DEPARTMENT OF
CIVIL ENGINEERING

CURRICULUM AND SYLLABI OF

B.E. – CIVIL ENGINEERING
COLLEGE VISION

- Transforming lives through quality Education and research with human values

COLLEGE MISSION

- To maintain excellent infrastructure and highly qualified and dedicated faculty

- To provide a conducive learning environment with an ambience of humanity, wisdom, creativity and team spirit

- To promote the values of ethical behavior and commitment to the society

- To partner with academic, industrial and government entities to attain collaborative research
DEPARTMENT OF CIVIL ENGINEERING

VISION

- Producing outstanding Civil Engineering Professionals with human values to face future challenges.

MISSION

- To provide with excellent teaching and research ambience.
- To prepare student for leadership roles in civil engineering.
- To facilitate student with lifetime skills and human values.
- To collaborate with industries to meet the ever challenging environment.

Program Educational Objectives (PEO)

Programme educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

1. Will have a successful career in civil engineering.
2. Pursue advanced degrees in support of their chosen profession.
Program Outcomes (PO)

At the time of graduation graduates of our CIVIL programme are expected to have

1. An ability to apply fundamental knowledge of mathematics, science and civil engineering in real-world problems.
2. An ability to identify, formulate and provide solution for engineering problems.
3. An ability to design and evaluate the desired needs.
4. An ability to conduct test and interpret the results.
5. An ability to use the skills, modern tools and techniques.
6. An ability to analyze the local and global impact of civil engineering.
7. Awareness of environment, innovations and sustainable development.
8. An ability to display their professional responsibilities meeting ethical standards.
9. An ability to have an idea of contemporary issues and an ability to function on multidisciplinary teams.
10. An ability to communicate effectively both in written and oral.
11. Recognition of the need for and an ability to engage in professional development and life-long learning.
12. An ability to lead a project team for the successful completion.
# REGULATIONS 2013 – CURRICULUM AND SYLLABI

## B.E. CIVIL ENGINEERING

**SEMESTER I** (Common to all B.E. / B.Tech., Degree Programmes)

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**Total Number of Credits:** 27
### SEMESTER II

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**Total Number of Credits**: 29
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Total Number of Credits 27

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Total Number of Credits 25
SH100            TECHNICAL ENGLISH – I
(Common to all B.E. / B.Tech., Degree Programmes)  L T P C
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COURSE OUTCOMES
The Student will
• apply basic grammar in Writing and Speaking.
• prepare formal Letter Writings.
• come out with proper pronunciation.
• speak confidently in interactions.
• develop interest to read any article.

UNIT I                                                                                                                             12
Language Focus: Technical Vocabulary, Word Formation, Concord, Tense (Present).
Writing: Leave Application Letter, Paragraph writing.
Listening: Listening to correct pronunciation of words.

UNIT II                                                                                                                            12
Language Focus: Words often misspelled, Articles, Tense (Past)
Writing: Permission letters (In-plant training/Seminar/Workshop), Chart description.
Listening: Listening to the Sentences with correct stress and Intonation.
Speaking: Situational Conversations.

UNIT III                                                                                                                         12
Language Focus: Compound nouns, Tense (Future), Preposition, Comparative Adjectives.
Listening: Listening to the conversations.
Speaking: One minute speech.

UNIT IV                                                                                                                         12
Language Focus: Modal verbs, Gerund, Infinitives, Voice.
Writing: Writing Instructions, Letters to Editor.
Listening: Listening to the different Tonal Expressions.
Speaking: Giving Opinions.

UNIT V                                                                                                                         12
Language Focus: ‘If’ Conditionals, ‘Wh’ questions, Question Tags.
Writing: Reading and Note - taking
Speaking: Group Discussion.
Reading: ERC, one word questions from the suggested book.

SUGGESTED ACTIVITIES
2. Exercises on gap filling and correction of errors on Concord (Subject – Verb Agreement).
3. Gap filling exercises using the appropriate Tense forms.
4. Exercises on transferring information from Graph to Text – Bar charts, Flow charts.
5. Making sentences using Modal verbs to express probability, compulsion, etc.
6. Exercises on Writing Instructions.
7. Exercises on framing Questions.
8. Other relevant classroom activities.

L: 45 T: 15  TOTAL: 60 PERIODS
BOOK SUGGESTED FOR READING

REFERENCES
SH101 MATRICES AND DIFFERENTIAL CALCULUS
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
- Ability to find inverse and integral powers of matrices and to perform transformations of matrices.
- Ability to find the evolutes of various curves.
- Ability to solve ordinary and partial differential equations.
- Ability to obtain constrained maxima and minima.

UNIT I MATRICES 12
Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties (excluding proofs); Cayley – Hamilton theorem (excluding proof) – Inverse and integral powers of a matrix using Cayley – Hamilton theorem; Diagonalisation of a matrix by orthogonal transformation; Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT II DIFFERENTIAL CALCULUS 12
Curvature in cartesian, parametric and polar forms; Centre, radius and circle of curvature; Evolutes.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12
Partial derivatives; Total derivatives; Differentiation of implicit functions; Jacobians; Maxima and Minima - Method of Lagrangian multipliers.

UNIT IV ORDINARY DIFFERENTIAL EQUATIONS 12
Higher order linear differential equations with constant coefficients; Method of variation of parameters; Cauchy’s and Legendre’s linear equations; Simultaneous first order linear equations with constant coefficients.

UNIT V PARTIAL DIFFERENTIAL EQUATIONS 12
Formation of partial differential equations; Lagrange’s linear equations; Solutions of standard types of first order partial differential equations; Linear partial differential equations of second and higher order with constant coefficients.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
The students will be able to

- gain knowledge on the properties of matter and hydrodynamics.
- study and apply the ultrasonic methods for industrial and medical field.
- understand Lasers and to identify the appropriate Laser technique for industrial and medical field.
- understand the different types, fabrication, losses of optical fibers and the applications of fiber optics in communication and instrumentation.
- understand the physical properties of photons and electrons and to study the different Electron Microscopes.

UNIT I   PROPERTIES OF MATTER AND HYDRODYNAMICS  9
Properties of Matter
Stress, Strain, Hooke’s law; Types of moduli of elasticity; Torsional pendulum – Determination of Rigidity modulus of a wire; Bending of beams – Expression for bending moment – Measurement of Young’s modulus by uniform and Non-uniform bending – I Shaped girders.

Hydrodynamics
Stream line flow, Turbulent flow, Poiseuille’s formula for flow of liquid through a capillary tube, Determination of coefficient of viscosity of a liquid.

UNIT II  ULTRASONICS  9

UNIT III LASERS  9
Principle of spontaneous emission and stimulated emission, Population inversion, Pumping, Einstein’s A and B coefficients – derivation; Types of Lasers - CO2 Laser, Nd-YAG Laser, Semiconductor Laser (Homojunction); Determination of wavelength of Laser using grating and Particle size; Applications of Lasers: Industrial applications – Welding, Cutting and Heat treatment; Medical applications; Holography (construction and reconstruction).

UNIT IV FIBER OPTICS AND ITS APPLICATIONS  9
Principle and propagation of light in optical fibers; Numerical aperture and Acceptance angle; Types of optical fibers – material, refractive index and mode; Double crucible technique of fiber drawing; Splicing – fusion splicing; Loss in optical fiber – attenuation, dispersion and bending; Fiber optical communication system (Block diagram); Advantages and Applications of optical fiber; Fiber optic sensors – temperature and displacement; Endoscope.

UNIT V QUANTUM PHYSICS AND MICROSCOPY  9
Black body radiation – Planck’s theory (derivation) – Deduction of Wien’s displacement law and Rayleigh Jean’s Law from Planck’s theory; Photoelectric effect – Law of Photoelectric effect – Photoelectric equation; Matter Waves – De Broglie wavelength - Schrodinger’s wave equation – time independent and time dependent equations – Particle in one dimensional box; Heisenberg’s Uncertainty principle; Linear Harmonic oscillator; Electron microscope – scanning electron microscope – transmission electron microscope.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
SH103 ENGINEERING CHEMISTRY (Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
The students will be able to
• select suitable water treatment techniques for industrial and domestic purpose.
• acquire knowledge of electrochemistry.
• apply the contextual knowledge of adsorption techniques for industrial applications.
• synthesize polymers for domestic and industrial applications.
• understand the knowledge of nano materials for their applications in Science and Engineering.

UNIT I WATER TREATMENT 9

UNIT II ELECTRO ANALYTICAL TECHNIQUES 9
Electrode potential: definition, measurement of electrode potential, Nernst equation – problems; EMF: definition, measurement of EMF – Pogendorff’s method; reference electrode: standard hydrogen electrode, calomel electrode, glass electrode – measurement of pH using glass electrode; CO₂ sensing electrode; conductometric titrations: acid-base titration (HCl vs NaOH); potentiometric titrations: redox titration (Fe²⁺ vs K₂Cr₂O₇), precipitation titration (Ag⁺ vs NaCl).

UNIT III CATALYSIS AND SURFACE PHENOMENA 9
Types of catalysis – homogeneous catalysis – heterogeneous catalysis, mechanism of catalytic action - contact theory, catalytic promoters, catalytic poison; enzyme catalysis: Michaelis-Menten equation; adsorption: definition, types – physical adsorption – chemical adsorption – differences between physical and chemical adsorption; adsorption isotherms: definition, Freundlich and Langmuir adsorption isotherms, applications of adsorption.

UNIT IV ENGINEERING POLYMERS 9

UNIT V NANO MATERIALS 9
Nanoparticles: definition, carbon nanotubes (CNT), types of carbon nano tubes – single walled and multi walled carbon nanotubes – fullerene; synthesis of carbon nanotubes: chemical vapour deposition – laser ablation – arc-discharge method; properties of CNT: mechanical, electrical, thermal and optical properties; applications of carbon nanotubes in chemical field, medicinal field, mechanical field and current applications.

