2	3	-	-
CO5	3	3	3	-	3	3	3	-	-	-	-	3	3	-	-



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List of Experiments:

I. ROAD AGGREGATES:

1. Aggregate Crushing value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING

1. Earthwork calculations for road works
2. Drawing of road cross sections
3. Rotary intersection design

TEXT BOOKS:

1. S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers 'Highway Material Testing Manual' New Chand Publications, New Delhi.

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.



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Nandamuru, Pedana Mandal, Krishna Dist – 521369

III Year II Semester

L	T	P	C
0	1	2	2

CAD LAB

Course Objectives: The objectives of the course are to

1. **Learn** the usage of any fundamental software for design
2. **Create** geometries using pre-processor
3. **Analyze** and Interpret the results using post processor
4. **Design** the structural elements

Course Outcomes:

CO	CO STATEMENT	TAXONOMY
CO1	Model and represent the geometry of structural elements and systems using design software tools.	L3
CO2	Perform structural analysis on different types of structural systems using analysis software.	L3
CO3	Interpret and validate analysis results using post-processing tools for design decisions.	L4
CO4	Design structural elements and systems as per IS Codes using software and spreadsheets	L5

CO-PO Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PSO1	PSO2	PSO3
CO1	3	2	3	-	3	-	-	-	-	-	2	3	3	-
CO2	3	3	3	2	3	-	-	-	-	-	2	3	3	-
CO3	2	3	3	2	3	1	-	-	-	-	2	3	3	-
CO4	3	3	3	2	3	2	-	-	-	-	3	3	3	-

LIST OF EXPERIMENTS

1. Analysis & Design determinate structures using a software
2. Analysis & Design of fixed & continuous beams using a software
3. Analysis & Design of Plane Frames
4. Analysis & Design of space frames subjected to DL & LL
5. Analysis & Design of residential building subjected to all loads (DL, LL, WL, EQL)
6. Analysis & Design of Roof Trusses
7. Design and detailing of built up steel beam
8. Developing a design program for foundation using EXCEL Spread Sheet



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9. Detailing of RCC beam and RCC slab
10. Detailing of Steel built up compression member

Note: Drafting of all the exercises is to be carried out using commercially available designing software's.

SVIET



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III Year II Semester

L	T	P	C
2	0	0	0

TECHNICAL PAPER WRITING & IPR

Course Learning Objectives:

The objective of this course is:

1. Understand the essentials of technical writing, including sentence structure, transitions, and tense usage in reports
2. Develop skills to plan, format, and structure technical documents for specific audiences
3. Learn drafting and design techniques using graphics and illustrations to enhance clarity
4. Gain practical skills in editing, proofreading, summarizing, and presenting technical content.
5. Gain skills in advanced MS Word tools like table of contents, macros, comments, footnotes, and version tracking
6. Understand types, processes, and global aspects of IPRs, including patents, copyrights, and trademarks.

Course Outcomes:

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

CO	CO STATEMENT	TAXONOMY
CO1	Apply principles of technical writing to construct clear, concise, and purposeful sentences.	L3
CO2	Plan, format, and structure technical reports for different readers and contexts.	L4
CO3	Create and refine technical content using proper illustrations and editing practices.	L6
CO4	Summarize technical content effectively and demonstrate presentation skills.	L3
	Utilize word processing tools for document design, citation, revision tracking, and security.	L3
CO5	Explain and apply the basics of Intellectual Property Rights and their relevance globally.	L2

CO-PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	3	2	-	2	-	-
CO2	3	2	-	-	1	-	-	-	-	3	2	-	2	-	-
CO3	2	-	2	-	2	3	2	-	-	2	2	2	2	2	-
CO4	1	-	2	-	2	3	2	-	-	2	2	2	2	2	-
CO5	2	-	2	1	3	2	2	-	-	2	2	2	2	3	-

Unit I:

Introduction: An introduction to writing technical reports, technical sentences formation, using transitions to join sentences, Using tenses for technical writing.

Planning and Structuring: Planning the report, identifying reader(s), Voice, Formatting and structuring the report, Sections of a technical report, Minutes of meeting writing.



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Unit II:

Drafting report and design issues: The use of drafts, Illustrations and graphics.

Final edits: Grammar, spelling, readability and writing in plain English: Writing in plain English, Jargon and final layout issues, Spelling, punctuation and Grammar, Padding, Paragraphs, Ambiguity.

Unit III:

Proofreading and summaries: Proofreading, summaries, Activities on summaries. **Presenting**

final reports: Printed presentation, Verbal presentation skills, Introduction to proposals and practice.

Unit IV:

Using word processor: Adding a Table of Contents, Updating the Table of Contents, Deleting the Table of Contents, Adding an Index, Creating an Outline, Adding Comments, Tracking Changes, Viewing Changes, Additions, and Comments, Accepting and Rejecting Changes, Working with Footnotes and Endnotes, Inserting citations and Bibliography, Comparing Documents, Combining Documents, Mark documents final and make them read only., Password protect Microsoft Word documents., Using Macros,

Unit V:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of **Patenting and Development:** technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property

TEXT BOOKS:

1. **Kompal Bansal & Parshit Bansal**, "Fundamentals of IPR for Beginner's", 1st Ed., BS Publications, 2016.
2. **William S. Pfeiffer and Kaye A. Adkins**, "Technical Communication: A Practical Approach", Pearson.
3. **Ramappa, T.**, "Intellectual Property Rights Under WTO", 2nd Ed., S Chand, 2015.

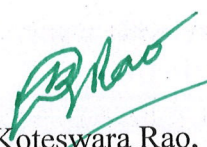
REFERENCE BOOKS:

1. **Adrian Wallwork**, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011.
2. **Day R**, how to Write and Publish a Scientific Paper, Cambridge University Press(2006)

E-resources:

1. <https://www.udemy.com/course/reportwriting/>
2. <https://www.udemy.com/course/professional-business-english-and-technical-report-writing/>
3. <https://www.udemy.com/course/betterbusinesswriting/>


(Ch. Giri Phani Kumar)
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