PROGRAMME EDUCATIONAL OBJECTIVES (PEOS) – B.E. CIVIL ENGG.,

I. To prepare students for successful careers in soil mechanics and foundation engineering field that meets the needs of Indian and multinational companies.

II. To develop the confidence and ability among students to synthesize data and technical concepts and thereby apply it in real world problems.

III. To develop students to use modern techniques, skill and mathematical engineering tools for solving problems in soil mechanics and foundation engineering.

IV. To provide students with a sound foundation in mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyse engineering problems and to prepare them for graduate studies.

V. To promote students to work collaboratively on multi-disciplinary projects and make them engage in life-long learning process throughout their professional life.

PROGRAMME OUTCOMES (B.E. - CIVIL)

a) Graduates will demonstrate basic knowledge in mathematics, science and engineering.

b) Graduates will demonstrate the ability to design and conduct experiment, interpret and analyse data and report results.

c) Graduates will demonstrate the ability to design basic structural elements or a structure that meets desired specifications and requirements.

d) Graduates will demonstrate the ability to function on engineering and science laboratory teams as well as on multidisciplinary design team.

e) Graduate will demonstrate the ability to identify, formulate, and solve civil engineering problems.

f) Graduate will demonstrate an understanding of their professional ethical responsibilities.

g) Graduate will be able to communicate effectively in both verbal and written form.

h) Graduate will have confidence to apply engineering solutions in global and societal context.

i) Graduate should be capable of self education and clearly understand the value of lifelong learning.

j) Graduate will be broadly educated and will have an understanding of the impact of engineering on society and demonstrate awareness of contemporary issues.

k) Graduate will be familiar with modern engineering, software tools, and equipment to analyse civil engineering problems.
The B.E. Civil Engineering Program outcomes leading to the achievement of the objectives are summarized in the following Table.

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<th>Programme Educational Objectives</th>
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ANNA UNIVERSITY: CHENNAI 600 025
UNIVERSITY DEPARTMENTS
R - 2013
B. E. CIVIL ENGINEERING (PART TIME)
I - VII SEMESTERS CURRICULUM AND SYLLABUS

SEMESTER I

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* The students should not take more than one elective course from each group.
OBJECTIVES:
- To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

UNIT I  MATRICES  9

UNIT II  FUNCTIONS OF SEVERAL VARIABLES  9

UNIT III  ANALYTIC FUNCTION  9
Analytic functions – Necessary and sufficient conditions for analyticity – Properties – Harmonic conjugates – Construction of analytic function – Conformal Mapping – Mapping by functions w = a + z, az, 1/z. - Bilinear transformation.

UNIT IV  COMPLEX INTEGRATION  9
Line Integral – Cauchy’s theorem and integral formula – Taylor’s and Laurent’s Series – Singularities – Residues – Residue theorem – Application of Residue theorem for evaluation of real integrals – Use of circular contour and semicircular contour with no pole on real axis.

UNIT V  LAPLACE TRANSFORMS  9

TOTAL: 45 PERIODS

OUTCOMES:
- To develop the use of matrix algebra techniques this is needed by engineers for practical applications.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current.
- To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To teach the essential principles of physics for civil engineering applications such as acoustical, thermal, air conditioning, etc. and also to introduce importance of new engineering materials.

UNIT I THERMAL APPLICATIONS

UNIT II VENTILATION AND REFRIGERATION
Requirements, principles of natural ventilation - ventilation measurements, design for natural ventilation - Window types and packaged air conditioners - chilled water plant - fan coil systems - water piping - cooling load - Air conditioning systems for different types of buildings - Protection against fire to be caused by A. C. Systems.

UNIT III ACOUSTICS AND LIGHTING DESIGNS
Methods of sound absorption - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multi-storeyed buildings. Visual field glare, colour - day light calculations - day light design of windows, measurement of day-light and use of models and artificial skies, principles of artificial lighting, supplementary artificial lighting.