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES
SH104 FUNDAMENTALS OF COMPUTING AND PROGRAMMING IN C
(Common to all B.E. / B.Tech., Degree Programmes)

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COURSE OUTCOMES

- Learn the major components of a computer system.
- Formulate the algorithms and analyze their complexity.
- Identify the correct and efficient ways of solving problems.
- Acquire knowledge about dynamic memory allocation, modular programming and data organization.
- Develop real time applications using the power of C language features.

UNIT I COMPUTER FUNDAMENTALS
Classification of Computers – Basic Computer organization – Number Systems – Problem Analysis –

UNIT II BASIC C PROGRAMMING
Structure of C Program – Keywords, Constants, Variables and Data Types – Operators and

UNIT III FUNCTIONS, ARRAYS AND POINTERS
Functions: User-defined functions – Definitions – Declarations - Call by reference – Call by value.
Arrays: Declaration – Definition – Multidimensional Arrays – Functions with array as arguments.
Pointers: Initialization – Pointers as Arguments – Pointers to Pointers – Dynamic Memory
Management Functions.

UNIT IV STRUCTURES AND UNIONS
Derived types – Structures: Declaration – Definition – Initialization of structures – Accessing
structures – Nested structures – Arrays of structures – Structures and functions – Pointers to
structures – Self-referential structures – Unions.

UNIT V FILE HANDLING

TOTAL: 45 PERIODS

TEXT BOOKS
   Kindersley (India), 2011.

REFERENCES
   Education Inc., 2005.
SH105  ENGINEERING GRAPHICS
(Common to all B.E. / B.Tech., Degree Programmes)  L T P C
2 3 0 4

COURSE OUTCOMES
• Students will be able to use the drawing instruments effectively.
• An ability to draw the basic engineering curves and problems related to projections of points, straight lines, planes and solids.
• Able to apply the knowledge acquired on practical applications of sectioning and development of solids.
• Able to draw simple solids and its sections in isometric view and projections and also to draw its perspective views.

Drawing Instruments – IS specifications on lines – drawing sheets – Printing letters and dimensioning – scales (not for examination) – First angle projection should be followed.

UNIT I  PLANE CURVES 12
Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloids – Epi and Hypo cycloids - construction of involutes of square and circle – Drawing of tangents and normal to the above curves.

UNIT II  PROJECTION OF POINTS, LINES AND PLANE SURFACES 12
Projection of points and straight lines located in the first quadrant – Traces – Determination of true lengths and true inclinations.
Projection of regular polygonal surfaces and circular lamina inclined to any one reference plane.

UNIT III  PROJECTION OF SOLIDS 12
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

UNIT IV  SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 12
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – obtaining true shape of section.
Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinder and cone – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.

UNIT V  ISOMETRIC AND PERSPECTIVE PROJECTIONS 12
Perspective projection of prisms, pyramids and cylinders by visual ray method and vanishing point method.

TOTAL: 60 PERIODS

Note: In end semester examination from each unit one question with either or pattern may be asked. No short questions.

TEXT BOOK

REFERENCES
COURSE OUTCOMES

- Acquire logical thinking and problem solving skills.
- Implement the algorithms and analyze their complexity.
- Identify the correct and efficient ways of solving problems.
- Acquire hands on practice in dynamic memory allocation, modular programming and data organization.
- Implement real time applications using the power of C language features.

LIST OF EXPERIMENTS

1. Solve problems such as temperature conversion, student grading, interest calculation.
2. Finding the 2’s complement of a binary number.
3. Generation of the first ‘n’ terms of the Fibonacci sequence and prime sequence.
5. Given distance traveled by a vehicle as \( d = ut + \frac{1}{2}at^2 \), where ‘u’ and ‘a’ are the initial velocity and acceleration. Calculate the distance traveled for different time intervals.
6. Solving the roots of a quadratic equation.
7. Designing a simple arithmetic calculator. (Use switch statement)
8. Performing the following operations: (Use loop statement)
   i. Generate Pascal’s triangle.
   ii. Construct a Pyramid of numbers.
9. Performing the following operations to a string:
   i. To insert a sub-string into main string at a given position.
   ii. To delete ‘n’ characters from a given position in a string.
   iii. To replace a character of string either from beginning or ending or at a specified location.
10. Performing the following operations: (Use arrays)
    i. Matrix addition.
    ii. Transpose of a matrix.
    iii. Matrix multiplication by checking compatibility.
11. Performing the following operations: (Use recursive functions)
    i. To find the factorial of a given integer.
    ii. To find the GCD (Greatest Common Divisor) of two given integers.
    iii. To solve Towers of Hanoi problem.
12. Performing the Student Information Processing using File Handling concepts.

TOTAL: 45 PERIODS

SOFTWARE REQUIREMENTS

- Turbo C/ ANSI C Compiler
- Gcc compiler
PHYSICS AND CHEMISTRY LABORATORY – I
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
At the end of the Laboratory classes, the students are able to
• develop collaborative learning skills and to add some of their own ideas to the experiments and their explanations.
• understand the optical properties, mechanical properties and electrical properties.

LIST OF EXPERIMENTS
1. (a) Particle size determination using Diode Laser.
   (b) Determination of Laser parameters – Wavelength, and angle of divergence.
   (c) Determination of Numerical aperture and acceptance angle of an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of the liquid – Ultrasonic Interferometer.
5. Determination of Young’s modulus – Non-uniform bending method.
7. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge.
   • A minimum of FIVE experiments shall be offered.

PART B - CHEMISTRY LABORATORY – I

COURSE OUTCOMES
The student
• can estimate the amount of hardness and acidity present in the water sample.
• gain knowledge about the estimation of nickel in an alloy.
• quantify the electrolyte by measuring the conductance and pH.

LIST OF EXPERIMENTS
1. Estimation of hardness of Water sample by EDTA method.
2. Estimation of acidity of Water sample.
3. Estimation of Nickel by EDTA method.
4. Conductometric titration (HCl Vs NaOH).
5. Conductometric titration (BaCl₂ Vs Na₂SO₄).
6. pH metric titration (HCl Vs NaOH).
7. Determination of molecular weight and degree of polymerization using Viscometry.
   • A minimum of FIVE experiments shall be offered.
   • Laboratory classes on alternate weeks for Physics and Chemistry.

TOTAL: 45 PERIODS
SH108 ENGINEERING PRACTICES LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
• Students will be able to prepare the pipe connections and identify the various components
  used in plumbing.
• An ability to prepare simple wooden joints using wood working tools.
• An ability to prepare simple lap, butt and tee joints using arc welding equipments.
• An ability to prepare simple components using lathe and drilling machine.

PART A – MECHANICAL AND CIVIL ENGINEERING PRACTICES

I PLUMBING WORKS:
Study of components related to plumbing.
Hands-on-exercise:
Basic pipe connections – Mixed pipe material connection – Pipe connections with
different joining components.

II CARPENTRY PRACTICES:
Study of the joints in roofs, doors, windows and furniture.
Hands-on-exercise:
Wood work, joints by sawing, planning and cutting.

III WELDING:
Study of the tools used in welding Gas welding practice.
Preparation of butt joints, lap joints and tee joints using arc welding.

IV BASIC MACHINING:
(a) Simple Turning and Taper turning.
(b) Drilling Practice.

REFERENCES
PART B – ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICES

COURSE OUTCOMES

- An ability to develop familiarity with rudimentary measurement equipment – signal generators, oscilloscopes, multimeters and power supplies.
- Ability to demonstrate and evaluate the parameters of basic electronic components (wires, resistors, capacitors, diodes etc.) based on their physical parameters and dimensions.
- Define, describe, and analyze fundamentals of Boolean algebra and digital logic gates.
- An ability to predict qualitatively and quantitatively compute the steady state AC responses of basic circuits using the phasor method.
- Gain experience in the documentation of measurements and procedures as well as the preparation of formal reports.

I ELECTRICAL ENGINEERING PRACTICE

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
5. Measurement of energy using single phase energy meter.

II ELECTRONICS ENGINEERING PRACTICE

1. Study of Electronic components and equipments – Resistor, colour coding, measurement of AC signal parameters (peak-peak, rms period, frequency) using CRO
2. Study of logic gates AND, OR, XOR and NOT.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

REFERENCES

COURSE OUTCOMES
The student will be able to
• apply correct form of language while Speaking and Writing.
• prepare his own Professional letter writings.
• interpret any passage after listening.
• interact at different situations fluently.

UNIT I 10
Language Focus: Homonyms, Different grammatical forms of the same word, correct usage of Words / phrases.
Writing: Recommendation writing.
Listening: Interpreting Poetic lines.
Speaking: Telephone English.

UNIT II 9
Language Focus: Cause and Effect, Phrasal Verbs.
Listening: Conversations.
Speaking: Asking questions.

UNIT III 9
Language Focus: Idioms and Phrases with animal names.
Writing: Checklist, Process Description.
Speaking: Presentations.

UNIT IV 9
Language Focus: Technical Definitions, Transformation of Sentences.
Writing: Job Application Letter, Curriculum Vitae, Bio-data, Resume.
Speaking: Mock Interview.

UNIT V 8
Language Focus: British and American Vocabulary, Numerical Expressions.
Writing: E-mail Writing, Report Writing.
Speaking: Group Discussion.

SUGGESTED ACTIVITIES
1. Making sentences using different grammatical forms of the same word.
2. Exercises on combining sentences using Cause and Effect expressions.
4. Writing exercises on Recommendations.
5. Exercises on Idioms and Phrases.
7. Exercises on British and American English words with meanings.

TOTAL: 45 PERIODS

BOOK SUGGESTED FOR READING
REFERENCES
13F21 INTEGRAL CALCULUS AND TRANSFORMS
(Common to all B.E. / B.Tech., Degree Programmes) L T P C
3 1 0 4

COURSE OUTCOMES
• Ability to find area and volume of objects using double and triple integrals.
• Ability to analyze the concepts related to vector calculus and to apply them in engineering field.
• Ability to perform the ideas of Laplace transform and Z-transform in their respective engineering subjects.

UNIT I MULTIPLE INTEGRALS
Double integration – Cartesian and polar coordinates; Change of order of integration; Change of variables between cartesian and polar coordinates; Triple integration in cartesian coordinates; Area as double integral; Volume as triple integral.

