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AIM
To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

OBJECTIVES
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To develop Z-transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I  FOURIER SERIES  9+3
Dirichlet’s conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval’s identity – Harmonic Analysis.

UNIT II  FOURIER TRANSFORM  9+3

UNIT III  PARTIAL DIFFERENTIAL EQUATIONS  9+3
Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange’s Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT IV  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  9+3
Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT V  Z-TRANSFORM AND DIFFERENCE EQUATIONS  9+3

L: 45, T: 15, TOTAL: 60 PERIODS

TEXT BOOK

REFERENCES
OBJECTIVE:
Enable the student to understand the behaviour of deformable structural elements, subjected to different types of loadings

UNIT I STRESS, STRAIN AND DEFORMATION OF SOLIDS

UNIT II ANALYSIS OF PLANE TRUSSES
Stability and equilibrium of plane frames – perfect frames - types of trusses – Analysis of forces in truss members – Method of joints – Method of tension co-efficient – Method of sections.

UNIT III BENDING OF BEAMS

UNIT IV TORSION
Theory of simple torsion - Stresses and deformation in circular and hollow shafts – Stepped shafts – Shafts fixed at both ends – Stresses and deflection in helical springs.

UNIT V DEFLECTION OF BEAMS
Double Integration method – Macaulay’s method – Area moment method – Conjugate beam method for computation of slopes and deflections in determinate beams.

L: 45 + T: 15 TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
1. Irwing H.Shames, James M.Pitarresi, “Introduction to Solid Mechanics”, Prentice Hall of India, New Delhi, 2002
OBJECTIVE:
The student is introduced to the mechanics of fluids through a thorough understanding of the properties of the fluids, behaviour of fluids under static conditions. The dynamics of fluids is introduced through the control volume approach which gives an integrated understanding of the transport of mass, momentum and energy. 2. The applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on vanes is studied.

UNIT I  FLUIDS PROPERTIES AND FLUID STATICS  12
Scope of fluid mechanics - Definitions of a fluid - Methods of analysis - Dimensions and units - viscosity, density, perfect gas, vapour pressure and surface tension - Basic equation of fluid statics - Pressure measurements - Manometers. - Forces on plane and curved surfaces - Buoyancy and floatation - Stability of floating bodies - Relative equilibrium.

UNIT II  BASIC CONCEPTS OF FLUID FLOW  12
(a) Kinematics – Methods of describing fluid motion - Classification of flows - Streamline, streak-line and path-lines - Stream function and velocity potentials - Flow nets; (b) Dynamics - Dimensional Concepts of System and Control volume - Application of control volume to continuity, energy and momentum - Euler’s equation of motion along a stream line - Bernoulli’s equation - Applications to velocity and discharge measurements - Linear momentum equation and moment-of-momentum equations and their applications.

UNIT III  DIMENSIONAL ANALYSIS AND MODEL STUDIES  12
Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pi-Theorem - Dimensionless parameters - Similitude and model studies. Distorted Models.

UNIT IV  INCOMPRESSIBLE VISCOUS FLOW  12
Laminar flow between parallel plates, and pipes - Development of laminar and turbulent flows in pipes - Reynolds experiment - Darcy-Weisbach equation - Moody diagram - Major and minor losses of flow in pipes - Pipes in series and in parallel.

UNIT V  BOUNDARY LAYERS  12
Definition of boundary layers - Displacement, momentum and energy thickness - Laminar and turbulent boundary layers - Momentum integral equation - Separation of boundary layer - Drag and Lift - Lift characteristics of airfoils - Induced drag - Polar Diagram.

TEXT BOOKS:


REFERENCES:

OBJECTIVE:
The objective of this course is to introduce the principles of surveying, various methods and applications to Civil Engineering projects.

UNIT I  INTRODUCTION AND CHAIN SURVEYING  8
Definition - Principles - Classification - Field and office work – Precision and Accuracy - Scales - Conventional signs - Survey instruments - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

UNIT II  COMPASS SURVEYING AND PLANE TABLE SURVEYING  7

UNIT III  LEVELLING  12
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  8
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  SURVEY APPLICATIONS  10
Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - 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 - Mine Surveying - instruments - Tunnels - Correlation of under ground and surface surveys - Shafts - Adits.

TEXT BOOKS:

REFERENCES:
### AG 9211  
**ENGINEERING GEOLOGY**  
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#### OBJECTIVES:
At the end of this course the student shall be able to understand about geological formations, classification and morphology of rocks, and the importance of the study of geology for civil engineers with regard to founding structures like dams, bridges, buildings, etc. The student shall also be able to appreciate the importance of geological formation in causing earthquakes and landslides.

#### UNIT I  
**PHYSICAL GEOLOGY**  
9  

#### UNIT II  
**MINEROLOGY**  
9  
Physical properties of minerals. Study of the following rock forming minerals – Quartz group, Feldspar group, Pyroxene group, Amphibole and Mica group, Calcite Gypsum and Clay minerals.

#### UNIT III  
**PETROLOGY**  
9  
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of: Granite, Syenite, Diorite, Gabbro, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Conglomerate, Breccia, Quartzite, Marble, Slate, Gneiss and Schist.

#### UNIT IV  
**STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS**  
9  

#### UNIT V  
**GEOLOGICAL INVESTIGATION**  
9  
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams and Reservoirs, Tunnels, Buildings and Road cuttings. Investigation of Landslides, causes and mitigation.

#### TEXT BOOKS:
REFERENCES:

CE 9204 STRENGTH OF MATERIALS LABORATORY L T P C
0 0 3 2

OBJECTIVES:
To study the properties of materials when subjected to different types of loading.

List of experiments:
1. Tension test on mild steel / tor steel rod (Tensile strength-Density-Proof Stress- Stress Strain Curve -Youngs Modulus-)
2. Compression test on wood
3. Double shear test on metal
4. Torsion test on mild steel rod
5. Impact test on metal specimen
6. Hardness test on metals
7. Deflection test on metal beam
8. Compression test on helical spring
9. Deflection test on carriage spring
10. Tests on bricks, concrete cubes and tiles - Demonstration only

REFERENCES:
1. Relevant Indian Standards

CE 9205 COMPUTER AIDED BUILDING DRAWING L T P C
0 0 4 2

OBJECTIVES:
Building drawing in accordance with development and control rules satisfying orientation and functional requirements for the following.

5. R.C.C. framed structures.
6. Industrial buildings – North light roof structures – King Post Truss

TOTAL: 60 PERIODS
TEXT BOOKS:

REFERENCES:
6. Relevant IS Codes.

CE 9206 SURVEY PRACTICALS – I  L T P C  0 0 4 2

OBJECTIVE:
The objective of this course is to train the students to acquire skill in operation of various survey instruments and to obtain accurate results.

1. CHAIN AND COMPASS SURVEYING
   Ranging and Chaining – Offsets - Traversing.

2. PLANE TABLE SURVEYING
   Radiation – Intersection – Resection – Traversing

3. LEVELLING
   Study of levels and levelling staff - Fly levelling using Dumpy level and Tilting level – Check Levelling.

4. THEODOLITE SURVEYING

TOTAL: 60 PERIODS
OBJECTIVE:
To learn the computation of deflection of beams and trusses using energy principles, analysis of indeterminate beams and columns, state of stress in three dimensions.

UNIT I ENERGY PRINCIPLES
Strain energy and strain energy density – Strain energy in axial force - shear, flexure and torsion – Castigliano’s and Engessor’s theorems – Principle of virtual work – Application of energy theorems for computing deflections in beams, pin jointed frames – Maxwell’s reciprocal theorem.

UNIT II INDETERMINATE BEAMS
Propped Cantilever and Fixed Beams – Fixed end moments reactions, slope and deflection for standard cases of loading — Continuous beams – support reactions and moments – Theorem of three moments – Shear Force and Bending Moment Diagrams

UNIT III COLUMNS
Behaviour of short and long columns. Euler’s theory of long columns – Critical loads for prismatic columns with different end conditions - Rankine-Gordon Formula - Eccentrically loaded long columns - Eccentrically loaded short columns - middle third rule – core of section.

UNIT IV STATE OF STRESS IN THREE DIMENSIONS
Determination of principal stresses and principal planes – volumetric strain – Theories of failure – Principal stress, principal strain, shear stress, strain energy and distortion energy theories – Application in analysis of stress, load carrying capacity and design of members. Interaction problems - interaction curves.

UNIT V ADVANCED TOPICS

TOTAL: 45 PERIODS

TEXT BOOKS:

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**OBJECTIVE:**
To make aware of the various techniques and practices on various stages of concreting, masonry works, service requirements, rehabilitation works and careful selection of suitable construction equipment.

**UNIT I** CONCRETE TECHNOLOGY

**UNIT II** CONSTRUCTION PRACTICES

**UNIT III** SERVICE REQUIREMENTS

**UNIT IV** REPAIR AND REHABILITATION WORKS
Causes of damage and deterioration in masonry and concrete structures – Symptoms and Diagnosis – Common types of repairs.

**UNIT V** CONSTRUCTION EQUIPMENT
Selection of equipment for earthwork, concreting, material hardening and erection of structures – Dewatering and pumping equipments.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**
REFERENCES:

OBJECTIVE:
To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

UNIT I OPEN CHANNEL FLOW
Steady uniform flow - Best hydraulic sections for uniform flow - Specific energy and specific force.

UNIT II STEADY GRADUALLY VARIED FLOWS
Dynamic equation - Water surface flow profile classifications - Profile determination by graphical method, direct step method and standard step methods.

UNIT III RAPIDLY VARIED FLOWS
Hydraulic jumps - Types - Energy dissipation - Surges and surge through channel transitions.