UNIT IV NEW ENGINEERING MATERIALS
Composites - Definition and Classification - Fibre reinforced plastics (FRP) and fiber reinforced metals (FRM) - Metallic glasses - Shape memory alloys - Ceramics - Classification - Crystalline - Non Crystalline - Bonded ceramics, Manufacturing methods - Slip casting - Isostatic pressing - Gas pressure bonding - Properties - thermal, mechanical, electrical and chemical ceramic fibres - ferroelectric and ferromagnetic ceramics - High Aluminium ceramics.

UNIT V HAZARDS
Seismology and Seismic waves - Earth quake ground motion - Basic concepts and estimation techniques - site effects - Probabilistic and deterministic Seismic hazard analysis - Cyclone and flood hazards - Fire hazards and fire protection, fire-proofing of materials, fire safety regulations and fire fighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS

OUTCOMES:
- The students will have the knowledge on physics related to Civil Engineering and that knowledge will be used by them in Various applications.

REFERENCES:
OBJECTIVES:
● To develop an understanding about the chemistry of building materials.
● Brief elucidation on corrosion and its control.
● To develop sound knowledge about the water science and technology.
● To impart basic knowledge on adhesives, abrasives, refractories and composites.
● To understand the basic concepts of chemical and instrumental methods of analysis.

UNIT I CHEMISTRY OF BUILDING MATERIALS


UNIT II CORROSION AND ITS CONTROL


UNIT III ADHESIVES AND COMPOSITES


UNIT IV ABRASIVES, AND REFRACTORIES

Abrasives: definition, classification or types, grinding wheel, abrasive paper and cloth. Refractories: definition, characteristics, classification, properties – refractoriness and RUL, dimensional stability, thermal spalling, thermal expansion, porosity; Manufacture of refractories – general method; acidic refractories – fire clay, silica; basic refractories – magnesite, dolomite; neutral refractories – silicon carbide, zircon.

UNIT V WATER AND INSTRUMENTAL ANALYSIS

Properties of water, sources, quality for different uses-significance of water quality parameter Ph, EC, TDS, Hardness, chloride, sulphate, iron, fluoride, nitrate, BOD, COD, and heavy metals (As, Hg, Cr, Pb) and their determination by titrimetry, electrometry, UV-visible, AAS, ICP-AES, softening of water by ion exchange method, municipal water treatment, principle, coagulations, and filtration, and disinfection. Desalination by reverse osmosis method.

TOTAL = 45 PERIODS
OUTCOMES:
- The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.

TEXTBOOKS:

REFERENCES:

PTGE8151  COMPUTING TECHNIQUES  L T P C
3 0 0 3

OBJECTIVES: The students should be made to:
- Learn the organization of a digital computer.
- Be exposed to the number systems.
- Learn to think logically and write pseudo code or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I  INTRODUCTION

UNIT II  C PROGRAMMING BASICS

UNIT III  ARRAYS AND STRINGS

UNIT IV  FUNCTIONS AND POINTERS
UNIT V        STRUCTURES AND UNIONS
Introduction – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.

TOTAL: 45 PERIODS

OUTCOMES:
At the end of the course, the student should be able to:
- Design C Programs for problems.
- Write and execute C programs for simple applications.

TEXTBOOKS:

REFERENCES:

PTCE8101 STRENGTH OF MATERIALS – I L T P C 3 0 0 3

OBJECTIVE:
- To 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 10

UNIT II       ANALYSIS OF PLANE TRUSSSES 8
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 10

UNIT IV       TORSION 8
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.

TOTAL: 45 PERIODS

OUTCOMES:
- students will have through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- they will be in a position to assess the behavior of columns, beams and failure of materials

TEXTBOOKS:

REFERENCES:
1. Irwing H.Shames, James M.Pitarresi, Introduction to Solid Mechanics, Prentice Hall of India, New Delhi, 2002

PTAG8201  ENGINEERING GEOLOGY  
L  T  P  C  
3  0  0  3

OBJECTIVES:
- At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies. The students of civil engineering will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor. The knowledge of geophysical methods and remote sensing techniques are useful to know the various surface and subsurface features. Based on this, civil engineers can choose the types of foundations and other related aspects.