UNIT II VECTOR CALCULUS
Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields; Vector integration – Green’s theorem in a plane, Gauss divergence theorem and Stoke’s theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.

UNIT III LAPLACE TRANSFORM

UNIT IV INVERSE LAPLACE TRANSFORM
Definition of Inverse Laplace transform – Convolution theorem – Solution of linear ordinary differential equations of second order with constant coefficients using Laplace transformation techniques and solution of simultaneous differential equations of first order with constant coefficients using Laplace transformation techniques.

UNIT V Z – TRANSFORM

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
The Student will
• identify the crystal lattices, their structures and how the structure influences its major properties at different levels.
• choose the major functional and structural properties required for specific applications of conducting materials
• check the parameters that satisfy the superconducting behaviours.
• relate technology to the physics of semiconductor devices.
• understand the physics underlying the magnetic behaviour of materials.
• Explain the mechanism by which electric field interacts with materials and their applications
• suggest materials based concepts to improve the properties and performance under given circumstances.

UNIT I       CRYSTAL PHYSICS                                                                                        9
Lattice, Unit cell, Bravais lattice, Lattice planes; Miller indices – d-spacing in cubic lattice; Calculation of number of atoms per unit cell, Atomic radius, Coordination number and Packing factor for SC, BCC, FCC and HCP structures; Crystal defects – point, line and surface defects; Burger vector.

UNIT II   CONDUCTING MATERIALS AND SUPERCONDUCTORS                    9
Conductors

Superconductors
Superconductivity: Properties – Meissner effect – Isotopic effect; Types of superconductors – Type I and Type II superconductors; Applications of superconductors – Magnetic levitation.

UNIT III    SEMICONDUCTORS                                                                                      9
Intrinsic semiconductor – carrier concentration derivation – Fermi level – variation of Fermi level with temperature – electrical conductivity – bandgap determination; Extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration; Hall effect – Determination of Hall coefficient – Applications.

UNIT IV    MAGNETIC MATERIALS AND DIELECTRIC MATERIALS                9
Magnetic materials

Dielectric materials
Electrical susceptibility, dielectric constant, Types of Polarization – electronic, ionic, orientation and space charge polarization – frequency and temperature dependence of polarization; Internal field – Clausius-Mosotti relation (derivation); dielectric loss, dielectric breakdown, Uses of dielectric materials in capacitor and transformer.
UNIT V  NEW ENGINEERING MATERIALS  9
Metallic glasses: preparation, properties and applications; Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA; Nano materials: synthesis – chemical vapor deposition – sol-gels – ball milling; properties of nano particles and applications; Solar cell – PN junction solar cell – Conversion efficiency and solar concentration – Hetero junction solar cell; Classification of Biomaterials and its applications.

TOTAL: 45 PERIODS

TEXT BOOKS  

REFERENCES  
13F23  CHEMISTRY FOR CIVIL ENGINEERING

COURSE OUTCOMES
The students
• can identify the types of corrosion and to design a method to control the corrosion.
• gain the knowledge about ceramics, refractories and abrasives.
• can select proper building materials for desired structural application.
• understand the importance of alloys and ensuring the water quality standard for construction purpose.

UNIT I  CORROSION AND ITS CONTROL  9

UNIT II  PROTECTIVE COATINGS AND ADHESIVES  6
Organic coating: paints – constituents and their functions; special paints – fire retardant, water repellent, temperature indicating and luminous paints; varnishes, lacquers and enamels; adhesive: definition, adhesive action, development of adhesive strength, physical and chemical factors influencing adhesive action – bonding process by adhesives, classification of adhesive.

UNIT III  CHEMISTRY OF BUILDING MATERIALS  12

UNIT IV  METALS IN BUILDING INDUSTRY  9

UNIT V  CERAMICS, REFRACTORIES AND ABRASIVES  9
Ceramics: clay products, white wares, manufacture, uses; refractories: definition, characteristics, classification – acidic, basic and neutral refractories; properties: refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling; manufacture of alumina bricks; abrasives: definition, Moh’s scale, classification – natural abrasives – diamond, corundum, emery, quartz, garnet – synthetic abrasives – carborundum, norbide.

TOTAL: 45 PERIODS

TEXT BOOKS
REFERENCES
13F24  ENGINEERING MECHANICS  L T P C  
(Common to Mechanical and Civil)  3 1 0 4

COURSE OUTCOMES
• An ability to use the basic concept of force systems and solve problems.
• An ability to implement the knowledge acquired in supports, reactions, equilibrium of rigid bodies for solving problems.
• The students gain an ability to predict centre of gravity, moment and product moment of inertia of simple configurations.
• An ability to solve practical problems on Projectiles, Newton’s laws, work-energy and impulse momentum.
• An ability to apply the principles of friction and rigid body dynamics to analyze and solve problems.

UNIT I  BASICS AND STATICS OF PARTICLES  12

UNIT II  EQUILIBRIUM OF RIGID BODIES  12

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  12
Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration – T section, I section – Angle section, Hollow section by using standard formula – second and product moments of plane area – Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula – Parallel axis theorem and perpendicular axis theorem.

UNIT IV  DYNAMICS OF PARTICLES  12

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  12

L: 45  T: 15  TOTAL: 60 PERIODS

TEXT BOOK

REFERENCES
13F25  BASIC ELECTRICAL AND ELECTRONICS ENGINEERING  
(Commercial to Mechanical and Civil)  L T P C  3 1 0 4

COURSE OUTCOMES
- Describe the basic concepts of electric circuits and measuring instruments.
- Discuss the principle of electrical machines.
- Summarize the concepts of semiconductor devices and electronic circuits.
- Solve basic binary operations and code conversion techniques using the logic gates.
- Explain the fundamentals of communication engineering.

UNIT I  ELECTRICAL CIRCUITS AND MEASUREMENTS  12
- Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Wattmeters and Energy meters.

UNIT II  ELECTRICAL MACHINES  12

UNIT III  SEMICONDUCTOR DEVICES AND APPLICATIONS  12

UNIT IV  DIGITAL ELECTRONICS  12

UNIT V  FUNDAMENTALS OF COMMUNICATION ENGINEERING  12
- Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

L: 45  T: 15  TOTAL: 60 PERIODS

TEXT BOOKS

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

- Demonstrate how to use the UNIX Shell commands.
- Use the Shell programming constructs.
- Learn tracing mechanisms (for debugging), user variables, Shell variables, read-only variables, positional parameters, reading input to a Shell script.
- Test on numeric values, test on file type, and test on character strings using shell scripts.
- Write moderately complex Shell scripts and make them executable.

Execute programs written in C under UNIX environment.

LIST OF EXPERIMENTS

1. Study of UNIX OS, vi Editor.

2. Use of Basic UNIX Shell Commands:
   - ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit.

3. Shell Programming:
   i. Interactive shell scripts
   ii. Positional parameters
   iii. Arithmetic Operators
   iv. if-then-fi, if-then-else-fi, nested if-else
   v. Logical operators
   vi. if - elif, case structure
   vii. while, until, for loops, use of break
   viii. Metacharacters

4. Shell scripts for the following:
   i. Showing the count of users logged in
   ii. Printing column wise list of files in your home directory
   iii. To count lines, words and characters in its input (do not use wc)

5. C Programming on UNIX:
   i. Dynamic Storage Allocation
   ii. Pointers
   iii. Functions
   iv. File Handling

SOFTWARE REQUIREMENTS
- UNIX/LINUX OS
- Gcc compiler

TOTAL: 45 PERIODS
PART A - PHYSICS LABORATORY – II

COURSE OUTCOMES
At the end of the Laboratory classes, the students
- demonstrate and report the elastic behaviour of materials
- demonstrate the interference property of light waves
- demonstrate the diffraction property of light waves
- measure the thermal properties of conducting materials
- identify the substance that deforms continuously when subjected to shearing stress.

LIST OF EXPERIMENTS
1. Determination of Young’s modulus – Uniform bending method.
2. Determination of Band Gap of a semiconductor material.
3. Determination of Hall Co-efficient.
5. Determination of wavelength of mercury spectrum using spectrometer and grating
7. Torsional pendulum – Determination of Moment of Inertia of the disc and Rigidity modulus of the material of the wire.

* A minimum of FIVE experiments shall be offered.

PART B - CHEMISTRY LABORATORY – II

COURSE OUTCOMES
The student
- can estimate the amount of alkalinity and Dissolved Oxygen (DO) present in the water sample.
- gain knowledge in the estimation of copper in an alloy and iron in rust.
- quantify electrolyte and ion by measuring the conductance and emf.

LIST OF EXPERIMENTS
1. Estimation of copper in brass by EDTA method.
2. Determination of Dissolved Oxygen (DO) in water (Winkler’s method)
3. Estimation of alkalinity of Water sample
4. Estimation of Fe$^{3+}$ ion in rust by Dichrometry
5. Conductometric titration (Mixture of acids vs NaOH)
6. Potentiometric Titration (Fe$^{2+}$ vs K$_2$Cr$_2$O$_7$)
7. Estimation of Fe$^{2+}$ ion by spectrophotometry.

TOTAL: 45 PERIODS

* A minimum of FIVE experiments shall be offered.
* Laboratory classes on alternate weeks for Physics and Chemistry.
13F28 COMPUTER AIDED DRAFTING AND MODELING LABORATORY
(Common to Mechanical and Civil)

COURSE OUTCOMES

- An ability to use software for constructing curves, solids.
- An ability to create orthographic views and sectional view of the solids.
- An ability to create plan of residential building.
- An ability to draw isometric and pictorial views.

List of exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola involutes using Bspline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

TOTAL: 45 PERIODS

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students

1. Pentium IV computer or better hardware with suitable graphics facility – 30 Nos.
2. Licensed software for Drafting and Modeling – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 Nos.
13F29 ENGLISH LANGUAGE SKILL LABORATORY
(Common to all B.E. / B.Tech., Degree Programmes)

COURSE OUTCOMES
The Student will
• improve their pronunciation skill.
• gather information from any speech.
• imbibe the stress and intonation of the native speakers’ accent.