UNIT IV TURBO MACHINES
Turbines – Classification - Reaction turbines – Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbines - Performance of turbines - Similarity laws; Centrifugal pumps - Minimum speed to start the pump – NPSH - Cavitation in pumps - Operating characteristics - Multistage pumps.

UNIT V POSITIVE DISPLACEMENT PUMPS
Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps.

L: 45 + T:15  TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9254 SURVEYING - II

L T P C
3 0 0 3

OBJECTIVE:
The objective of this course is to equip the students with advanced methods of surveying and to introduce elements of photogrammetry, electromagnetic distance measurement, cartography, hydrographic surveying and cadastral surveying.

UNIT I TACHEOMETRIC SURVEYING
Tacheometric 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 II CONTROL SURVEYING
Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre – Trignometrical levelling - Single and reciprocal observations - Modern trends.

UNIT III SURVEY ADJUSTMENTS
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 IV ASTRONOMICAL SURVEYING
Celestial sphere - Astronomical terms and definitions - Motion of sun and stars - Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems - Nautical almanac - Star constellations - Practical astronomy - Field observations and calculations for azimuth.

UNIT V MISCELLANY

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

CE 9255 SOIL MECHANICS

OBJECTIVE:
To impart knowledge on behaviour and the performance of saturated soil. At the end of this course student attains adequate knowledge in assessing both Physical and Engineering behaviour of soils, mechanism of stress transfer in two-phase systems and stability analysis of slope.

UNIT I SOIL CLASSIFICATION AND COMPACTION

UNIT II SOIL WATER AND WATER FLOW

UNIT III STRESS DISTRIBUTION AND SETTLEMENT
Effective stress concepts in soils – Stress distribution in soil media – Boussinesq theory - Use of Newmarks influence chart – Components of settlement – immediate and consolidation settlement – Terzaghi’s one dimensional consolidation theory – computation of rate of settlement- \( \sqrt{t} \) and log t methods - Factors influencing settlement characteristics of soils.

UNIT IV SHEAR STRENGTH
Shear strength of cohesive and cohesionless soils – Mohr – Coulomb failure theory – Measurement of shear strength, direct shear – Triaxial compression, UCC and Vane shear tests – Cyclic loading – Pore pressure parameters.

UNIT V SLOPE STABILITY

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:

GE 9261 ENVIRONMENTAL SCIENCE AND ENGINEERING  L  T  P  C
3  0  0  3

AIM
To create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates

OBJECTIVE:
At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  14
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 – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.
UNIT II ENVIRONMENTAL POLLUTION 8
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.
Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – 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 IV SOCIAL ISSUES AND THE ENVIRONMENT 7

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

TEXT BOOKS:

REFERENCES:

CE 9256 HYDRAULICS ENGINEERING LABORATORY

OBJECTIVE:
Student should be able to verify the principles studied in theory by conducting the experiments

1. FLOW MEASUREMENT
Calibration of Flow Measuring instruments like Venturimeter, Orificemeter and Rotometer

2. LOSSES IN PIPES
Estimation of major and minor losses in pipes

3. PUMPS
Performance characteristics of pumps

4. TURBINES
Performance characteristics of turbines

5. WATER MANAGEMENT PARAMETERS
Recording and Non-Recording raingauges, pan evaporation, measurements, Double ring infiltrometer test and estimation of water management parameters such as soil water, field capacity, infiltration capacity.

TOTAL: 45 PERIODS

REFERENCE:
OBJECTIVE:

The objective of this course is to train the students to acquire skill in making precise measurements and obtaining accurate results.

1. Setting out works - Foundation marking - Simple curve (right/left-handed) – Transition curve.
2. Theodolite Traversing
3. Heights and Distances – Triangulation problem – Single plane method
4. Tacheometry - Tangential system - Stadia system - Subtense system.
5. Field observation on SUN to calculate azimuth.
6. Experiments on Total Station – GPS.
7. Study of Micro Optic Theodolite - Digital Theodolite.

TOTAL: 60 PERIODS

OBJECTIVE:

To learn the modern method of analysis of beams and frames.

UNIT I DEFLECTION OF DETERMINATE STRUCTURES 12
Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid plane frames –Williott diagram.

UNIT II FLEXIBILITY MATRIX METHOD 12
Equilibrium and compatibility - Determinate vs indeterminate structures - Static and Kinematic -Indeterminacy - primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames

UNIT III SLOPE DEFLECTION METHOD 12
Slope deflection equations- Analysis of continuous beams and rigid frames (with and without sway) - Symmetry and antisymmetry – Simplification for hinged end - Support settlements.

UNIT IV MOMENT DISTRIBUTION METHOD 12
Stiffness and carry over factors – Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway.

UNIT V MATRIX STIFFNESS METHOD 12
TEXT BOOKS:

REFERENCES:

CE 9302 DESIGN OF STEEL STRUCTURES

OBJECTIVE:
To learn the design of Component and structure using steel and timber material subjected to external loading.

UNIT I SECTIONS AND JOINTS
Types of steel structures – Properties of rolled steel sections and Light gauge steel sections – Allowable Stresses as per IS code - Riveted and bolted connections – Failures of joints – Single and multiple riveted lap and butt joints under axial and eccentric loading – Strength of fillet and butt welded joints – Design of riveted and welded joints.

UNIT II TENSION MEMBERS
Design of simple and built-up members subjected to tension – Effective area of angles connected to gussets.

UNIT III COMPRESSION MEMBERS
Maximum slenderness ratio of various compression members – IS code provision for compression members – Design of simple and built-up compression members with lacings and battens – Design of column bases.

UNIT IV BEAMS
Design of simple beams based on strength and stiffness as per IS code – Design of built – up beams and curtailment of flange plates – Flange splice and web splice- Design of plate girder and stiffeners.
UNIT V  TIMBER  6
Study of properties and strength of natural and laminated timber – Allowable stresses in compression, tension and flexure as per IS Code – Types of joints with nails and bolts – Design of simple compression members as per IS code– Design of beams for strength and stiffness as per IS code.

TOTAL : 45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9303  FOUNDATION ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
To impart knowledge on common method of sub soil investigation and design of foundations. At the end of this course student acquires the capacity to investigate the soil condition and to select and design a suitable foundation.

UNIT I  SITE INVESTIGATION AND SELECTION OF FOUNDATION  9

UNIT II  SHALLOW FOUNDATION  9
Introduction – Location and depth of foundation – Codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi’s formula and BIS formula – factors affecting bearing capacity – problems – Bearing capacity from in-situ tests (SPT, SCPT and plate load) – Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total
and differential settlement – Allowable settlements – Codal provision – Methods of minimizing total and differential settlements.

UNIT III FOOTINGS AND RAFTS

UNIT IV PILE FOUNDATION
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 Hileys) – Capacity from insitu tests (SPT and SCPT) – Negative skin friction – uplift capacity- Group capacity by different methods (Feld’s rule, Converse – Labarre formula and block failure criterion) – Settlement of pile groups – Interpretation of pile load test (routine test only) – Underreamed piles – Capacity under compression and uplift.

UNIT V RETAINING WALLS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
Principles and design of water treatment and distribution will be covered. Relevant BIS codes and GOI Manuals will be referred.

UNIT I SOURCES OF WATER 9

UNIT II CONVEYANCE FROM THE SOURCE 9

UNIT III WATER TREATMENT 10
Objectives – Unit operations and processes – Principles, functions design and drawing of flash mixers, flocculators, sedimentation tanks and sand filters; Disinfection –THM; Iron and Manganese removal, Defluoridation - Residue Management – Corrosion Control; Construction, Operation and Maintenance aspects-Layout and Hydraulic Profile of water treatment plants.

UNIT IV ADVANCED WATER TREATMENT 7
Water softening - Desalination -demineralization – Adsorption -Membrane Systems - Construction and Operation & Maintenance aspects – Recent advances.

UNIT V WATER DISTRIBUTION AND SUPPLY TO BUILDINGS 10
Principles of design of water supply in buildings – House service connection – Fixtures and fittings; Systems of plumbing and drawings of types of plumbing.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To give an overview / basis of highway engineering with respect to the development, planning, design, construction and maintenance of highways.

UNIT I  HIGHWAY PLANNING AND ALIGNMENT  8
History of road development in India – Classification of highways – Institutions for Highway planning, design and implementation at different levels – factors influencing highway alignment – Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II  GEOMETRIC DESIGN OF HIGHWAYS INCLUDING HILL ROADS  10
Typical cross sections of Urban and Rural roads – Lateral and vertical clearance at underpasses – Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients, hairpin bends – IRC standards

UNIT III  DESIGN FLEXIBLE AND RIGID PAVEMENTS  9
Design principles – pavement components and their role - Design practice for flexible and rigid pavements, (IRC methods only).

UNIT IV  HIGHWAY CONSTRUCTION MATERIALS, EQUIPMENTS AND PRACTICE  8
Highway construction materials, properties, testing methods – Construction practice including modern methods, concrete road constructions (problem not included) - Highway drainage – Special considerations for hilly roads.

UNIT V  EVALUATION AND MAINTENANCE OF PAVEMENTS  10
Pavement distress in flexible and rigid pavement – Pavement evaluation, roughness, present serviceability index, skid resistance, structural evaluation, evaluation by deflection measurements – Strengthening of pavements –Types of maintenance – IRC standards

TOTAL: 45 PERIODS

TEXT BOOKS:
3. Indian Road Congress (IRC), Guidelines and Special Publications of Planning and Design.

REFERENCES:
OBJECTIVE:
To make students understand the various hydrological processes, estimate the surface and groundwater resources of a drainage basin and to estimate the hydrologic extremes i.e. floods and droughts and their management.

UNIT I HYDROLOGIC PROCESSES 9

UNIT II SURFACE RUNOFF 9

UNIT III GROUNDWATER 9

UNIT IV RESERVOIR PLANNING AND MANAGEMENT 9

UNIT V FLOODS AND DROUGHTS 9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
At the end of the course student attains adequate knowledge in assessing both Physical and Engineering properties of soils through laboratory testing procedures.