UNIT I  PHYSICAL GEOLOGY  

UNIT II  MINEREOLOGY  

UNIT III  PETROLOGY  
Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist
UNIT IV  STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS

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

TOTAL: 45 PERIODS

OUTCOMES: The students completing this course
- Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
- Will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor Can choose the types of foundations and other related aspects

TEXTBOOKS:

REFERENCES:

PTCE8202   FLUID MECHANICS
L T P C
3 0 0 3

OBJECTIVE:
- To introduce the students 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.
- To expose to the applications of the conservation laws to a) flow measurements b) flow through pipes (both laminar and turbulent) and c) forces on vanes.

UNIT I  FLUIDS PROPERTIES AND FLUID STATICS
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
(a) Kinematics – Methods of describing fluid motion - Classification of flows - Streamline, streakline 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
Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pi-Theorem - Dimensionless parameters - Similarity and model studies - Distorted Models.

UNIT IV INCOMPRESSIBLE VISCOUS FLOW
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 AND TRANSPORT BY ADEPTION AND DIFFUSION
Definition of boundary layers - Displacement, momentum and energy thickness - Laminar and turbulent boundary layers - Momentum integral equation – Steady molecular diffusion and conduction – Turbulent transport equations – Channel diffusion and Dispersions and Applications.

TOTAL: 45 PERIODS

OUTCOMES:
• The students will be able to get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
• They will also gain the knowledge of the applicability of physical laws in addressing problems in hydraulics.

TEXTBOOKS

REFERENCES

PTCE8203 STRENGTH OF MATERIALS – II

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 – 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

OUTCOMES:
- students will have through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
- they will be in a position to assess the behaviour of columns, beams and failure of materials.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- This subject deals with geodetic measurements and Control Survey methodology and its adjustments. The student is also exposed to the Modern Surveying.

UNIT I CONTROL SURVEYING

UNIT II SURVEY ADJUSTMENT

UNIT III TOTAL STATION SURVEYING

UNIT IV GPS SURVEYING
Basic Concepts - Different segments - space, control and user segments - satellite configuration - signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment – Hand Held and Geodetic receivers –data processing - Traversing and triangulation.

UNIT V APPLICATIONS

OUTCOMES: On completion of this course students shall be able to
- Understand the advantages of electronic surveying over conventional surveying methods
- Understand the working principle of GPS, its components, signal structure, and error sources
- Understand various GPS surveying methods and processing techniques used in GPS observations

TEXTBOOKS:
OBJECTIVES:

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

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

UNIT II  FOURIER TRANSFORM  9

UNIT III  PARTIAL DIFFERENTIAL EQUATIONS  9
Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange’s Linear equation – Solution of homogenous linear equations of higher order with constant coefficients.

UNIT IV  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  9
Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation.

UNIT V  Z–TRANSFORM AND DIFFERENCE EQUATIONS  9

TOTAL: 45 PERIODS

OUTCOMES:

- 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.

TEXTBOOK:


REFERENCES:

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

I. TOTAL STATION SURVEYING
   a) Study of Micro-Optic, Digital Theodolite and Total Station
   b) Total station Traversing

II. GPS SURVEYING
   a) Study of Hand Held GPS
   b) Study of geodetic GPS
   c) Precise Positioning
   d) GPS Traversing

III. FIELD ASTRONOMY
   a) Study of motion of the Sun
   b) Determination of azimuth using known latitude
   c) Determination of azimuth using hour angle
   d) Determination of watch error
   e) Determination of latitude

IV. SETTING OUT WORKS
   a) Simple curve using chain and tape only
   b) Simple curve by Rankine’s method

V. ESTABLISHMENT OF BASELINE

VI. THEODOLITE TRAVERSING

TOTAL: 60 PERIODS

OUTCOMES:
- Students completing this course would have acquired practical knowledge on handling survey instruments like Theodolite, Tacheometry GPS and Total station and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and curves setting.

REFERENCE:

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 construction at different levels – factors influencing highway alignment – Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.

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

UNIT III  DESIGN OF 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 AND PRACTICE  8
Highway construction materials, properties, testing methods – Construction practice including modern materials and methods, Concrete road constructions, Polymer modified bitumen, Recycling, Different materials – Glass, Fibre, Plastic, Geo-Textiles, Geo-Membrane (problem not included) - Highway drainage – Special considerations for hilly roads.