1. Micro Skills
   ▪ Spotting the Homonyms / Silent letter words / mispronounced words
   ▪ Identifying the missing words in native speech
   ▪ Finding the cluster words
   ▪ Marking correct punctuation
   ▪ Marking word chunks
   ▪ Identification of sentences

2. Content Comprehension and making inferences
   ▪ Listening to audio files of Speech, Poetry, Recent Issues, News clippings, etc
     a. True / False
     b. Multiple Choice Questions
     c. Filling the blanks
     d. Filling the charts

3. Listen and Act
   ▪ Drawing the map using audio
   ▪ Picture completing task
   ▪ Transferring data to Graph

4. Interpreting the video clippings

5. Listening to Conversations

TOTAL: 30 PERIODS
COURSE OUTCOMES
On successful completion of the course, the students should be able to
- Perform Fourier series analysis of the functions.
- Implement the properties of Fourier transforms and Compute the Fourier transforms of various functions.
- Calculate the Fourier series solution of Wave and Heat equations.
- Grasp analytic functions and their properties and be introduced to the host of conformal mappings with suitable examples that have direct application.
- Understand the basics of complex integration and the concept of contour integration encountered in practice.

UNIT I   FOURIER SERIES  12

UNIT II   FOURIER TRANSFORMS  12

UNIT III   APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  12
Solutions of one dimensional wave equation – One dimensional equation of heat conduction– Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV   ANALYTIC FUNCTIONS  12
Functions of a complex variable – Analytic functions – Necessary and Sufficient conditions excluding proofs) – Harmonic and orthogonal properties of analytic functions – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w= z+c, cz, 1/z and bilinear transformation.

UNIT V   COMPLEX INTEGRATION  12
Complex integration – Statement and applications of Cauchy’s integral theorem and Cauchy’s integral formula (excluding proofs) – Taylor’s and Laurent’s expansions – Singular points – Residues – Residue theorem (excluding proof) – Application of residue theorem to evaluate real integrals – Unit circle and semi-circular contour(excluding poles on boundaries).

L: 45 T:15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13CE32  ENVIRONMENTAL SCIENCE AND ENGINEERING
(Common to all B.E./B.Tech. Degree Programmes)
L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of course the student will be able to
• Understand the various ecosystem and biodiversity
• Classify the different types of natural resources and identify the role of individual in
  conservation of resources
• Identify and analyse the causes, effects and control measures of environmental pollution
• Identify the different types of environmental hazards and their management
• Analyse the social issues related to the environment and how human population affect the
  environment

UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  9
Definition, scope and importance of environment – need for public awareness - concept of an
ecosystem – structure and function of an ecosystem – producers, consumers and decomposers– energy
flow in the ecosystem – food chains, food webs and ecological pyramids – Introduction, types,
characteristic features, structure and function of the (a) forest ecosystem (b) aquatic (pond)
cecosystems. Field study of simple ecosystems –pond and forest. Introduction to biodiversity:
definition - genetic, species and ecosystem diversity – value of biodiversity: consumptive use,
productive use, social, ethical, aesthetic and option values –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. Field study of common plants, insects, birds.

UNIT II  NATURAL RESOURCES  9
Forest resources: Use and over-exploitation, deforestation, case studies- dams and their effects on
forests and tribal people – Water resources: Use and overutilization of surface and ground water –
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: Growing energy needs, renewable and non renewable energy sources, case studies – role of
an individual in conservation of natural resources – Equitable use of resources for sustainable
lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill /
mountain.

UNIT III  ENVIRONMENTAL POLLUTION  9
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil
pollution (d) Noise pollution (e) Nuclear hazards – solid waste management: causes, effects and
control measures of municipal solid wastes – e-Waste: Definition-dimension of the problem - source-
toxic Substances in e-waste - risks related to toxic substances–environmental problems-role of an
individual in prevention of pollution.

UNIT IV  ENVIRONMENTAL HAZARDS  9
Environmental hazards: Definition – Hazard- Types-Natural and man-made hazards – Natural
hazards: Causes, effect and management of Earthquake, Flood, Landslide, Cyclones and Tsunami;
Man-made Hazards: Hazards due to dams and reservoirs, hazards due to nuclear power plant,
Industrial hazards. Case study: Chernobyl disaster, Bhopal gas tragedy.

UNIT V  SOCIAL ISSUES, HUMAN POPULATION AND THE ENVIRONMENT  9
Water conservation: rain water harvesting-climate change: global warming, acid rain, ozone layer
depletion-Population growth, variation among nations – population explosion – family welfare
of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
13CE33 MECHANICS OF SOLIDS L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to
- Identify stress, strain, deformation of solids and torsion in shafts & springs.
- Analyze plane truss, thin cylinders, shells and shear stresses.
- Dramatize bending moment and shear force diagram for different types of beams.

UNIT I STRESS STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS 12

UNIT II ANALYSIS OF PLANE TRUSS, THIN CYLINDERS / SHELLS 12
Stability and equilibrium of plane frames – types of trusses – analysis of forces in truss member’s method of joints, method of sections, method of tension coefficients – thin cylinders and shells – under internal pressure – deformation of thin cylinders and shells.

UNIT III TRANSVERSE LOADING ON BEAMS 12

UNIT IV DEFLECTION OF BEAMS AND SHEAR STRESSES 12

UNIT V TORSION AND SPRINGS 12
Stresses and deformation in circular (solid and hollow shafts) – stepped shafts – shafts fixed at both ends – leaf springs – stresses in helical springs – deflection of springs.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13CE34 MECHANICS OF FLUIDS L T P C
3 1 0 4

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

• Perform unit conversion related to basic fluid properties, fluid statics and fluid dynamics including concepts of mass and momentum conservation
• Apply and analyse hydrostatic forces and moments on submerged and partially submerged surfaces
• Manipulate Bernoulli equation and continuity principle, and their application to simple flows
• Comply frictional and major losses for laminar and turbulent flows in pipes
• Evaluate dimensional analysis to determine appropriate dimensionless parameters and use the parameter for scaling and other model/prototype problems

UNIT I DEFINITIONS AND FLUID PROPERTIES 10
Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum Concept of system and control volume

UNIT II FLUID STATICS AND KINEMATICS 14
Pascal’s Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Metacentre – Pressure measurement – Fluid mass under relative equilibrium
Fluid Kinematics
Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets – Velocity measurement (Pilot tube, current meter, Hot wire and hot film anemometer, float technique, Laser Doppler velocimetry)

UNIT III FLUID DYNAMICS 13
Euler and Bernoulli’s equations – Application of Bernoulli’s equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poiseuille equation – Turbulent flow – Darcy – Weisbach formula – Moody diagram – Momentum Principle

UNIT IV BOUNDARY LAYER AND FLOW THROUGH PIPES 13
Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Development of laminar and turbulent flows in circular pipes – Major and minor losses of flow in pipes – Pipes in series and in parallel – Pipe network

UNIT V SIMILITUDE AND MODEL STUDY 10
Dimensional Analysis – Rayleigh’s method, Buckingham’s Pi-theorem – Similitude and models – Scale effect and distorted models.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13CE35 SURVEYING – I

L T P C
3 1 0 4

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to
- Order the basic principle of chain surveying
- Describe the working principle of compass and plane table surveying
- Demonstrate the application of leveling in the field surveying
- Formulate surveys in civil engineering related works.

UNIT I INTRODUCTION AND CHAIN SURVEYING 12
Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II COMPASS SURVEYING AND PLANE TABLE SURVEYING 12

UNIT III LEVELLING AND APPLICATIONS 14
Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

UNIT IV THEODOLITE SURVEYING 10
Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale’s tables - Omitted measurements.

UNIT V ENGINEERING SURVEYS AND MODERN INSTRUMENTS 12
Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Mine Surveying - instruments - Tunnels - Correlation of under ground and surface surveys - Shafts - Adits. Electromagnetic distance measurement - Carrier waves - Principles – Instruments –Total Station –GPS.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of the course, the student will be able to
- Identify the concepts of geological formations, classification and morphology of rocks,
- Translate the importance of geology with respect to foundation of structures like dams, bridges, buildings, etc.
- Demonstrate the geological formation in causing earthquakes and land slides.

UNIT I   GENERAL GEOLOGY

UNIT II   MINERALOLOGY
Elementary knowledge on symmetry elements of important crystallographic systems – physical properties of minerals – study of the following rock forming minerals – Quartz family. Feldspar family, Augite, Hornblende, Biotite, Muscovite, Calcite, Garnet – properties, behaviour and engineering significance of clay minerals – Fundamentals of process of formation of ore minerals – Coal and petroleum – Their origin and occurrence in India.

UNIT III   PETROLOGY
Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks. Description occurrence, engineering properties and distribution of following rocks. Igneous rocks – Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite and Basalt Sedimentary rocks sandstone, Limestone, shale congl, Conglomerate and breccia. Metamorphic rocks. Quartzite, Marble, Slate, Phyllite, Gniess and Schist.

UNIT IV   STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD
Attitude of beds – Outcrops – Introduction to Geological maps – study of structures – Folds, faults and joints – Their bearing on engineering construction. Seismic and Electrical methods for Civil Engineering investigations

UNIT V   GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
13CE37 SURVEY PRACTICAL – I

COURSE OUTCOMES

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

- Categorize the practical usage of chain and compass traversing
- Examine the concepts of leveling and tachometry survey in the field.