LIST OF EXPERIMENTS:
1. Specific gravity of soil solids
2. Grain size distribution – Sieve analysis
3. Grain size distribution - Hydrometer analysis
4. Liquid limit and Plastic limit tests
5. Shrinkage limit and Differential free swell tests
6. Field density Test (Sand replacement method)
8. Permeability determination (constant head and falling head methods)
9. Direct shear test in cohesionless soil
10. Unconfined compression test in cohesive soil
11. Triaxial compression test in cohesionless soil (Demonstration only)
12. Laboratory Vane Shear test in cohesive soil
13. One dimensional consolidation test (Determination of co-efficient of consolidation only)

TOTAL: 60 PERIODS

REFERENCES:
4. I.S. Code of Practice (2720): Relevant Parts, as amended from time to time.

OBJECTIVE:
To learn the principles and procedures of testing of highway materials

I. TESTS ON BITUMEN
1. Penetration
2. Softening Point
3. Ductility
4. Viscosity
5. Elastic Recovery
6. Storage Stability
II. TESTS ON AGGREGATES

1. Stripping
2. Soundness
3. Proportioning of Aggregates
4. Water Absorption

III. TESTS ON BITUMINOUS MIXES

1. Determination of Binder Content
3. Specific Gravity
4. Density

TOTAL: 60 PERIODS

REFERENCES:

GE 9371 COMMUNICATION SKILLS AND SOFT SKILLS LAB L T P C
0 0 2 1

OBJECTIVES:
- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their jobs.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

A. Viewing and discussing audio-visual materials

1. Resume / Report Preparation / Letter Writing:

Letter writing – Job application with Resume - Project report - Email etiquette.

2. Presentation skills:

Elements of effective presentation – Structure of presentation - Presentation tools – Body language.

3. Soft Skills:

Time management – Stress management – Assertiveness – Negotiation strategies.
4. **Group Discussion:**

Group discussion as part of selection process, Structure of group discussion – Strategies in group discussion – Mock group discussions.

5. **Interview Skills:**

Kinds of interviews – Interview techniques – Corporate culture – Mock interviews. (Career Lab Software may be used for this section).

**NOTE:** Career Lab software may be used to learn the skills, to be applied in the practice session.

**B. PRACTICE SESSION:**

1. Resume / Report Preparation / Letter writing: Students prepare their own resume and report. 4
2. Presentation Skills: Students make presentations on given topics. 8
3. Group Discussion: Students participate in group discussions. 6
4. Interview Skills: Students participate in Mock Interviews 6

**TOTAL: 30 PERIODS**

**REFERENCES:**

OBJECTIVE:
To learn the influence lines and its uses in various applications like bridges, arches. Also to learn Plastic analysis of beams and rigid frames.

UNIT I MOVING LOADS AND INFLUENCE LINES 12
Influence lines for reactions in statically determinate structures – influence lines for member 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.

UNIT II INFLUENCE LINES FOR INDETERMINATE STRUCTURES 12
Muller Breslau’s principle – Application of Muller Breslau’s principle to determinate beams and continuous beams.

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

UNIT IV SUSPENSION BRIDGES AND SPACE TRUSSES 12
Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders. Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

UNIT V PLASTIC ANALYSIS 12

L: 45 + T: 15  TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To introduce the student to the concept of soil – Plant characteristics and their water requirements. At the completion of the course the students should be able to understand the necessity of planning an irrigation system to provide water at the right quantity and at right time.

UNIT I  IRRIGATION PRINCIPLES  10
Need for irrigation – Advantages and ill effects – Development of irrigation – National Water Policy – Tamil Nadu scenario - Physical properties of soil that influence soil moisture characteristics – Concept of soil water potential and its components: Gravitational, Pressure and Osmotic- Retention of water in soils and concept of plant available water – Movement of water into and within the soils – Measurement of soil moisture content and the matric tension with which it its held

UNIT II  IRRIGATION WATER REQUIREMENT AND CROPS  8
Soil- Water-Plant relationship - Water as a constituent of plant – Soil-Plant-Airmosphere continuum – Terminology in plant – Water relationships (Evapotranspiration, consumptive use and crop factor) – Critical stages of crop growth for water requirement – Analysis of crop water demand: basic concepts and estimation

UNIT III  IRRIGATION SYSTEM COMPONENTS  11
Components of irrigation network; Diversion headworks, Canal regulators, Canal drop, canal cross drainage works, Canal outlets, - Functions of the above components – Canal lining - Supply of irrigation water: Duty, Delta and Base period – Concepts of Kennedy’s and Lacey’s formulae

UNIT IV  FIELD TECHNIQUES  8
Field Measurements, Land leveling and drainage – Irrigation methods: relative merits and limitations – Evaluation of irrigation methods –Irrigation water quality - Irrigability of soils and the irrigation related degradation of soil resource (such as water logging, salinity and sodicity)

UNIT V  IRRIGATION WATER MANAGEMENT  8

UNIT VI  DESIGN AND DRAWING OF IRRIGATION STRUCTURES (FOR INTERNAL EVALUATION)  30
Design of Tank Surplus Weir – Tank Sluice with a Tower Head – Direct Sluice taking off from a main canal – Canal Drop with Notch Type – Regulators across the canal – Profile of Gravity Dam using AutoCAD – Design of Cross Drainage work: Syphon Aqueduct (Type III)

L: 45 + P: 30 TOTAL: 75 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9353 DESIGN OF REINFORCED CEMENT CONCRETE AND MASONRY STRUCTURES

OBJECTIVE:
To introduce the various philosophies of R.C. design and to study in detail the limit state design of structural elements such as beams, columns and footings

UNIT I DESIGN CONCEPTS AND ELASTIC DESIGN OF BEAMS

UNIT II LIMIT STATE DESIGN OF BEAMS
Design of singly and doubly reinforced rectangular and flanged beams – use of design aids for flexure – Behaviour of R.C. beams in shear and torsion – Shear and torsional reinforcement – Limit State design of R.C. members for combined bending, shear and torsion – Use of design aids. Design requirement for bond and anchorage as per IS code. Serviceability requirements.

UNIT III LIMIT STATE DESIGN OF SLABS
Behaviour of one way and two way slabs — design of one way simply supported, cantilever and continuous slabs. Design of two-way slabs for various edge conditions. Types of staircases - design of dog-legged staircase.

UNIT IV LIMIT STATE DESIGN OF COLUMNS AND FOOTING
Types of columns – design of short columns for axial load, combined axial load with uniaxial and biaxial bending - use of design aids. Design of footing for masonry and reinforced walls – design of axially and eccentrically loaded square and rectangular footings – design of combined rectangular footings for two columns only

UNIT V MASONRY MEMBERS
Design of masonry walls, pillars and footings as per NBC and IS Codes.

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:
2. Krishna Raju N., Design of Reinforced Concrete Structures, CBS Publishers and Distributors, Delhi 1995

CE 9354 WASTE WATER ENGINEERING

OBJECTIVE:
Principles and design of Sewage Collection, Conveyance, treatment and disposal system will be covered. Relevant GIS codes and Government of India manual will be referred.

UNIT I PLANNING FOR SEWERAGE SYSTEMS

UNIT II SEWER NETWORK 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 – Construction, Operation and Maintenance aspects.

UNIT IV SECONDARY TREATMENT OF SEWAGE

UNIT V DISPOSAL OF SEWAGE AND SLUDGE

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

CE 9355 FUNDAMENTALS OF REMOTE SENSING AND GIS L T P C
3 0 2 4

OBJECTIVE:
To introduce the students to the basic concepts and principles of various components of remote sensing. To provide an exposure to GIS and its practical applications in civil engineering.

UNIT I EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL 9
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein’s Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT II PLATFORMS AND SENSORS 9
Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

UNIT III IMAGE INTERPRETATION AND ANALYSIS 9

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9

UNIT V DATA ENTRY, STORAGE AND ANALYSIS 9

L: 45 + P: 30 TOTAL: 75 PERIODS

TEXT BOOKS:
5. Ian Heywood., An Introduction to GIS, Pearson Education Asia, 2000

CE 9356 COMPUTER AIDED STRUCTURAL ENGINEERING DRAWING

OBJECTIVES:
To develop the ability to design steel and concrete structural components and transfer the design into drawings as per IS Codes

1. Design and Drawing of R.C.C. cantilever and counter fort type retaining walls with reinforcement details.
2. Design and Detailing of R.C slab and R.C. Tee Beam Bridge deck and reinforcement details
6. Demonstration using modern soft ware

TOTAL: 60 PERIODS

TEXT BOOKS:

REFERENCES:
2. Krishnamurthy, D., Structural Design and Drawing Vol.III (Steel Structures), CBS, Publishers & Distributors, Delhi, 1992
OBJECTIVES:
Students should be conversant with the experimental procedures for quantitative estimation of important environmental water quality parameters.

1. Suspended solids and Total Dissolved solids
2. Turbidity and Hardness
3. Flouride
4. TKN
5. Biochemical Oxygen Demand
6. Chemical Oxygen Demand
7. Most Probable Number
8. Chlorine demand
9. Optimum dosage (Jar) test
10. Sludge Volume Index (SVI)
11. Estimation of Mixed Liquor Suspended Solids
12. Settling Column Studies (Demonstration)

TOTAL: 60 PERIODS

REFERENCE:

CE 9358 SURVEY CAMP

A Survey Camp for ten days during winter will be conducted to train the students to establish horizontal control by Triangulation.

CE 9359 TECHNICAL SEMINAR

AIM:
To work on a specific technical topic in Civil Engineering and acquire the skill of written and oral presentation. To acquire writing abilities for seminars and conferences.