UNIT V  EVALUATION AND MAINTENANCE OF PAVEMENTS  10

TOTAL:  45 PERIODS

OUTCOMES:
• The students completing this course would have acquired knowledge on planning, design, construction and maintenance of highways as per IRC standards and other methods.

TEXTBOOKS:
1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
3. Indian Road Congress (IRC), Guidelines and Special Publications of Planning and Design.

REFERENCES:
OBJECTIVES:
• To impart knowledge on behavior 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 slopes.

UNIT I SOIL CLASSIFICATION AND COMPACTION 9

UNIT II SOIL WATER AND WATER FLOW 9

UNIT III STRESS DISTRIBUTION AND SETTLEMENT 9
Stress distribution - 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 – e-log p relationship - Factors influencing compression behaviour of soils.

UNIT IV SHEAR STRENGTH 9

UNIT V SLOPE STABILITY 9

TOTAL: 45 PERIODS

OUTCOMES:
• Students have the ability to determine Index properties and classify the soil. They can also know to determine engineering properties through standard tests and empirical correction with index properties.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To learn the modern method of analysis of beams and frames.

UNIT IDEFLECTION OF DETERMINATE STRUCTURES
Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid plane frames - Williott’s diagram.

UNIT II SLOPE DEFLECTION METHOD
Slope deflection equations - Analysis of continuous beams and rigid frames - Support settlements.

UNIT III MOMENT DISTRIBUTION METHOD
Stiffness and carry over factors - Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway - Support settlement.

UNIT IV FLEXIBILITY MATRIX METHOD
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 VMATRIX STIFFNESS METHOD
Element and global stiffness matrices - Co-ordinate transformations - Rotation matrix - Compatibility matrix – transformations of stiffness matrices, load vectors and displacement vectors – Analysis of Continuous Beams – Analysis of pin-jointed plane frames and rigid frames by direct stiffness method.

TOTAL: 45 PERIODS

OUTCOMES: Students will be able to
- analysis trusses, frames and arches
- analyse structures for moving loads and
- will be conversant with classical methods of analysis.

TEXTBOOKS:

REFERENCES:
1. William Weaver, Jr & James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Delhi, 1995
OBJECTIVES:

- To understand the structure and function of an ecosystem. To probe into various kinds of environmental pollution along with measures to control and prevent such pollution. To study the exploitation of various natural resources like Forest, Water, Land and Energy with substantial case studies. The course also enlightens on the steps taken by the Government and NGOs through the implementation of various Legislative protection acts and their impact on the environment. To study the population explosion and its impact on the environment. To focus on explaining the available Family welfare programs through the cognizance of the role of Information Technology in environment protection and human health with apt case studies.

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

OUTCOMES:
• Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
• Public awareness of environmental is at infant stage.
• Ignorance and incomplete knowledge has lead to misconceptions
• Development and improvement in std. of living has lead to serious environmental disasters

TEXTBOOKS:

REFERENCES:

PTCE8401  APPLIED HYDRAULIC ENGINEERING  L T P C
3 0 0 3

OBJECTIVES:
• 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  UNIFORM FLOW
Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.

UNIT II  VARIED FLOWS

UNIT III  RAPIDLY VARIED FLOWS
Application of the energy equation for RVF - Critical depth and velocity - Critical, Sub-critical and Super-critical flow - Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Surges and surge through channel transitions.

UNIT IV  TURBINES
Turbines - Classification - Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbine - Performance of turbine - Specific speed - Runaway speed - Similarity laws.

UNIT V  PUMPS
Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps: Gear pump.

OUTCOMES:
- The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
- They will have knowledge in hydraulic machineries (pumps and turbines).

TEXTBOOKS:

REFERENCES:
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
10

UNIT II LIMIT STATE DESIGN OF BEAMS
10
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
10
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
10
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
5
Determination of permissible stresses on masonry, load carrying capacity of masonry walls and pillars - Design of masonry walls, pillars and footings as per IS Codes.