LIST OF EXPERIMENTS

1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Resection – Three point problem
8. Plane table surveying: Resection – Two point problem
9. Study of levels and levelling staff
10. Fly levelling using Dumpy level & Tilting level
11. Check levelling
12. Study of theodolite
13. LS and CS
14. Measurement of horizontal angles by reiteration and repetition and vertical angles

TOTAL: 45 PERIODS

SURVEY PRACTICAL I & SURVEY PRACTICAL II

LIST OF EQUIPMENTS

(For a batch of 30 students)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description of Equipments</th>
<th>Quantity</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>Total Station</td>
<td>2 Nos</td>
</tr>
<tr>
<td>2</td>
<td>Theodolites</td>
<td>Atleast 1 for every 5 Student</td>
</tr>
<tr>
<td>3</td>
<td>Dumpy level</td>
<td>Atleast 1 for every 5 Student</td>
</tr>
<tr>
<td>4</td>
<td>Plain table</td>
<td>Atleast 1 for every 5 Student</td>
</tr>
<tr>
<td>5</td>
<td>Prismatic compass</td>
<td>6 Nos</td>
</tr>
<tr>
<td>6</td>
<td>Pocket stereoscope</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Ranging rods</td>
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<tr>
<td>8</td>
<td>Levelling staff</td>
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<td>9</td>
<td>Cross staff</td>
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<tr>
<td>10</td>
<td>Chains</td>
<td>1 for a set of 5 student</td>
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<tr>
<td>11</td>
<td>Tapes</td>
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<tr>
<td>12</td>
<td>Arrows</td>
<td></td>
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</tbody>
</table>
13CE38 COMPUTER AIDED BUILDING DRAWING L T P C 0 0 3 2

COURSE OUTCOMES

- Generalize basic concepts of various elements of Residential / Institutional / Workshop buildings.
- Identify and practice AutoCAD to draw truss structures, plan, elevation and sectional view of a building.

LIST OF EXPERIMENTS

1. Buildings with load bearing walls (Flat and pitched roof) – Including details of doors and windows
2. RCC framed structures
3. Industrial buildings – North light roof structures – Trusses
4. Perspective view of one and two storey buildings

TOTAL: 45 PERIODS

TEXT BOOKS

1. Varma B.P, Civil Engineering Drawing & House Planning, Khanna publishers, Delhi

REFERENCES


LIST OF EQUIPMENTS

(For a batch of 30 students)

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Description of Equipments</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Computer system of Pentium IV or Equivalent</td>
<td>1 for each student</td>
</tr>
<tr>
<td>2.</td>
<td>Licensed version of any reputed Analysis, Design &amp; Drafting software</td>
<td>1 copy for a set of 3 student</td>
</tr>
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</table>
13CE39 COMMUNICATION SKILLS AND TECHNICAL SEMINAR L T P C

0 0 3 2

COURSE OUTCOMES
The student will
- express themselves fluently and appropriately in social and professional contexts.
- develop the sub-skills required for paper presentations and group discussions.
- acquire the soft skills and interpersonal skills which will help them to excel in their workplace.

A) LANGUAGE FUNCTIONS

1. Compare and contrast
2. Giving reasons
3. Reporting
4. Expressing agreement and disagreement
5. Evaluating different standpoints
6. Analyzing a problem and giving solution.
7. Describing daily routines, events, and weather
8. Describing Objects
9. Defending a point of view
10. Talking about future plans and intentions

Language Functions:
The teacher should build micro activities to develop the use of language required to handle these Sub-
functions of communication. In the process, the learners should get used to the linguistic. Elements
needed for these functions.

B) SPEECH PRACTICE

1. Cloning
2. Artificial satellites
3. Renewable sources
4. Telecommunication
5. Cyber Revolution
6. Space research
7. Polythene pollution
8. Fossil fuels
10. Ecological threats
11. Water resources
12. Nuclear technology
13. Scientific farming
14. Thermal power plants
15. Nano Technology
16. Robotics
17. Artificial intelligence
18. Role of Fibre Optics
19. Exploration of Mars
20. Gas turbines
21. Indian space missions
22. Converting agricultural wastes for useful purposes
23. Developments in transportation
24. Scientific Farming
25. Impact of global warming
26. Desalination of water
27. Technology for national security
28. Industrial development and ecological issues
29. Recent trends in Automobiles
30. Hazards of E-waste
31. Mobile Jammer
32. Touch Screen Technology
33. Tidal Power
34. 3G Technology
35. Tsunami Warning System
36. Blue Tooth Technology

Seminar presentation on the themes allotted:
Each student should collect materials from Books, Internet, Journals and Newspapers for his/her theme and prepare a short Seminar Paper for 4 to 5 Pages. The presentation should be for 10 minutes using power point frames. It should be followed by a Viva Voce during which others should come forward to question, clarify, supplement or evaluate.

C) GROUP DISCUSSION / DEBATE 10
Grouping (each group consisting of 12 members)
Topics (12 topics – 3 topics to be selected by each group - to be practiced in cycles)

Group Discussion / Debate Topics:
1. Advertising is a legalized form of lying- Discuss.
2. Communicative competency in English is the golden key for success in the Global arena.
3. Is it just to force people to retire?
4. Attitude decides one’s altitude in life.
5. Should an aspiring student go for a course which is in demand or for a course which he / she likes?
6. Is westernization a cultural degradation or enrichment?
7. Is Brain drain a threat to India?
9. Do Mobile phones spoil the youth?
10. No two generations see eye to eye- Discuss.
11. Is scientific advancement a boon or a bane?
12. Does ragging develop friendship?

D) SPEAKING ON THE GIVEN PICTURE/DIAGRAM/CHART/TABLE 5
RECORD LAY OUT:
Every student has to maintain a record in which he/she has to incorporate the following details.

- First page containing learner details and the topic of specialization
- Use of appropriate Language used in Language Function should be listed.
- Three newspaper cuttings or journal or internet sources related to the specialized theme. (To be pasted on the pages)
- 10 Quiz questions of the specialized topic with expected answers.
- The seminar paper presented by the learner (to be pasted).
- Notes of observation - Lab. (Details about Interview skills – GD – Soft skills)
- The record should be duly signed by the course teacher and submitted to the External Examiner for verification during the semester practical.

TOTAL: 45 PERIODS

REFERENCES
13CE41 PROBABILITY, STATISTICS AND NUMERICAL METHODS  

COURSE OUTCOMES

At the end of the course, students should be able to

- Understand the concepts of probability, random variables and their distributions.
- Apply the concepts of estimation (confidence intervals) and hypothesis testing for population averages and percentages.
- Analyze the appropriate tabular for displaying design of experiments.
- Able to use numerical techniques for solving linear system of equations and numerical integration problems.
- Demonstrate the utility of numerical techniques of ordinary differential equations.

UNIT I ONE DIMENSIONAL RANDOM VARIABLES AND ITS DISTRIBUTIONS  12

Discrete and continuous random variables –Moments, Moment generating functions and their properties- Discrete distributions: Binomial and Poisson– Continuous distribution: Normal distribution.

UNIT II TESTING OF HYPOTHESIS  12

Sampling distributions - Tests for single mean, Proportion, Difference of means (for large and small samples) – Tests for single variance and equality of variances – Chi-square test for goodness of fit – Independence of attributes.

UNIT III DESIGN OF EXPERIMENTS  12

Completely randomized design – Randomized block design – Latin square design.

UNIT IV SOLUTION OF EQUATIONS AND NUMERICAL INTEGRATION  12


UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS  12


L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES

13CE42  STRNGTH OF MATERIALS  L T P C  3 1 0 4

COURSE OUTCOMES
Upon successful completion of the course, the student will be able to
• Recognize the concept of Forces and their effects with suitable protective measures
• Analyze structures as determinate and indeterminate
• Acquire Knowledge on Energy principles, Columns and State of stress

UNIT I  ENERGY PRINCIPLES  12
Strain energy and strain energy density – strain energy in traction, shear in flexure and torsion –
castigiano’s theorems – principle of virtual work – application of energy theorems for computing
deflections in beams and trusses – Maxwell’s reciprocal theorems

UNIT II  INDETERMINATE BEAMS  12
Propped cantilever and fixed beams-fixed end moments and reactions for concentrated load (central,
non central), uniformly distributed load, triangular load (maximum at centre and maximum at end) –
theorem of three moments – analysis of continuous beams – shear force and bending moment
diagrams for continuous beams

UNIT III  COLUMNS  12
Eccentrically loaded short columns – middle third rule – core section – columns of unsymmetrical
sections – (angle channel sections) – Euler’s theory of long columns – critical loads for prismatic
columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns –
thick cylinders – compound cylinders.

UNIT IV  STATE OF STRESS IN THREE DIMENSIONS  12
Spherical and deviatory components of stress tensor - determination of principal stresses and principal
planes – volumetric strain – dilatation and distortion – theories of failure – principal stress dilatation –
principal strain – shear stress – strain energy and distortion energy theories – application in analysis of
stress, load carrying capacity and design of members – residual stresses

UNIT V  ADVANCED TOPICS IN BENDING OF BEAMS  12
Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – curved beams –
Winkler Bach formula – stress concentration – fatigue and fracture.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS
Jan-2008.

REFERENCES
COURSE OUTCOMES
Upon successful completion of the course, the student will be able to

- Reproduce the basics of hydraulics such as the occurrence, movement and use of water
- Express specific energy principles to assess flow depth and velocity flows in open channel systems
- Analyse rapidly varied channel-flow and dam break problems by the method of characteristics
- Derive flow calculation for weirs and various types of water measurement devices and demonstrate their application to measure flow, velocity and pressure
- Examine the pumps for various engineering applications based on pump performance curves without incurring cavitations.

UNIT I OPEN CHANNEL FLOW
Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation – channel transition.

UNIT II UNIFORM FLOW
Uniform flow – Velocity measurement – Manning’s and Chezy’s formula – Determination of roughness coefficients – Determination of normal depth and velocity – Most economical sections – Non-erodible channels

UNIT III VARIED FLOW

UNIT IV PUMPS
Centrifugal pump - minimum speed to start the pump – multistage Pumps – Jet and submersible pumps - Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done - rotary pumps.

UNIT V TURBINES
Turbines - draft tube and cavitations – Application of momentum principle – Impact of jets on plane and curved plates - turbines - classification - radial flow turbines - axial flow turbines – Impulse and Reaction

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of the course, the student will be able to

- Employ the concept in designing of curves.
- Compute tacheometric surveying and the application of various electronic instruments in surveying.
- Generate the probable error and its correction factor in surveying.

UNIT I SETTING OUT OF CURVES 12
Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances

UNIT II TACHEOMETRIC SURVEYING 10
Tachometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants – Anallactic lens - Subtense bar.

UNIT III CONTROL SURVEYING 12
Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Satellite station - Reduction to centre –Trilateration - Trigonometric leveling - Single and reciprocal observations – Bench marking

UNIT IV SURVEY ADJUSTMENTS 12
Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.