SYLLABUS:
The students will work for three hours per week guided by a group of staff members. They will be asked to talk on any topic of their choice and to engage in dialogue with the audience. A brief copy on their talk also should be submitted. Similarly, the students will have to present a seminar of not more than fifteen minutes on the technical topic. They should also answer the
queries on the topic. The students as the audience also should interact. Evaluation will be based on the general and technical presentation and the report and also on the interaction shown during the seminar.

CE 9401 PRINCIPLES OF MANAGEMENT

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OBJECTIVE:
To introduce the basic concepts of management needed for a Civil Engineer

UNIT I BASIC CONCEPTS IN MANAGEMENT

Types of business operations - Sole proprietorship – Partnership – Company – Public and private sector enterprises / Joint ventures, collaborations.

Functions of Management - Principles of management – Functions of management – Functions of a manager.


UNIT II INTRODUCTION TO MARKETING AND FINANCIAL MANAGEMENT


UNIT III MATERIALS AND EQUIPMENT MANAGEMENT

Planning – Identification, Procurement, Schedule and Cost control – systems approach in resource management – ABC analysis, VED analysis, FSN analysis, vendor rating evaluation, buying versus leasing of equipment

UNIT IV HUMAN RESOURCE MANAGEMENT


UNIT V INTRODUCTION TO COMPUTER APPLICATION (IN CONSTRUCTION MANAGEMENT)

Project identification-formulation-Preparation of detailed project report (DPR)-Planning – Scheduling and Resource analysis - Recording and operations- Project accounting, costing and finance – usage of project management software-

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9402 STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
To provide a basic understanding of dynamic loading. Study the effect of earthquake loading on the behaviour of structures. Understand the codal provisions to design the structures as earthquake resistant.

UNIT I SINGLE DEGREE OF FREEDOM SYSTEMS 9
Formulation of equation of motion, Free and forced vibrations, Damping, Types of Damping-
Damped and undamped vibrations, Response to dynamic loading.

UNIT II MODAL ANALYSIS 9
Free and forced vibration of undamped and damped MDOF systems. Equation of motions,
Evaluation of natural frequencies and modes, Eigen Values and Eigen Vectors

UNIT III INTRODUCTION TO EARTHQUAKE ENGINEERING 9

UNIT IV BEHAVIOUR OF STRUCTURES AND SOIL 9
Performance of structures under past earthquakes, Lessons learnt from past earthquakes–
soil liquefaction - Soil – Structure Interaction (SSI) effects.

UNIT V EARTHQUAKE RESISTANT DESIGN 9
Concept of Earthquake Resistant Design, Provisions of Seismic Code IS 1893 (Part I),
Response Spectrum, Design Spectrum, Design of Buildings, Reinforcement Detailing,
Provisions of IS 13920.

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

CE 9403 GROUND IMPROVEMENT TECHNIQUES

OBJECTIVE:
At the end of the course student is expected to identify the problematic soil and suitable suggest remedial measures to improve their behaviour.

UNIT I PROBLEMATIC SOIL AND IMPROVEMENT TECHNIQUES
Role of ground improvement in foundation engineering – methods of ground improvement – Geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II DEWATERING
Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two – dimensional flow for fully and partially penetrated slots in homogeneous deposits (Simple cases only).

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

UNIT IV EARTH REINFORCEMENT
Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – simple design - applications of reinforced earth. Role of Geotextiles in filtration, drainage, separation and road works.

UNIT V GROUT TECHNIQUES

TOTAL:45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9404 ESTIMATING, COSTING AND VALUATION ENGINEERING

OBJECTIVE:
To offer knowledge in estimation, tender practices, contract procedures, and valuation. The student will be able to prepare estimates, call for tenders and execute works.

UNIT I QUANTITY ESTIMATION 9

UNIT II RATE ANALYSIS AND COSTING 9
Standard Data – Observed Data – Schedule of rates – Market rates – Assessment of Man Hours and Machineries for common civil works – Rate Analysis – Cost Estimates using Computer softwares

UNIT III SPECIFICATIONS AND TENDERS 9

UNIT IV CONTRACTS 9

UNIT V VALUATION 9
TEXT BOOKS:

REFERENCES:

CE 9405 RAILWAYS AND AIRPORTS ENGINEERING

OBJECTIVE:
To introduce the students about the various types of transport like Railways and airways; planning and design principles of construction of railway track and airport terminals will be covered with an exposure on standards.

UNIT I RAILWAY PLANNING AND CONSTRUCTION
Route alignment surveys, modern methods – Elements of permanent way – Rails, sleepers, ballast, rail fixtures and fastenings, coning of wheels, creep in rails, defects in rails – Geometric design of railway track, gradient, super elevation, widening of gauge on curves

UNIT II RAILWAY STATION YARDS AND OPERATIONS
Planning and development of railway station yards, –Turnouts, points and crossings – Signalling - Interlocking, track circuiting – Modern developments in railways, urban railways, underground and tube railways–Basic planning for MRTS and Suburban railways–Electric traction

UNIT III RAILWAY CONSTRUCTION AND MAINTENANCE
Earthwork – Stabilization of track on poor soil- Tunneling - Methods, drainage and ventilation – Construction and maintenance of tracks – uniguage – Maintenance of rolling stocks and signals

UNIT IV AIRPORT PLANNING
Airport site selection – Components of airports- Forecasting in aviation- Airport obstructions – Zoning laws - Regional planning - Airport architecture - Airport lighting - Air traffic control aids

UNIT V AIRPORT DESIGN
Runway orientation – Basic runway length – Corrections to basic runway length – geometric design of runways – Layout of taxiway and terminal area- airport pavement design (flexible pavement only).

TOTAL: 45 PERIODS
TEXT BOOKS:

REFERENCES:
2. Shahini. P., Airport Technique, New Delhi
6. Agarwal. M.M., Indian Railway Track, New Delhi

CE 9406 ARCHITECTURE AND TOWN PLANNING

OBJECTIVE:
To provide the basic knowledge on the principles of design of buildings relating to the environment and climate.

UNIT I ARCHITECTURAL DESIGN
Architectural Design – an analysis – integration of function and aesthetics – Introduction to basic elements and principles of design.

UNIT II SITE PLANNING
Surveys – Site analysis – Development Control – Layout regulations - Layout design concepts.

UNIT III BUILDING TYPES
Residential, institutional, commercial and Industrial – Application of anthropometry and space standards-Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior design.

UNIT IV CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN
Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V TOWN PLANNING
Planning – Definition, concepts and processes- Urban planning standards and zoning regulations- Urban renewal – Conservation – Principles of Landscape design

TOTAL: 45 PERIODS

REFERENCES:
CE 9407  PRACTICAL TRAINING  L T P C
0 0 0 2

OBJECTIVE:
To train the students in field work so as to have a first hand knowledge of practical problems in carrying out engineering tasks. To develop skills in facing and solving the field problems.

SYLLABUS:
The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

CE 9451  PROJECT WORK  L T P C
0 0 12 6

OBJECTIVE:
To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

SYLLABUS:
The student works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

SYLLABUS FOR ELECTIVE SUBJECTS

CE 9021 BRIDGE STRUCTURES  L T P C  3 0 0 3

OBJECTIVE:
To impart exposure on various aspects of structural design of common types of steel and concrete bridges.

UNIT I  HIGHWAY STEEL BRIDGES  8

UNIT II  RAILWAY STEEL BRIDGES  7

UNIT III  REINFORCED CONCRETE BRIDGES  15

UNIT IV  AQUEDUCTS AND BOX CULVERTS  6
Design of Aqueducts and Syphon Aqueducts – Design of Box Culverts.

UNIT V  PRESTRESSED CONCRETE BRIDGES  9

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCE:
1. Dr.B.C.Punmia, Ashok Kumar, Jain and Arun Kumar Jain, R.C.C. Designs, Laxmi Publications (P) Ltd., New Delhi, 1998
CE 9022  
PREFABRICATED STRUCTURES  
L T P C  
3 0 0 3

OBJECTIVE:

To learn the design prefabricated structures

UNIT I  
INTRODUCTION  
10  

UNIT II  
PREFABRICATED COMPONENTS  
10  
Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs Wall panels – Columns – Shear walls.

UNIT III  
DESIGN PRINCIPLES  
10  
Disuniting of structures – Design of cross section based on efficiency of material used - Problems in design because of joint flexibility – Allowance for joint deformation.

UNIT IV  
JOINTS IN STRUCTURAL MEMBERS  
8  

UNIT V  
DESIGN FOR ABNORMAL LOADS  
7  
Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones etc., - Importance of avoidance of progressive collapse.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
The overall idea of implementing a computer aided design with advantages and demerits. The software techniques in finite element analysis and the applications and optimize the structural components.

UNIT I INTRODUCTION
Fundamentals of CAD - Software requirements – Hardware components in CAD system – Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS
Graphic Software – Graphic primitives - Transformations - 2 Dimensional and 3Dimensional transformations – Concatenation - Wire frame modeling and solid modeling - Graphic standards - Drafting packages – Auto CAD.

UNIT III STRUCTURAL ANALYSIS

UNIT IV DESIGN AND OPTIMIZATION
Principles of design of steel and RC structures - Beams and Columns - Applications to simple design problems - Optimization techniques - Algorithms - Linear programming.

UNIT V EXPERT SYSTEMS
Introduction to artificial intelligence - Knowledge based expert systems – Rules and decision tables - Inference mechanisms - simple applications

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

UNIT I MAINTENANCE AND REPAIR STRATEGIES
Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II SERVICEABILITY AND DURABILITY OF CONCRETE
Quality assurance for concrete construction concrete properties- strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking

UNIT III MATERIALS AND TECHNIQUES FOR REPAIR

UNIT IV REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES
Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

UNIT V DEMOLITION TECHNIQUES
Engineered demolition techniques for dilapidated structures - case studies

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
4. N.Palaniappan, Estate Management, Anna Institute of Management, Chennai, 1992
OBJECTIVE:
To learn the design of water tank and other storage elements.