TOTAL: 45 PERIODS

OUTCOMES:
- The student shall be in a position to design the basic elements of reinforced concrete structures.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To introduce the students about Railways planning, design, construction and maintenance and planning design principles of airport and harbour

UNIT I RAILWAY PLANNING AND CONSTRUCTION 10
Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, Selection of gauges - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods--Geometric design of railway, gradient, super elevation, widening of guage on curves- Level Crossings - Mass Rapid Transit System.

UNIT II RAILWAY CONSTRUCTION AND MAINTENANCE 8
Earthwork – Stabilization of track on poor soil - Tunneling Methods, drainage and ventilation – Calculation of Materials required for track laying - Construction and maintenance of tracks –Railway Station and yards and passenger amenities

UNIT III AIRPORT PLANNING 8
Air transport characteristics-airport classification-air port planning: objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, typical Airport Layouts, Case Studies, parking and Circulation Area

UNIT IV AIRPORT DESIGN 10

UNIT V HARBOUR ENGINEERING 9

TOTAL: 45 PERIODS

OUTCOMES:
- On completing the course, the students will have the ability to Plan and Design various civil Engineering aspects of Railways, Airports and Harbour.

TEXTBOOKS:
1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
2. Saxena Subhash, C. and Satyapal Arora, A Course in Railway Engineering,Dhanapat Rai and Sons, Delhi, 1998

REFERENCES:
2. Shahini.P., Airport Technique, New Delhi
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
Influence lines for reactions in statically determinate structures – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads - influence lines for member forces in pin jointed frames.

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

UNIT III ARCHES
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
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

TOTAL: 45 PERIODS

OUTCOMES:
• The student will have the knowledge on advanced methods of analysis of structures including space and cable structures.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To equip the students with the principles and design of water treatment and distribution

UNIT I SOURCES OF WATER

UNIT II CONVEYANCE FROM THE SOURCE

UNIT III WATER TREATMENT
Objectives – Unit operations and processes – Principles, functions, and design of water treatment plant units, aerators of flash mixers, flocculators, sedimentation tanks and sand filters; Disinfection – Iron and Manganese removal, Defluoridation – Residue Management – Corrosion Control; Construction, Operation and Maintenance aspects – Process flow diagram Layout and Hydraulic Profile for water treatment plants.

UNIT IV ADVANCED WATER TREATMENT

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

OUTCOMES: The students completing the course will have
- an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
- an understanding of water quality criteria and standards, and their relation to public health,
- the ability to design and evaluate water supply project alternatives on basis of chosen selection criteria

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To learn the design of Component and structure using steel (Limit State Design) and timber material subjected to external loading.

UNIT I  SECTIONS AND 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
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

OUTCOMES:
- The students would have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code and also know to design Timber Members.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To impart knowledge on common method of sub soil investigation and design of foundation.
  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
Scope and objectives – Methods of exploration – auguring and boring – Wash boring and rotary
drilling – Depth of boring – Spacing of bore hole – Sampling techniques – Representative and
undisturbed sampling – methods - Split spoon sampler, Thin wall sampler, Stationery piston sampler –
Penetration tests (SPT and SCPT) – Data interpretation - strength parameters and Liquefaction
potential - Selection of foundation based on soil condition- Bore log report.

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  9
Types of footings – Contact pressure distribution: Isolated footing – Combined footings – Types and
proportioning – Mat foundation – Types and applications – Proportioning – Floating foundation –
Seismic force consideration – Codal Provision.

UNIT IV  PILE FOUNDATION  9
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 – Labarra formula and block failure criterion) –
Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles –
Capacity under compression and uplift.

UNIT V  RETAINING WALLS  9
Plastic equilibrium in soils – active and passive states – Rankine’s theory – cohesionless and
cohesive soil – Coulomb’s wedge theory – Condition for critical failure plane – Earth pressure on
retaining walls of simple configurations – Culmann Graphical method – pressure on the wall due to
line load – Stability analysis of retaining walls.

TOTAL : 45 PERIODS

OUTCOMES:
- Students will have the ability to select type of foundation required for the soil at a place and
  able to design shallow, foundation, deep foundation and retaining structures.