UNIT V ASTRONOMICAL AND HYDROGRAPHIC SURVEYING 14
Celestial sphere - Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Nautical almanac - Star constellations - Practical astronomy - Field observations and calculations for azimuth- Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods - Three point problem - Strength of fix - Sextants and station pointer.

L: 45 T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
13CE45 CONSTRUCTION MATERIALS AND PRACTICE L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of the course, the student will be able to
• Describe the building materials and their properties
• Illustrate new topics such as construction joints and water proof materials
• Select the ingredients of special and conventional concrete and admixtures

UNIT I PRIMARY CONSTRUCTION MATERIALS 9
Stones – Types – characteristics – uses - BIS tests - Tiles-types-selection -suitability – uses -
maintenance – Bricks – composition – manufacture – types - BIS tests. Hollow concrete blocks, Burnt
clay hollow Blocks, Stabilized mud blocks – Selection of Building Blocks – Cement – Manufacturing –
Different types - hydration- setting and hardening – Initial & Final Setting Time-Cement mortar

UNIT II SECONDARY CONSTRUCTION MATERIALS 9
Timber- defects-causes of decay - seasoning - preservation - fire proofing -Laminated wood products -
types – properties – uses of fiber boards, particle boards, hard boards and A.C boards - Paints –
types – wall paints – wood paints – metal paints. Steel Properties – types- Aluminum products -
thermocole – fiber reinforced plastic – smart concrete and smart bricks.

UNIT III CONSTRUCTION PRACTICES 9
Specifications, details and sequence of activities and construction co-ordination – Site Clearance –
Marking – Earthwork - masonry – stone masonry – Bond in masonry – concrete hollow block
masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre
cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip
forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames –
braced domes – laying brick — weather and water proof – roof finishes – acoustic and fire protection.

UNIT IV SPECIAL FORMS OF CONSTRUCTION 9
Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and
basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - driving
diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant
equipment for underground open excavation. Launching girders, bridge decks, off shore platforms.
Material handling - erecting light weight components on tall structures.

UNIT V CONSTRUCTION EQUIPMENT 9
Selection of equipment for earth work - earth moving operations - types of earthwork equipment -
tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile
driving. Equipment for compaction, batching and mixing and concreting - Equipment for material
handling and erection of structures - Equipment for dredging, trenching, tunneling.

TOTAL: 45 PERIODS

TEXT BOOKS
2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of

REFERENCES
13CE46  HIGHWAY ENGINEERING  L T P C
3 0 0 3

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

- Describe the components of Highways and properties of highway materials & various practices adopted for construction.
- Examine highway planning, engineering surveys for highway alignment.
- Appraise knowledge on Design of Geometric Elements of Highways, Urban roads, Rigid and Flexible pavements
- Formulate the skills on evaluation of the pavements and to decide appropriate types of maintenance.

UNIT I  HIGHWAY PLANNING AND ALIGNMENT  9
History of Road Construction, Highway Development in India - Jayakar Committee Recommendations and Realizations, Twenty-year Road Development Plans, Concepts of Ongoing Highway Development Programmes at National Level, Institutions for Highway Development at National level - Indian Roads Congress, Highway Research Board, National Highway Authority of India, Ministry of Road Transport and Highways (MORTH) and Central Road Research Institute.

UNIT II  GEOMETRIC DESIGN OF HIGHWAYS  9

UNIT III  FLEXIBLE AND RIGID PAVEMENTS  9

UNIT IV  HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE  9

UNIT V  HIGHWAY MAINTENANCE  9

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES
3. Bureau of Indian Standards (BIS) Publications on Highway Materials Specifications for Road and Bridges, NORTH (India)
13CE47 HYDRAULIC ENGINEERING LABORATORY  L T P C 0 0 3 2

COURSE OUTCOMES
Upon successful completion of the course, the student will be able to
• Apply knowledge on flow measurements in pipes and open channels
• Calculate the performance on hydraulic machineries
• Develop pipe layouts and design pumps for residential buildings

LIST OF EXPERIMENTS
1. Determination of co-efficient of discharge for orifice
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Study of impact of jet on flat plate (normal / inclined)
6. Study of friction losses in pipes
7. Study of minor losses in pipes
8. Study on performance characteristics of Pelton turbine.
9. Study on performance characteristics of Francis turbine
10. Study on performance characteristics of Kaplan turbine
11. Study on performance characteristics of Centrifugal pumps (Constant speed / variable speed)
12. Study on performance characteristics of reciprocating pump.

TOTAL: 45 PERIODS

LIST OF EQUIPMENTS
1. Bernoulli’s theorem – Verification Apparatus - 1 No.
2. Flow Measurement open channel flow
   (i) Channel with provision for fixing notches
       (rectangular, triangular & trapezoidal forms) - 1 Unit
   (ii) Flume assembly with provisions for conducting experiments on Hydraulic jumps, generation of surges etc. - 1 Unit
3. Flow measurement in pipes
   (i) Venturimeter, U tube manometer fixtures like Valves, collecting tank - 1 Unit
   (ii) Orifice meter, with all necessary fittings in pipe lines of different diameters - 1 Unit
   (iii) Calibration of flow through orifice tank with Provisions for fixing orifices of different shapes, collecting tank - 1 Unit
   (iv) Calibration of flow through mouth piece
       Tank with provisions for fixing mouth pieces
       Viz external mouth pieces & internal mouth piece
       Borda’s mouth piece - 1 Unit
4. Losses in Pipes
   Major loss – Friction loss - 1 Unit
   Pipe lengths (min. 3m) of different diameters with Valves and pressure rapping & collecting tank - 1 Unit
Minor Losses - 1 Unit
Pipe line assembly with provisions for having Sudden contractions in diameter, expansions Bends, elbow fitting, etc.

5. Pumps

(i) Centrifugal pump assembly with accessories (single stage) - 1 Unit
(ii) Centrifugal pump assembly with accessories (multi stage) - 1 Unit
(iii) Reciprocating pump assembly with accessories - 1 Unit
(iv) Deep well pump assembly set with accessories - 1 Unit

6. Turbine

(i) Impulse turbine assembly with fittings accessories - 1 Unit
(ii) Francis turbine assembly with fittings accessories - 1 Unit
(iii) Kaplan turbine assembly with fittings accessories - 1 Unit
COURSE OUTCOMES
Upon successful completion of the course, the student will be able to
- Analyse and design simple curves
- Apply knowledge to find horizontal angle, vertical angle and distance using total station.

LIST OF EXPERIMENTS

1. Theodolite survey traverse
2. Tacheometry
   i. Tangential system
   ii. Stadia system
   iii. Subtense system.
3. Setting out works
   i. Foundation marking
   ii. Simple curve by Rankine’s method & Two Theodolite method
   iii. Transition curve.
4. Triangulation – Single plane method – Double plane method
5. Sun / Star observation to determine azimuth
6. Surveying using Total Station
13CE51        STRUCTURAL ANALYSIS – I          L T P C
                                      3 1 0 4
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Apply the fundamentals of Energy principles in simple problems
CO 2: Draw ILD for shear force, bending moment for statically determinate structure and for
indeterminate structure restricted to redundancy of one
CO 3: Analyse hinged arches
CO 4: Analyse a structure using slope deflection method
CO 5: Analyse a structure using moment distribution method

UNIT I   FUNDAMENTALS - DEFLECTION OF DETERMINATE STRUCTURES   12
Definition and Determination of Static and Kinematic Indeterminacy – Beams, Trusses and Frames –
Degree of Freedom– Equilibrium and Kinematic Stability – Principle of Superposition – Basic Methods of
Structural Analysis.
– Complementary Energy – Principle of virtual Forces – Castigliano’s First and Second Theorem –
Theorem of least work – Clark Maxwell’s theorem of reciprocal deflection – Betti’s theorem – Application
to simple problems of Statically determinate beams, trusses and frames.

UNIT II  MOVING LOADS AND INFLUENCE LINES             12
(Determinate & Indeterminate Structures with Redundancy Restricted To One)
Influence lines for reactions in statically determinate structures – influence lines for members forces in pin-
jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of
critical stress resultants due to concentrated and distributed moving loads.
Muller Breslau’s principle – Influence lines for continuous beams and single storey rigid frames

UNIT III  ARCHES                                            12
Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged and
two hinged arches, parabolic and circular arches – Settlement and temperature effects.

UNIT IV   SLOPE DEFLECTION METHOD  (Redundancy restricted to Two)               12
Continuous beams and rigid frames (Single storey, single bay with and without sway) – Symmetry and
antisymmetry – Simplification for hinged end – Support displacements – Gable frames – Box Culverts

UNIT V    MOMENT DISTRIBUTION METHOD (Redundancy restricted to Two)  12
Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams –
Plane rigid frames (Single storey, single bay with and without sway) – Support displacements – Gable
frames – Box Culverts

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS
   Publications, New Delhi, 2007
   Publications, New Delhi, 2015

REFERENCES
3. NPTEL
13CE52 SOIL MECHANICS L T P C 3 1 0 4

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Classify the soil based on Index and Engineering properties
CO 2: Explain the principle of soil water movement and its effect on stress distribution.
CO 3: Explain the stresses in the soil and principle of consolidation.
CO 4: Determine the shear strength parameters of soil
CO 5: Analyse the stability of slopes and slope protection measures

UNIT I INTRODUCTION 15
Nature of Soil - Problems with soil - phase relation - sieve analysis - sedimentation analysis – Atterberg limits - classification for engineering purposes - BIS Classification system - Soil compaction - factors affecting compaction – field compaction methods and monitoring.

UNIT II SOIL WATER AND WATER FLOW 15

UNIT III STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT 12
Stress distribution in soil media – Boussinesque formula – stress due to line load and Circular and rectangular loaded area - approximate methods - Use of influence charts – Westergaard equation for point load - Components of settlement - Immediate and consolidation settlement - Terzaghi's one dimensional consolidation theory – governing differential equation - laboratory consolidation test – Field consolidation curve – NC and OC clays - problems on final and time rate of consolidation

UNIT IV SHEAR STRENGTH 9
Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand – Stress path for conventional triaxial test.