UNIT I STEEL WATER TANKS

UNIT II CONCRETE WATER TANKS

UNIT III STEEL BUNKERS AND SILOS

UNIT IV CONCRETE BUNKERS AND SILOS

UNIT V FOUNDATION
Design of various types of foundation like isolated, combined and raft foundation for a Water tanks, Bunkers and Silo’s.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
CE 9026 DESIGN OF PLATE AND SHELL STRUCTURES  L T P C
3 0 0 3

OBJECTIVE:

To learn the design of plate and shell structures

UNIT I THIN PLATES WITH SMALL DEFLECTION  10
Laterally loaded thin plates - Governing differential equation, various boundary conditions.

UNIT III RECTANGULAR PLATES  10
Simply supported rectangular plates - Navier solution and Levy's method – Loading.

UNIT III THIN SHELLS  5
Classification of shells - Types of shells - Structural action.

UNIT IV ANALYSIS OF SHELLS  10
Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic paraboloid.

UNIT V DESIGN OF SHELLS  10
Spherical dome, Conical shell and cylindrical shell.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9027 PRESTRESSED CONCRETE STRUCTURES  L T P C
3 0 0 3

OBJECTIVE:

To understand the behaviour and performance of prestressed concrete structures. Compare the behaviour of prestressed concrete members with that of the normal reinforced concrete structures. Understand the performance of composite members. Finally to learn the design of prestressed concrete structures.

UNIT I FUNDAMENTAL PRINCIPLES  9
Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons
UNIT II BEHAVIOUR
Losses of prestress – factors affecting the losses of prestress. Deflections of prestressed concrete members - Factors influencing deflections – Effect on tendon profile on deflections. Short term and long term – deflections

UNIT III DESIGN
Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing – Applications.

UNIT IV COMPOSITE CONSTRUCTION

UNIT V SPECIAL STRUCTURES
Prestressed concrete tanks, poles, sleepers. Prestressed concrete bridges - General aspects – pretensioned prestressed bridge decks – Post tensioned prestressed bridge decks – Advantages over R.C. bridges – Principles of design only

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To learn the layout design and functional aspects and designing the various industrial elements.

UNIT I  PLANNING  9
Classification of industries and industrial structures – General requirements of various industries – Planning and layout of buildings and components.

UNIT II  FUNCTIONAL REQUIREMENTS  9

UNIT III  DESIGN OF STEEL STRUCTURES  9
Industrial roofs – Crane girders – Mills buildings – Chimney.

UNIT IV  DESIGN OF R.C. STRUCTURES  9
Silos and bunkers – Principles of Design of Chimney.

UNIT V  PREFABRICATION  9
Principles of prefabrication – Pretressed precast roof trusses

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
CE 9029  TALL STRUCTURES  L  T  P  C
3  0  0  3

OBJECTIVE:
To provide an insight to the design of tall buildings. To enlighten the students on modern techniques available for the analysis of tall buildings.

UNIT I  DESIGN CRITERIA  8
Design Philosophy, Materials – Modern concepts – High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete.

UNIT II  LOADING  9

UNIT III  BEHAVIOUR OF STRUCTURAL SYSTEMS  9
Factors affecting the growth, height and structural form, Behaviour of Braced frames, Rigid Frames, in filled frames, Shear walls, Coupled Shear walls, Wall – Frames, Tubular, Outrigger braced, Hybrid systems.

UNIT IV  ANALYSIS  10
Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of structures as an integral unit, Analysis for member forces, drift and twist. Computerized 3D analysis, Evaluation of frequency of vibration of structures

UNIT V  DESIGN OF TALL BUILDINGS  9
Design for differential movement, Creep and Shrinkage effects, Temperature Effects and Fire Resistance.

TOTAL: 45 Periods

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
The course introduces to the undergraduate students, the phenomena, governing equations and the engineering problems associated with wind flow around various structures.

UNIT I INTRODUCTION TO WIND ENGINEERING 9
Continuity and Navier-Stokes equations, atmospheric pressure and gradient wind, peak and hourly mean wind speeds, wind energy and turbulence, spectral distribution and boundary layer.

UNIT II AERODYNAMICS OF WIND LOADING 9
Bluff bodies aerodynamics, ideal flow, separation, wake, vortex shedding flow past circular and rectangular objects, Buffeting and ovalling, Galloping and flutter

UNIT III MODELLING AND ANALYSIS 9
Wind tunnel studies, types of wind tunnels, Modeling requirements, pressure, velocity, turbulence and force measurements and related instrumentation, Wall effects, similarity laws, Aero-elastic models

UNIT IV WIND ON STRUCTURES 9
Chimneys, tall buildings, towers and bridges, Rigid and flexible structures, Analytical procedures for along wind and across wind forces.

UNIT V DESIGN OF STRUCTURES UNDER WIND LOADING 9
Applications to design, codal provisions, Design wind velocities, Wind resistant design by Indian Codes and other International Codes of Practice, Case studies.

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
OBJECTIVE:
The course is designed to give an insight into the latest developments regarding smart materials and their use in structures. This also deals with structures which can self adjust their stiffness with load.

UNIT I PROPERTIES OF MATERIALS
Piezoelectric Materials, Piezoelectric properties, Actuation of structural components, Shape Memory Alloys, Constitutive modeling of the shape memory effect, vibration control, Embedded actuators, Applications of shape memory alloys.

UNIT II ER AND MR FLUIDS
Electrorheological and magnetorheological fluids, Mechanisms and Properties, Applications of ER and MR fluids, Fiber Optics, Fiber characteristics, Fiber optic strain sensors, Applications of optical fibers

UNIT III VIBRATION ABSORBERS
Parallel damped vibration absorber, Gyroscopic vibration absorber, Active vibration, absorber, Applications, Vibration Characteristics of mistuned systems, Analytical approach

UNIT IV CONTROL OF STRUCTURES
Control modeling of structures, Control strategies and limitations, classification of control systems, Classical control, Modern control, Optimal control and Digital control, Active structures in practice.

UNIT V BIOMIMETICS
Characteristics of natural structures, Biomimetic structural design, Biomimetic sensing, Challenges and opportunities for Biomimetics, Chemical and biochemical sensing in structural assessment, Absorptive chemical sensors, Spectroscopes

Total: 45 PERIODS

TEXT BOOK:

REFERENCES:
1. Brian Culshaw, Smart Structures and Materials, Artech House, Boston, 1996
2. M.V. Gandhi and B.S. Thompson, Smart Materials and Structures, Chapman and Hall 1992
OBJECTIVE:
The course is designed to provide an insight into the Finite Element Techniques for modeling and analysis of structural systems.

UNIT I  INTRODUCTION
Modelling- Continuum and Discrete Domains – Boundary value problem – Approximate Solutions – Variational and Weighted Residual Formulations – Ritz formulation – Introduction to finite domains and finite elements.

UNIT II  ONE DIMENSIONAL PROBLEMS

UNIT III  TWO DIMENSIONAL AND BEAM ELEMENTS

UNIT IV  ISO PARAMETRIC FORMULATION AND NUMERICAL INTEGRATION
Concept of Isoparametric elements – Working with shape functions – Numerical integration in one and two dimensions.

UNIT V  APPLICATIONS

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To introduce the student to the Principles of Groundwater governing equations and characteristics of different aquifers.
- At the completion of the course the students should be able to understand the Techniques of development and management of groundwater.

UNIT I  HYDROGEOLOGICAL PARAMETERS  10

UNIT II  WELL HYDRAULICS  10

UNIT III  GROUND WATER MANAGEMENT  8

UNIT IV  WATER QUALITY  8
Ground water chemistry - Origin, movement and quality - Water quality standards – Saline intrusion – Environmental concern.

UNIT V  GROUNDWATER CONSERVATION  9
Artificial recharge techniques – Remediation of Saline intrusion–Ground water management studies – Ground water Pollution and legislation.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To introduce the student to the concept of Mathematical approaches for managing the water resources system.
- At the completion of the course the students should be able to apply an appropriate system approach to optimally operate a water resource system.

UNIT I  SYSTEM APPROACH
Philosophy of modelling – Goals and Objectives – Basics of system analysis concept – scopes and steps in systems engineering.

UNIT II  PHYSICAL AND SOCIO-ECONOMIC DATA
Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project.

UNIT III  LINEAR PROGRAMMING
Operation research an introduction - Problem Formulation-graphical solution- Simplex method – Sensitivity analysis - simple applications

UNIT IV  DYNAMIC PROGRAMMING
Optimality criteria Stage coach problem – Bellman's optimality criteria Problem formulation and Solution - simple applications

UNIT V  SIMULATIONS
Basic principles – Methodology and Philosophy – Model development – input and outputs – Deterministic simulation - simple applications

TOTAL : 45 PERIODS

TEXT BOOK:

REFERENCES:
OBJECTIVES:

- To introduce the student to the concept of hydraulic, hydrology and ground water models in management of Water Resources.
- At the completion of the course the students should be able to understand and build the mathematical models for various problems in water resources management.