UNIT V SLOPE STABILITY 9

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
5. NPTEL
13CE53 DESIGN OF REINFORCED CONCRETE ELEMENTS L T PC 3 1 0 4

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Design the reinforced concrete flexural members by working stress method and explain the different method of design.
CO 2: Design the reinforced concrete beams, slabs by limit state method.
CO 3: Design and identify the behavior of reinforced concrete subjected to bond, anchorage, shear and torsion by limit state method.
CO 4: Design the reinforced concrete columns by limit state method.
CO 5: Design the reinforced concrete footings by limit state method.

UNIT I METHODS OF DESIGN OF CONCRETE STRUCTURES 12

UNIT II LIMIT STATE DESIGN FOR FLEXURE 12
Analysis and design of singly and doubly reinforced rectangular and flanged beams – Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects.

UNIT III LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR AND TORSION 12
Behaviour of RC members in bond and Anchorage - Design requirements as per current code - Behaviour of RC beams in shear and torsion - Design of RC members for combined bending shear and torsion.

UNIT IV LIMIT STATE DESIGN OF COLUMNS 12
Types of columns – Braced and unbraced columns – Design of short column for axial, uniaxial and biaxial bending – Design of long columns.

UNIT V LIMIT STATE DESIGN OF FOOTING AND DETAILING 12

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
3. NPTEL
13CE54 WATER SUPPLY TREATMENT AND MANAGEMENT L T PC 3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Summarize the various sources of water and their characteristics
CO 2: Classify the different types of conveyance system, pipes and pumping system
CO 3: Design the components of a water treatment plant
CO 4: Explain the various processes of advance water treatment
CO 5: Outline the different types of distribution networks and water supply to buildings

UNIT I PLANNING FOR WATERSUPPLY SYSTEM 9

UNIT II CONVEYANCE SYSTEM 9
Water supply - intake structures - Functions and drawings - Pipes and conduits for water - Pipe materials - Hydraulics of flow in pipes - Transmission main design - Laying, jointing and testing of pipes - Drawings appurtenances - Types and capacity of pumps - Selection of pumps and pipe materials.

UNIT III WATER TREATMENT 9

UNIT IV ADVANCED WATER TREATMENT 9

UNIT V WATER DISTRIBUTION AND SUPPLY TO BUILDINGS 9

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
3. NPTEL
13CE55 PROFESSIONAL ETHICS AND HUMAN VALUES (Common to all branches) L T P C

3 0 0 3

COURSE OUTCOMES
Upon completion of this course, the student will be able to
CO1: Understood the core values that shape the ethical behavior of an engineer
CO2: Exposed awareness on professional ethics and human values.
CO3: Known their role in technological development

UNIT I HUMAN VALUES

UNIT II ENGINEERING ETHICS

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors -Moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE),India, etc.

L: 45, TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain the properties of concrete making materials and their testing methods.
CO 2: Explain the testing procedures of concrete in plastic and hardened state.
CO 3: Design concrete mixes by various methods.
CO 4: Apply statistical quality control techniques to concrete quality.
CO 5: Summarize durability of concrete and concreting under special circumstances.
CO 6: Outline the properties of special concrete and its applications.

UNIT I  INGREDIENTS OF CONCRETE  

UNIT II  PROPERTIES OF CONCRETE  

UNIT III  CONCRETE MIX DESIGN AND QUALITY CONTROL OF CONCRETE  
Quality Control - Frequency of sampling – Statistical analysis of test results – standard deviation – Coefficient of variation – Characteristic strength – Acceptance and rejection Criteria – Importance of water cement ratio– Importance of cover to concrete – Nominal mixes – Design Mixes – factors influencing the design mix – Mix Design by ACI and IS method.

UNIT IV  DURABILITY AND CONCRETE UNDER SPECIAL CIRCUMSTANCES  

UNIT V  SPECIAL CONCRETES  

L:45 TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES
3. NPTEL
13CE57  STRENGTH OF MATERIALS LABORATORY  L T P C  0 0 3 2

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Demonstrate the fundamental modes of loading the structures
CO 2: Perform experiments making measurements of loads, displacements and strains.
CO 3: Compute experimentally the strength of the material and stiffness properties of
structural elements.

LIST OF EXPERIMENTS
1. Test involving axial compression to obtain the stress – strain curve
2. Test involving axial tension to obtain the stress – strain curve and the strength
3. Test involving torsion to obtain the torque vs. angle of twist and hence the stiffness
4. Test involving flexure to obtain the load deflection curve and hence the stiffness
5. Tests on springs
6. Test to verify Maxwell’s reciprocal theorem
7. Test on wooden specimen (Compression, Tension and shear)
8. Hardness tests
9. Shear test
10. Test for impact resistance
11. Compression test on bricks

The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.

P:45 TOTAL: 45 PERIODS

LIST OF EQUIPMENTS (For a batch of 30 students)

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>DESCRIPTION OF EQUIPMENTS</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UTM of minimum 400 KN capacity</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Torsion testing machine for steel rods</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Izod impact testing machine</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Hardness test</td>
<td>1 Each</td>
</tr>
<tr>
<td></td>
<td>Rockwell</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vicker’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brinnel</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Beam deflection test apparatus</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Extensometer</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Compressometer</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Dial gauges</td>
<td>Few</td>
</tr>
<tr>
<td>9.</td>
<td>Compression Testing Machine (100 Ton)</td>
<td>1</td>
</tr>
</tbody>
</table>
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Determine the index properties of soil
CO 2: Determine the engineering properties of soil

1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Specific gravity of soil grains
4. Relative density of sands
5. Atterberg limits test
7. Permeability determination (constant head and falling head methods)
8. Determination of shear strength parameters.
9. Direct shear test on cohesionless soil
10. Unconfined compression test on cohesive soil
11. Triaxial compression test (demonstration only)
12. One dimensional consolidation test (Demonstration only)
13. Field density test (Core cutter and sand replacement methods)

P:45 TOTAL: 45 PERIODS

LIST OF EQUIPMENTS (For a batch of 30 students)

<table>
<thead>
<tr>
<th>S. NO.</th>
<th>DESCRIPTION OF EQUIPMENTS</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sieves</td>
<td>2 sets</td>
</tr>
<tr>
<td>2.</td>
<td>Hydrometer</td>
<td>2 sets</td>
</tr>
<tr>
<td>3.</td>
<td>Liquid and plastic limit apparatus</td>
<td>2 sets</td>
</tr>
<tr>
<td>4.</td>
<td>Shrinkage limit apparatus</td>
<td>3 sets</td>
</tr>
<tr>
<td>5.</td>
<td>Proctor compaction apparatus</td>
<td>1 set</td>
</tr>
<tr>
<td>6.</td>
<td>CBR Apparatus</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Direct shear apparatus</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Thermometer</td>
<td>2</td>
</tr>
<tr>
<td>9.</td>
<td>Field density measuring device</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Triaxial shear apparatus</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Three gang consolidation test device</td>
<td>1</td>
</tr>
</tbody>
</table>
13CE59   CONCRETE AND HIGHWAY ENGINEERING LABORATORY    L T P C  
                        0 0 3 2

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Perform test on cement
CO 2: Demonstrate properties of concrete experimentally
CO 3: Predict properties of highway materials experimentally

I. TEST ON CEMENTS
   a. Consistency
   b. Initial & Final Setting time
   c. Soundness
   d. Cube Compressive strength

II. TESTS ON FRESH CONCRETE
   a. Slump cone test
   b. Flow table
   c. Compaction factor
   d. Vee bee test.

III. TESTS ON HARDENED CONCRETE
   a. Compressive strength – Cube
   b. Splitting tensile – cylinders
   c. Flexure test
   d. Modulus Of Elasticity

IV. TESTS ON BITUMEN
   a. Penetration
   b. Softening Point
   c. Ductility
   d. Viscosity
   e. Elastic Recovery

V. TESTS ON AGGREGATES
   a. Proportioning of Aggregates
   b. Water Absorption & Specific gravity
   c. Aggregate Impact Value
   d. Aggregate Crushing value
   e. Bulking of sand

VI. TESTS ON BITUMINOUS MIXES
   a. Determination of Binder Content
   b. Marshall Stability and Flow values

P:45 TOTAL: 45 PERIODS
# EQUIPMENT REQUIRED FOR A BATCH OF 30 STUDENTS

<table>
<thead>
<tr>
<th>S.NO</th>
<th>DESCRIPTION OF EQUIPMENTS</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Concrete cube moulds</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Concrete cylinder moulds</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Concrete Prism moulds</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Sieves</td>
<td>1 set</td>
</tr>
<tr>
<td>5.</td>
<td>Concrete Mixer</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Slump cone</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>Flow table</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Vibrator</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>Trovels and planers</td>
<td>2 set</td>
</tr>
<tr>
<td>10.</td>
<td>Vee Bee Consistometer</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Aggregate impact testing machine</td>
<td>1</td>
</tr>
<tr>
<td>12.</td>
<td>Blains Apparatus</td>
<td>1</td>
</tr>
<tr>
<td>13.</td>
<td>Compression Testing Machine 200T capacity</td>
<td>1</td>
</tr>
<tr>
<td>14.</td>
<td>Flexure Testing Machine</td>
<td>1</td>
</tr>
<tr>
<td>15.</td>
<td>Compressometer</td>
<td>1</td>
</tr>
<tr>
<td>16.</td>
<td>Le Chatelier’s apparatus</td>
<td>2</td>
</tr>
<tr>
<td>17.</td>
<td>Vicat’s apparatus</td>
<td>2</td>
</tr>
<tr>
<td>18.</td>
<td>Mortar Cube moulds</td>
<td>10</td>
</tr>
</tbody>
</table>
13CE61 DESIGN OF REINFORCED CONCRETE AND BRICK MASONRY Structures 3 1 0 4

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

CO 1: Design the retaining walls.
CO 2: Design the water tanks.
CO 3: Design the staircase, flat slab, reinforced concrete walls and explain the basic concept of mat foundation, box culvert, road bridges.
CO 4: Design the slab using yield line theory.
CO 5: Design the brick masonry walls under axial and eccentricity loaded.