UNIT I  MATHEMATICAL MODELLING  6
Role of models in water resources engineering – basic concept of model study- Planning model - operational model- elements on hydraulic models- Elements of hydrologic models

UNIT II  HYDRAULIC MODELS  7
Over land flow- time of concentration- isochrone- time area diagram- hydraulic routing- kinematics wave model –HEC Models- case studies

UNIT III  HYDROLOGIC MODELS  10
Stream network model- basic concepts of basin simulation- single and multipurpose reservoir operation model (MITSIM) - Storm water management model

UNIT IV  OPTIMIZATION MODELS  10
Basics of optimization – objective of model- linear decision rule with applications – concepts of probability and transitional probability- optimization through Genetic algorithm- Fuzzy logic concepts- case studies

UNIT V  GROUND WATER MODELS  12
Analytical-Analog models- model of a aquifer- finite difference approximation- Introduction to Finite element technique to solve Ground water flow equation- contaminant transport model using Visual Modflow software.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To introduce the student to the concept of Ecology, Environment, and Socio-economic disciplines in management of Water Resources.
- At the completion of the course the students should be able to understand the integrated effects of inter disciplinary approach in water resources management.

UNIT I  IWRM CONCEPT  6
Integrated Water Resources Management (IWRM) Definition – Principles- Approaches- Global issues – food securities

UNIT II  RIVER BASIN  12

UNIT III  ENVIRONMENT  8
Impact of land use changes in basin morphology – impact of watershed changes an qualities and quantities

UNIT IV  WATER ECONOMY  7
Economic view of water issues – Economic characteristics of water as good and services – Policy operation for water conservation and sustainable issue – pricing.

UNIT V  SPECIAL TOPICS  12

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
UNIT I  FUNDAMENTALS OF SOCIOLOGY
Sociology – Basic concept – Perspectives of sociology – social system – Sociological Understanding.

UNIT II  CONCEPT OF PARTICIPATION

UNIT III  ORGANIZATIONAL DESIGN
Membership and decision making – Leadership and responsibilities – Development strategy – Channels for implementation – Improving agency relations – Technical co-operation – Special roles.

UNIT IV  PARTICIPATION IN WATER MANAGEMENT

UNIT V  FARMER ORGANIZATION AND PARTICIPATION

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9038  WATERSHED CONSERVATION AND MANAGEMENT  L T P C
3 0 0 3

OBJECTIVES:
• To introduce the student to the concept of dynamic process of a watershed resulting in soil erosion.
• At the completion of the course the students should be able to understand the appropriate Conservation measures to be adopted for remediation of watershed.
UNIT I WATERSHED

UNIT II SOIL CONSERVATION

UNIT III WATER CONSERVATION

UNIT IV WATERSHED MANAGEMENT
Watershed programmes – factors affecting watershed management – planning of watershed works – watershed water resources – watershed management practices.

UNIT V MANAGEMENT PRACTICES

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9039 TRANSPORTATION PLANNING AND SYSTEMS

OBJECTIVE:
To give an exposure on overview of the principles of the bus and rail transportation planning and evaluation of the transportation projects.

UNIT I STUDY AREA AND SURVEYS
Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning - Conducting various surveys – Travel patterns, transport facilities and planning parameters.
UNIT II MODES
Basics of trip generation – Trip distribution – Trip assignment and modal split models – Validation of the model.

UNIT III PLAN PREPARATION AND EVALUATION
Preparation of alternative plans – Evaluation techniques – Economic and financial evaluation – Environment Impact Assessment (EIA) – Case studies

UNIT IV BUS TRANSPORTATION
Characteristics of bus transportation in urban areas – Fare policy – route planning – Planning of terminals – Break even point and its relevance.

UNIT V RAIL TRANSPORTATION
Characteristics of suburban, IRT and RRT systems – Planning of rail terminals – Fare policy – unified traffic and transport authority.

TOTAL = 45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9040 TRAFFIC ENGINEERING AND MANAGEMENT

OBJECTIVE:
To give an overview of Traffic engineering - Various surveys to be conducted, traffic regulation, management and traffic safety.

UNIT I TRAFFIC CHARACTERISTICS
Road Characteristics – Classification – Functions and standards – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India

UNIT II TRAFFIC SURVEYS

UNIT III TRAFFIC ENGINEERING REGULATION AND CONTROL
UNIT IV  TRAFFIC SAFETY AND ENVIRONMENT  
Road accidents – Causes, effect, prevention, and cost – street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, health effects and abatement measures.

UNIT V  TRAFFIC MANGEMENT 
Area Traffic Management System – One way street system, exclusive traffic lanes, tidal flow operation, staggering of work hours and road pricing – Non road pricing options _ Parking charges, Public transport, Subsidies, Vehicle License fees, Road Building, Permit system, Physical Traffic Management Transport System Management (TSM) and Transport Demand Management (TDM) 

TOTAL: 45 PERIODS

TEXT BOOKS:
4. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management.

REFERENCES:

CE 9041  TRANSPORTATION ENGINEERING – DOCKS AND HARBOURS  L T P C
3 0 0 3

OBJECTIVES:
To introduce the various components in Docks and Harbour. The planning and design principles of various components in Docks and harbours will be covered.

UNIT I  WIND, TIDES AND CURRENTS  
Wind characteristics – Tide producing forces – Tidal theories – Types of ocean currents – Littoral drift – Coastal erosion and protection works.
UNIT II  PLANNING OF PORT AND HARBOURS  

UNIT III  BREAK WATERS AND DREDGING  
Types of break waters and factors determining their selection – Location, arrangement, design and construction of various types of break waters – Dredging – Objectives, types and equipments.

UNIT IV  PORT FACILITIES  
General aspects of selection and design – Piers, wharves, quay walls, jetties, dolphins, trestle, moles, fenders and moorings, lock and lock gates – Dry and wet docks – Transit sheds and ware houses.

UNIT V  COASTAL SHIPPING  
Coastal shipping – Inland navigation – Container transportation – Environmental concerns in port construction – Coastal regulation zones – Navigational aids.

TOTAL:45 PERIODS

TEXT BOOK:

REFERENCES:

CE 9042  TRANSPORT AND ENVIRONMENT  
L T P C  
3 0 0 3

OBJECTIVE:
The objective of this course is to create an awareness / overview of the Impact of Transportation Projects on the Environment and Society.

UNIT I  INTRODUCTION  
Environmental Inventory, Environmental Assessment, Environmental Impact Assessment (EIA), Environmental Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development

UNIT II  METHODOLOGIES  
Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate Methodology

UNIT III  ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT  

Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land, acquisition and resettlement, Socio-economic impact, indigenous people, aesthetics, health and safety, energy studies, IRC guidelines.

UNIT IV ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN
Mitigation of the impact on natural and man-made Environment, health, water, land, noise, air, public participation, Environmental Management Plan, Energy Conservation, Methods to reduce global warming

UNIT V EIA CASE STUDIES
EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TOTAL: 45 PERIODS

TEXT BOOKS:
2. T.F.Fwa, Hand Book of Highway Engineering
3. Indian Road Congress (IRC), Environmental Impact of Highway Projects, IRC, Delhi 1998
4. P.Meena_kshi; Elements of Environmental Science and Engineering, Prentice Hall of India, New Delhi, 2006
5. Thirumurthy A.M.; Introduction to Environmental Science and Management, Shroff Publishers, Bombay, 2005

REFERENCES:

CE 9043 PAVEMENT MANAGEMENT SYSTEMS

OBJECTIVE:
To introduce the concepts of design, evaluation and performance of existing and new flexible and rigid pavements with due emphasis on systems approach and performance prediction models.

UNIT I PAVEMENT MANAGEMENT PROCESS
Historical background – General nature and applicability of systems methodology – Basic components of Pavement Management System – Planning pavement investments

UNIT II EVALUATION AND PERFORMANCE
UNIT III DESIGN STRATEGIES 12
Framework for pavement design – Design objectives and constraints – Basic structural response models – Characterization of physical design inputs – generating alternative pavement design – Economic evaluation of alternative design – Analysis of alternative design strategies – Selection of optimal design strategy

UNIT IV PERFORMANCE PREDICTION MODELS 6
Techniques for developing prediction models – AASHTO, CRRI and HDM models- Computer applications

UNIT V REHABILITATION 9
Repair of pavement defects – Maintenance of flexible and rigid pavements- Bituminous and cement concrete overlays – System analysis

TEXT BOOK:

REFERENCES:

CE 9044 COMPUTER APPLICATIONS IN HIGHWAY AND TRANSPORTATION ENGINEERING

OBJECTIVES:
To provide knowledge on Computer Applications related to Highway and Transportation Engineering

UNIT I CAD APPLICATIONS IN HIGHWAY ENGINEERING 12
Writing Programs for Drawing Graphics Elements like Point, Line. Preparation of Cad Drawing for Highway Elements and Transportation Infrastructure.

UNIT II GIS APPLICATIONS IN TRANSPORTATION PLANNING 12

UNIT III COMPUTER AIDED HIGHWAY DESIGN 12
Design of Highway Geometric Elements – Carriageway, shoulders, cross slope etc., Highway Alignment – Practical exercise

UNIT IV PAVEMENTS MANAGEMENT SYSTEM 12
Pavement Surface condition Evaluation methods - Pavement Management System – Practical exercise
UNIT V  COMPUTER APPLICATIONS IN TRAFFIC ENGINEERING AND TRANSPORT PLANNING

Signal Design and Signal Coordination – Network Analysis, Theory, Practice and Case studies

L: 30 + P: 30  TOTAL: 60 PERIODS

REFERENCES:

CE 9045  ADVANCED HIGHWAY ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
To give exposure to the advanced topics in the area of Highway Engineering.

UNIT I  MATERIALS
Properties and tests on modified bitumen and bitumen emulsion – IS requirements – advantages Geo synthetics. Types and selection of cement for Pavement Quality Concrete (PQC) – Use of admixtures and fibers in PQC

UNIT II  MIX DESIGN

UNIT III  ANALYSIS AND DESIGN OF RIGID PAVEMENTS
Stresses and deflections in rigid pavements – Design of plain jointed and continuously reinforced cement concrete pavements using IRC method

UNIT IV  ANALYSIS AND DESIGN OF FLEXIBLE PAVEMENTS
Stresses and deflection in flexible pavements – Design of flexible pavements using IRC method KENLAYER applications.