UNIT I RETAINING WALLS 12
Retaining wall – Types – Design and detailing of cantilever and counterfort retaining walls

UNIT II WATER TANKS 12
Design – Underground rectangular tanks – Domes – Overhead circular and rectangular tanks – Design of staging and foundations

UNIT III SELECTED TOPICS 12

UNIT IV YIELD LINE THEORY 12
Application of virtual work method and equilibrium method to square, rectangular, circular and triangular slabs

UNIT V BRICK MASONRY 12
Introduction, Classification of walls, Lateral supports and stability, effective height of wall and columns, effective length of walls, design loads, load dispersion, permissible stresses, design of axially and eccentrically loaded brick walls – design of masonry footings

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
4. NPTEL
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Explain the concept of flexibility method and be able to apply it for analysis of
statically indeterminate Structures.
CO 2: Explain the concept of stiffness method and be able to apply stiffness methods for
analysis of statically indeterminate structures.
CO 3: Make use of the fundamental theory of the FEA method.
CO 4: Make use of appropriate assumptions to perform plastic hinge analysis of statically
indeterminate axial problems.
CO 5: Analyze the behavior of space trusses and suspension cables and bridges.

UNIT I  FLEXIBILITY MATRIX METHOD
Equilibrium and compatibility – Determinate Vs Indeterminate structures – Indeterminacy - Primary
structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous
beams, rigid jointed plane frames (with redundancy restricted to two).

UNIT II  STIFFNESS MATRIX METHOD
Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations
– Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors –
Analysis of pin-jointed plane frames and rigid frames (with redundancy restricted to two).

UNIT III  FINITE ELEMENT METHOD
Introduction – Discretisation of a structure – Displacement functions – Truss element – Beam element
– Plane stress and plane strain - Triangular elements.

UNIT IV  PLASTIC ANALYSIS OF STRUCTURES
Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance –
Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of
indeterminate beams and frames – Upper and lower bound theorems.

UNIT V  SPACE AND CABLE STRUCTURES
Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension
cables – suspension bridges with two and three hinged stiffening girders.

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS
   2007
   2013
   2003.
   Publications, New Delhi, 2007
   Publications, New Delhi, 2015
9. NPTEL

REFERENCES
13CE63 DESIGN OF STEEL STRUCTURES 3 1 0 4

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Design simple, eccentric connections
CO 2: Design tension members by appropriate identification of structural steel
CO 3: Design compression members by appropriate identification of structural steel
CO 4: Design beams, plate girder and web splices
CO 5: Design the basic components of a truss
CO 6: Explain the basics of gantry girder design

UNIT I INTRODUCTION 12

UNIT II TENSION MEMBERS 10
Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III COMPRESSION MEMBERS 14
Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of lacing and battening type columns – Design of column bases – Gusseted base

UNIT IV BEAMS 12
Types of simple beam connections – Design of laterally supported and unsupported beams – Built up beams – Beams subjected to biaxial bending – Design of plate girders riveted and welded – Intermediate and bearing stiffeners – Web splices

UNIT V ROOF TRUSSES AND INDUSTRIAL STRUCTURES 12
Roof trusses – Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing – Basics of gantry girder design

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
5. NPTEL
**13CE64 FOUNDATION ENGINEERING**

**COURSE OUTCOMES**

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

- CO 1: Plan site investigation program to select foundation
- CO 2: Design shallow foundation based on the soil conditions
- CO 3: Design raft and footings based on contact pressure distribution
- CO 4: Explain the load carrying capacity of piles
- CO 5: Illustrate the behavior of soil behind retaining structures

**UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION**


**UNIT II SHALLOW FOUNDATION**


**UNIT III FOOTINGS AND RAFTS**

Types of foundation – Contact pressure distribution below footings and raft - Isolated and combined footings – Types and proportioning - Mat foundation– Types, applications uses and proportioning-principle of floating foundation.

**UNIT IV PILES**

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley’s) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity – Group capacity by different methods (Feld’s rule, Converse Labarra formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test – Forces on pile caps – under reamed piles – Capacity under compression and uplift.

**UNIT V RETAINING WALLS**

Plastic equilibrium in soils – active and passive states – Rankine’s theory – cohesionless and cohesive soil - Coloumb’s wedge theory – condition for critical failure plane - Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.

**TOTAL: 45 PERIODS**

**TEXT BOOKS**


**REFERENCES**

4. NPTEL
COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Summarize the various sources of waste water and their characteristics
CO 2: Design the sewer system and classify the pumps and plumbing system
CO 3: Design the components of primary treatment of a waste water treatment plant
CO 4: Design the components of secondary treatment of a waste water treatment plant
CO 5: Explain the various methods of sludge and sewage disposal

UNIT I  PLANNING FOR SEWERAGE SYSTEMS

UNIT II  SEWER DESIGN

UNIT III  PRIMARY TREATMENT OF SEWAGE
Objective – Unit Operation and Processes – Selection of treatment processes – Onsite sanitation - Septic tank, Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Operation and Maintenance aspects.

UNIT IV  SECONDARY TREATMENT OF SEWAGE
Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units - Activated Sludge Process and Trickling filter, other treatment methods – Oxidation ditches, UASB – Biomethanisation and Gobar gas plant - Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants - Online monitoring system

UNIT V  DISPOSAL OF SEWAGE AND SLUDGE

TEXT BOOKS

REFERENCES
3. NPTEL
13CE66  IRRIGATION ENGINEERING  L T P C
3 0 0 3

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Compute the water requirement of crops based on soil conditions.
CO 2: Illustrate on different types of irrigation systems and their performances.
CO 3: Demonstrate the behaviour of various irrigation structures and their design principles.
CO 4: Analyze the concept of seepage through appropriate theories.
CO 5: Evaluate the purpose and function of different types of dams.

UNIT I  INTRODUCTION
8
Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons –
consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and
Development of irrigation projects – Water quality standards for Irrigation

UNIT II  IRRIGATION METHODS AND WATER MANAGEMENT
9
Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits –
Sprinkler irrigation – Drip irrigation – Optimum use of water – Need for optimisation of water use –
Methods for improving canal irrigation management – Water losses – On farm development works

UNIT III  CANAL IRRIGATION
8
Alignment of canals – Classification of canals – Canal falls – Types – Design of vertical drop – Cross
drainage works – Types – Canal Head works – Canal regulators – River Training works.

UNIT IV  WEIRS AND TANKS
10
Weirs and Barrage – Classification of weirs – Layout of a diversion head work – component parts –
Failure of weirs founded on impervious foundation – Bligh’s creep theory – Khosla’s theory – Tanks –
Isolated tanks and tanks in series – Tank weirs – Types of tank weirs – Tank sluices.

UNIT V  DAMS
10
Dams – Types of dams – Problems in dam construction – Factors governing the selection of particular
Type of dam – Selection of dam site – Gravity dam – Typical cross section – Forces acting on gravity
dam – Earth dam – Types of Earth dam – Causes of failure – Arch dam – Types – Forces acting on
arch dam – Spillways – Types

TEXT BOOKS
New Delhi, 2007
Publications Private Limited, New Delhi, 2009

REFERENCES
1. Dilip Kumar Majumdar, “Irrigation Water Management (Principles & Practices)”, Prentice
Hall of India Private Limited, 2000
4. NPTEL
13CE67 ENVIRONMENTAL ENGINEERING LABORATORY

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Determine the quality parameters of water
CO 2: Determine the quality parameters of sewage

LIST OF EXPERIMENTS
1. Sampling and preservation methods and significance of characterisation of water and wastewater.
2. Determination of pH & Electrical conductivity
3. Determination of Turbidity & Hardness
4. Determination of iron & fluoride
5. Determination of residual chlorine
6. Determination of Chlorides
7. Determination of Ammonia Nitrogen
8. Determination of Sulphate
9. Determination of Optimum Coagulant Dosage
   i) Alum dosing
   ii) Lime dosing
10. Determination of available Chlorine in Bleaching powder
11. Determination of dissolved oxygen
12. Determination of solids
13. C.O.D Test
14. B.O.D Test (Demonstration only)
15. Introduction to Bacteriological Analysis (Demonstration only)

P:45 TOTAL: 45 PERIODS

LIST OF EQUIPMENTS (For a batch of 30 students)

1  pH meter - 1 No.
2  Turbidity meter - 1 No.
3  Conductivity meter - 1 No.
4  Refrigerator - 1 No.
5  BOD incubator - 1 No.
6  Muffle furnace - 1 No.
7  Hot air oven - 1 No.
8  Magnetic stirrer with hot plates - 5 Nos.
9  Desicator - 1 No.
10  Jar test apparatus - 1 No.
11  Water bath - 1 No.
12  Furniture - 1 lot
13  Glass waves / Crucibles - 1 lot
14  COD apparatus - 1 No.
15  Kjeldane apparatus - 1 No.
16  Calorimeter - 1 No.
17  Chlorine comparator - 1 No.
REFERENCES
13CE68 COMPUTER AIDED DESIGN AND DRAFTING LABORATORY  L T P C 0 0 3 2

COURSE OUTCOMES
Upon successful completion of this course, the students will be able to
CO 1: Design various elements of Retaining wall / RCC Bridges / Water tanks / Plate girder bridges.
CO 2: Sketch structural drawings using simulation software of a various elements in a Retaining wall / RCC Bridges / Water tanks / Plate girder bridges.

LIST OF EXPERIMENTS
1. Design and detailing of Reinforced Cement Concrete cantilever and counterfort type retaining walls with reinforcement details
2. Design of solid slab and Reinforced Cement Concrete Tee beam bridges for Indian Road Congress loading and reinforcement details
3. Design and detailing of Intz type water tank, circular and rectangular water tanks

P:45 TOTAL: 45 PERIODS

LIST OF EQUIPMENTS
1. Models of Structures - 1 each.
2. Computers Pentium IV - 30 Nos.
3. Auto CAD Software - Multi user License - 1 No.

TEXT BOOKS

REFERENCES