UNIT V  MAINTENANCE
Factors affecting the performance of flexible and rigid pavements – Performance indicators and evaluation – Use of performance prediction models in maintenance – Recent techniques for repairing pavement defects – Maintenance management system – MOSRTH (India) recommendations.

TOTAL = 45 PERIODS
TEXT BOOKS:
3. Indian Road Congress (IRC), Guidelines and Special Publications on Highway Planning and Design.

REFERENCES:

CE 9046 ENVIRONMENTAL IMPACT ASSESSMENT  L T P C
3 0 0 3

OBJECTIVE:
Students should be conversant with assessment of environmental impacts due to major infrastructure projects and their management

UNIT I INTRODUCTION 10

UNIT II METHODOLOGIES 9
Methods of Categorization of industries for EIA - Elements of EIA – Process screening, Methods of EIA – Strengths, weaknesses and applicability – appropriate methodology solution.

UNIT III PREDICTION AND ASSESSMENT 9

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN 9
Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, water, energy, flora and fauna; Addressing the issues related to the Project Affected People – Environment management Plan – Structure and Documentation. Development of green building concept

UNIT V CASE STUDIES 8
TEXT BOOKS:

REFERENCES:

CE 9047 GLOBAL CLIMATE CHANGE L T P C
3 0 0 3

OBJECTIVE:
To expose the students to the complexities, impacts on socio economic and environmental spheres and initiatives to mitigate Global Climate Change

UNIT I INTRODUCTION
Ancient Earth - Climate and Chemical Histories, Paleo-indicators of climate, Global energy balance, Concern about Climate Change, Climate Change and Sustainable development.

UNIT II CLIMATE AND WEATHER
Factors affecting global, regional and local climates. Tropical, Monsoon, Polar, Desert, Mid-latitude climates and their role in global climate change. Antarctica, Greenland and the North Pole case studies.

UNIT III ELEMENTS AND PROCESSES RELATED TO CLIMATE CHANGE

UNIT IV IMPACTS OF GLOBAL CLIMATE CHANGE
The Greenhouse effect – ecosystems and species interactions, global warming, sea level rise, ozone problem, El Nino and southern oscillation, storms, thunderstorms, tornadoes, changes in agricultural production, droughts, spread of epidemics, wildfires and other extreme weather events. Nuclear winter.

UNIT V CLIMATE CHANGE MITIGATION / ADAPTATION
REFERENCES:

CE 9048 MUNICIPAL SOLID WASTE MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:
To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

UNIT I SOURCES AND TYPES  8
Sources and types of municipal solid wastes-Waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management – Municipal solid waste (M&H) rules- Integrated management.- Social and Financial aspects; Public awareness; Role of NGO’s.

UNIT II SOURCE REDUCTION AND ON-SITE STORAGE  8
Source reduction of waste- Reduction, Reuse and Recycling - On-site storage methods- Effect of storage, materials used for containers- segregation of solid wastes – Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions.

UNIT III COLLECTION AND TRANSFER  8
Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of collection systems; Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Field problems – solving.

UNIT IV PROCESSING OF WASTES  12
Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation ; Thermal processing options- case studies under Indian conditions.
UNIT V DISPOSAL
Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners - Management of leachate and landfill gas – Landfill bioreactor - Dumpsite Rehabilitation.

TOTAL: 45 PERIODS

TEXT BOOKS:
2. Paul T Williams (2000), Waste Treatment and Disposal, John Wiley and Sons

REFERENCES:

CE 9049 INDUSTRIAL WASTEWATER POLLUTION PREVENTION AND CONTROL
3 0 0 3

OBJECTIVE:
Students should be conversant with extent of minimizing the generation of wastes and application of control techniques for recovery, reuse and disposal of wastes in Indian Industries.

UNIT I INDUSTRIAL POLLUTION SCENARIO
Industrial scenario in India – sources, generation rates and characteristics of Industrial wastewaters – Environmental impacts – Regulatory Requirements for industrial wastewaters.

UNIT II INDUSTRIAL POLLUTION PREVENTION

UNIT III TREATMENT OF INDUSTRIAL WASTEWATERS

UNIT IV WASTEWATER REUSE AND RESIDUAL MANAGEMENT
UNIT V CASE STUDIES
Sources, characteristics and waste treatment Flow sheets for selected industries – Tanneries, Textiles, Diary, Sugar, Pulp and Paper, Distilleries, Refineries, Thermal Power Plants.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
1. Eckenfelder, W.W., Industrial Water Pollution Control, McGraw Hill, 1999

CE 9050 AIR POLLUTION CONTROL

OBJECTIVE:
To impart knowledge on the sources, effects and control techniques of air pollutants and noise pollution.

UNIT I INTRODUCTION
Sources and classification of air pollutants and their effect on human health, vegetation and property – Global issues and Air pollution – Ambient air quality and emission standards – Air pollution indices – Indoor Air Pollutants – Air quality Sampling and Monitoring.

UNIT II AIR POLLUTION METEOROLOGY & DISPERSION MODELS

UNIT III CONTROL TECHNOLOGIES
Principles and Equipment description of control technologies – Gravitational, Centrifugal, Filtration and Electrostatic Precipitator for control of particulate air pollutants – Absorption, adsorption, Condensation, incineration and Bio-filtration for control of gaseous air pollutants – Case studies.

UNIT IV EMERGING TRENDS
Radioactive pollution and its control - Automobile Air Pollution and its Control – Ultraviolet photolysis – High efficiency Particulate Air Filters – Control of Indoor Air Quality.

UNIT V NOISE POLLUTION & CONTROL
Sources, effects and control of noise – Noise standards – Measurement – Control and Preventive measures.
TEXT BOOKS:

REFERENCES:

CE 9051 PAVEMENT ENGINEERING

OBJECTIVES:
Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements. Further, he/she will be in a position to assess quality and serviceability conditions of roads.

UNIT I TYPES OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM
Introduction – Pavement as layered structure – Pavement types: rigid and flexible. Resilient modulus - Stress and deflections in pavements under repeated loading.

UNIT II DESIGN OF FLEXIBLE PAVEMENTS
Flexible pavement design - factors influencing design of flexible pavement, Empirical - Semi empirical and theoretical methods – Design procedure as per IRC guidelines – Design and specification of rural roads.

UNIT III DESIGN OF RIGID PAVEMENTS
Cement concrete pavements - factors influencing CC pavements – Modified Westergaard approach – Design procedure as per IRC guidelines – Concrete roads and their scope in India.

UNIT IV PERFORMANCE EVALUATION AND MAINTENANCE

UNIT V STABILISATION OF PAVEMENTS

TEXT BOOKS:

TOTAL: 45 PERIODS

REFERENCES:

CE 9052 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS

OBJECTIVES:
At the end of the course, student is expected to assess various design dynamic properties of soil, design of foundation for common machineries and also about the measures to isolate vibration due to the operations of machines.

UNIT I THEORY OF VIBRATION
Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping. Principles of vibration measuring instruments.

UNIT II WAVES AND WAVE PROPAGATION
Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space.

UNIT III DYNAMIC PROPERTIES OF SOILS

UNIT IV DESIGN PROCEDURES
Design criteria – dynamic loads – simple design procedures for foundations of reciprocating, impact and rotary type machines - Codal provisions (Simple cases).

UNIT V VIBRATION ISOLATION
Vibration isolation technique - foundation isolation- isolation by location-isolation by barriers-active and passive isolation methods.

TOTAL: 45 PERIODS

TEXT BOOKS:
REFERENCES:

CE 9053  GEOTECHNICAL ENGINEERING PROCESSES AND APPLICATIONS  L T P C

3 0 0 3

OBJECTIVES:
At the end of the course student gains knowledge to study the various process involved in stabilising problematic soils and also mitigate the geotechnical problems associated with natural disaster.

UNIT I  REGIONAL DEPOSITS AND WASTE MATERIALS  9
Geotechnical problems associated with alluvial, lateritic and black cotton soils, solid wastes like municipal waste and flyash; characterization, prediction and improvement of their properties -Applications; case studies.

UNIT II  ENVIRONMENTAL PROBLEMS-associated WITH GEOTECHNICAL ENGINEERING  9
Environmental problems related to soil contamination - waste generation - geotechnical engineering: vibration problems and control; Rain induced land slides. Bearing capacity and compressibility of land fills. Site remediation - utilization of waste for improvement of site.

UNIT III  IN-SITU TREATMENT  10

UNIT IV  SOIL REINFORCEMENT  8
Concepts of Reinforced Earth – Types of reinforcement – Applications to footings and earth retaining walls.

UNIT V  GEOTEXTILES AND GEOGRIDS  9
Geogrids as reinforcement, Geotextiles in filtration, drainage and road works: Applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:

CE 9054            ROCK ENGINEERING             L    T    P    C
                                  3    0    0    3

OBJECTIVE:
To impart knowledge on fundamentals of rock mechanics and its application in solving simple problems associated with rock slopes and underground openings. Student gains the knowledge on the mechanics of rock and its applications in underground structures and rock slope stability analysis.

UNIT I  CLASSIFICATION AND INDEX PROPERTIES OF ROCKS   6
Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.

UNIT II  ROCK STRENGTH AND FAILURE CRITERIA   12
Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength. Stress strain behaviour of rock under compression – Mohr - Coulomb failure criteria and empirical criteria for failure – Deformability of rock.

UNIT III  INITIAL STRESSES AND THEIR MEASUREMENTS    10
Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – measurements of in-situ stresses.

UNIT IV  APPLICATION OF ROCK MECHANICS IN ENGINEERING   10

UNIT V  ROCK BOLTING   7

TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES:
GI 9403 GEOGRAPHIC INFORMATION SYSTEM APPLICATIONS

OBJECTIVE:
To provide exposure to applications of GIS in various application domains through case studies

UNIT I NATURAL RESOURCE MANAGEMENT APPLICATIONS

UNIT II FACILITY MANAGEMENT APPLICATIONS

UNIT III LOCATION BASED SERVICES APPLICATIONS

UNIT IV LAND INFORMATION SYSTEM APPLICATIONS AND ALIGNMENT STUDIES
Land Information System (LIS) – Tax Mapping – Other LIS applications – Pipe line routing, Highway alignment

UNIT V MISCELLANEOUS TOPICS
Disaster Management Applications, Web GIS applications, Health applications

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Laura Lang, Managing Natural Resources with GIS, ESRI Press, 1998.
6. Laura Lang, GIS for Health Organizations, ESRI Press, 2000
OBJECTIVE:
The main objective of this course, is to introduce Cartography, and its elements as the Art and Science of Map Making. The course also describes its connections with the Communication Science and Digital Computer as structured and need based information of Spatial Data.

UNIT I  FUNDAMENTALS OF CARTOGRAPHY  9

UNIT II  EARTH  9

UNIT III  SOURCES OF DATA  9

UNIT IV  PERCEPTION AND DESIGN  9
Cartographic design – Colour theory and models – Colour and pattern creation and specification – colour and pattern – Typography and lettering the map – Map compilation – Demography and Statistical mapping.

UNIT V  CARTOGRAPHY ABSTRACTION  9

(L = 45 + T : 30) TOTAL: 75 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVE:
To understand the working of EDM equipment and solve the surveying problems with an EDM equipment.

UNIT I  FUNDAMENTALS  5
Methods of Measuring Distance, Basic Principles of EDM, Historical Development Classifications, applications and comparison with conventional surveying.

UNIT II  BASIC ELECTRONICS  10
Oscillators (Crystal controlled and Gunn diode) Kerrcell / Pockel’s modulator, Frequency mixing, modulation and Demodulation Measurement of phase differences, reflectors (Corner, Antenna), Transducers and power sources.

UNIT III  ELECTROMAGNETIC WAVES  20
Classification and applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting RI, Computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions. Computation of RI for microwaves. Reference refractive index. Real time application of first velocity correction. Measurement of atmospheric parameters. Mean refractive index, Second velocity correction, Total atmospheric correction, Use of temperature and pressure transducers.

UNIT IV  ELECTROMAGNETIC DISTANCE MEASURING SYSTEM  10

UNIT V  FIELD WORK  30
Study of different EDM instruments and Total station. Setting out works, Base line Measurement, EDM traversing: observations and computation of area Trilateration.

(L = 45 + P : 30) TOTAL: 75 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
The Objective of this course is to introduce the students to the cadastral survey Methods and its applications in generation of Land information system. Cadastral surveys are those classes of land surveys which are executed for the purpose of systematically recording the land rights, producing register of land holdings or an inventory of land areas, land use and determine land tax.

UNIT I INTRODUCTION

UNIT II CADAstral SURVEY METHODS

UNIT III CADAstral SURVEY MAINTENANCE
Resurveys – Measurement of sub-division – Measurement of obstructed lines – Survey of urban areas – Control requirement for urban survey

UNIT IV MAPPING
Photogrammetry for cadastral surveying and mapping – Orthophoto map – GPS for cadastral survey.

UNIT V CADAstral MAP REPRODUCTION AND CADAstral OFFICES

TEXT BOOKS:
2. Survey of India, Hand book of Topography

REFERENCE:

OBJECTIVE:
To impart skills in survey calculation and adjustment to suit field conditions
UNIT I  MEASUREMENT AND ERROR  9
Concepts of measurement and Error, types of errors, elementary concepts in probability,
Reliability of measurement – significant figures. Error Propagation – linearization.
Multivariate distribution, the error ellipse, weights and cofactors - Non-linear stochastic
variables.

UNIT II  THE CONCEPT OF ADJUSTMENT  9
Introduction - simple adjustment methods. The least squares method, Examples of least
squares problems.

UNIT III  LEAST SQUARES ADJUSTMENT  9
Techniques of least squares, the concept of weight, least squares adjustment of indirect
Observations, least squared adjustment of observations only.

UNIT IV  ELEMENTARY PROBABILITY THEORY  9
Random events and probability, Random variables, continuous probability distributions,
The normal distribution, Expectation – measures of precision and accuracy, covariance and
correlation, covariance, cofactor and weight matrices, introduction to sampling.

UNIT V  VARIANCE COVARIANCE PROPAGATION  9
Introduction – Derivation of the propagation laws Examples, stepwise propagation,
propagation of least squares adjustment of indirect observations, propagation least square
adjustment of observations only.

TOTAL: 45 PERIODS

TEXT BOOK:
1. Mikhail, E.M. and Gracie G. Analysis and adjustment of Survey measurements, Van
Nostrand Reinhold, New York, 1981

REFERENCE:
    squares in surveying and GIS Jhon Wiley and sons inc 1996.

MA 9261  PROBABILITY AND STATISTICS  L T P C
3 1 0 4

AIM
To provide the required skills to apply the statistical tools in

OBJECTIVES:
The students will acquire
• Knowledge of the applications of various probability distributions.
• Exposure to statistical inference using statistical tools and quality control aspects.
UNIT I  RANDOM VARIABLES  9 + 3
Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

UNIT II  TWO-DIMENSIONAL RANDOM VARIABLES  9 + 3
Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III  TESTING OF HYPOTHESIS  9 + 3

UNIT IV  DESIGN OF EXPERIMENTS  9 + 3
Completely randomized design – Randomized block design – Latin square design - $2^2$ - factorial design.

UNIT V  STATISTICAL QUALITY CONTROL  9 + 3
Control charts for measurements ($\bar{X}$ and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

L: 45 + T: 15  Total: 60 PERIODS

TEXT BOOKS:

REFERENCES:

MA 9262  NUMERICAL METHODS  L T P C
3 1 0 4

AIM
This course gives a complete procedure for solving numerically different kinds of problems occurring in engineering and technology.
OBJECTIVES:
The students would be acquainted with the basic concepts of numerical methods and their applications.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9 + 3

UNIT II INTERPOLATION AND APPROXIMATION 9 + 3
Interpolation with unequal intervals – Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines – Interpolation with equal intervals – Newton’s forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9 + 3

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9 + 3

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+3
Finite difference methods for solving two-point linear boundary value problems. Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank Nicholson) methods - One dimensional wave equation by explicit method.

L: 45 + T: 15 TOTAL: = 60 PERIODS

TEXT BOOKS:

REFERENCES:
OBJECTIVES:
- To create an awareness on Intellectual Property Rights (IPR)
- To understand patents and copyrights
- To know about application procedures of IPR

UNIT I TYPES OF PROPERTY

UNIT II PATENTS AND APPLICATION PROCEDURES

UNIT III INTERNATIONAL PARTICES

UNIT IV LEGISLATIONS AND POLICY

UNIT V CASE STUDIES
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TEXT BOOKS:

REFERENCES:
OBJECTIVES:

- To expose the fundamental rights and constitutional remedies
- To understand the structure and functions of Central and State Governments
- To know the social structure and rights of weaker sections.

UNIT I CONSTITUTION OF INDIA


UNIT II UNION GOVERNMENT

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III STATE GOVERNMENT


UNIT IV FEDERAL SYSTEM

Indian Federal System – Center – State Relations – President’s Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V SOCIETY AND RIGHTS

Society : Nature, Meaning and definition; Indian Social Structure; Castle, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL: 45 PERIODS

TEXT BOOKS:


REFERENCES:

OBJECTIVES:
Students should be conversant with contract procedures, legal requirements and labour regulations.

UNIT I CONSTRUCTION CONTRACTS 10

UNIT II TENDERS 10

UNIT III ARBITRATION 5

UNIT IV LEGAL REQUIREMENTS 10

UNIT V LABOUR REGULATIONS 10

TOTAL: 45 PERIODS

TEXT BOOK:

REFERENCES:
AIM
To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES
• To understand the various principles, practices of TQM to achieve quality
• To learn the various statistical approaches for quality control.
• To understand the TQM tools for continuous process improvement.
• To learn the importance of ISO and Quality systems.

UNIT I INTRODUCTION

UNIT II TQM PRINCIPLES
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV TQM TOOLS & TECHNIQUES II

UNIT V QUALITY SYSTEMS

TOTAL: 45 PERIODS

TEXT BOOK

REFERENCES

GE 9021 PROFESSIONAL ETHICS IN ENGINEERING

AIM
To sensitize the engineering students on blending both technical and ethical responsibilities.

OBJECTIVES
- Identify the core values that shape the ethical behavior of an engineer.
- Utilize opportunities to explore one’s own values in ethical issues.
- Become aware of ethical concerns and conflicts.
- Enhance familiarity with codes of conduct.
- Increase the ability to recognize and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER’S RESPONSIBILITY FOR SAFETY

UNIT IV RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TEXT BOOKS
REFERENCES


GE 9023 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

AIM
To make the students understand the importance, relevance and potentialities of this emerging field of study.

OBJECTIVES
- Study the basic nano technology and nano science.
- Understand interdisciplinary nature of this field.
- Understand the importance role of physics, chemistry, biology.
- Recognize that the rules of nano science are fundamentally different than those we experience.
- Study the basic fabrication strategies of nano science.

UNIT I INTRODUCTION
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II PREPARATION METHODS
Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES
Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma/reactive ion) etching, Etch resists-dip pen lithography

UNIT IV PREPARATION ENVIRONMENTS
Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards.
UNIT V  CHARACTERISATION TECHNIQUES
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

TOTAL : 45 PERIODS

TEXT BOOKS

REFERENCES