TEXTBOOKS:
  Distributers Ltd., New Delhi, 2007.
  Ltd, New Delhi, 2005.
  Distributors, New Delhi, 2005.

REFERENCES:

PTCE8503 IRRIGATION ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
• To introduce the student to the concept of soil-plant characteristics and their water requirements.
• To understand the necessity of planning an irrigation system to provide water at the right time and right place.

UNIT I IRRIGATION PRINCIPLES
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 CROP WATER REQUIREMENT
UNIT III  DIVERSION AND IMPOUNDING STRUCTURES  9

UNIT IV  CANAL IRRIGATION  11

UNIT V  IRRIGATION WATER MANAGEMENT  8

TOTAL: 45 PERIODS

OUT COMES:
- The students will have knowledge and skills on Planning, design, operation and management of reservoir system.
- The student will gain knowledge on different methods of irrigation including canal irrigation.

TEXTBOOKS:

REFERENCES:

PTCE8504  WASTE WATER ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

UNIT I  PLANNING AND DESIGN OF SEWERAGE SYSTEM  9
UNIT II PRIMARY TREATMENT OF SEWAGE

UNIT III SECONDARY TREATMENT OF SEWAGE

UNIT IV DISPOSAL OF SEWAGE

UNIT V SLUDGE TREATMENT AND DISPOSAL

OUTCOMES: The students completing the course will have
- ability to estimate sewage generation and design sewer system including sewage pumping stations
- required understanding on the characteristics and composition of sewage, self-purification of streams
- ability to perform basic design of the unit operations and processes that are used in sewage treatment

TEXTBOOKS:

REFERENCES:

PTCE8601 ESTIMATION, 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

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:

REFERENCES:
2. Tamil Nadu Transparencies in Tenders Act, 1998
3. Arbitration and Conciliation Act, 1996

PTCE8602  GROUND IMPROVEMENT TECHNIQUES  L T P C
3 0 0 3

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  8
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 - Design.

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, road works and containment.

UNIT V  GROUT TECHNIQUES

TOTAL: 45 PERIODS

OUTCOMES:
- Student will be in a position to identify and evaluate the deficiencies if any in the deposits of a project area and capable of providing alternate methods to improve its character suitable to the project so that the structures built will be stable and serve.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:

- This course aims at providing students with a solid background on the principles of structural engineering design. Students will be exposed to the theories and concepts of both concrete and steel design and analysis both at the element and system levels.

UNIT I INTRODUCTION AND PLANNING 6+9

UNIT II LIQUID STORAGE STRUCTURES 6+9
RC Water Tanks- Circular and Rectangular – Design and Drawing –Hemispherical Bottomed Steel Water Tank – Design and Drawing.

UNIT III DESIGN OF BRIDGE COMPONENTS 6+9
IRC Specifications and Loading – Design and Drawing of a Solid Slab RC Bridge – Design and Drawing of Steel Foot-over Bridge.

UNIT IV RETAINING WALLS 6+9
Design and Detailing of RC Cantilever and Counterfort Retaining Walls – Horizontal Backfill with Surcharge – Design of Shear Key.

UNIT V INDUSTRIAL STRUCTURES 6+9

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

OUTCOMES:

- At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.

TEXTBOOKS:

REFERENCES:
UNIT I SINGLE DEGREE OF FREEDOM SYSTEM 9
Definition of degree of freedom – Idealization of structure as SDOF system – Formulation of equation of motion for various SDOF system – D’Alemberts Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces.

UNIT II MULTI DEGREE OF FREEDOM SYSTEM 9

UNIT III INTRODUCTION TO EARTHQUAKE ENGINEERING 9

UNIT IV EARTHQUAKE EFFECTS ON STRUCTURES 9

UNIT V CONCEPTS OF EARTHQUAKE RESISTANT DESIGN 9

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of the course, student will have the knowledge to analyse structures subjected to dynamic loading and to design the structures for seismic loading as per code provisions.

TEXTBOOKS:


REFERENCES:

6. Moorthy.C.V.R., Earthquake Tips, NICEE, IIT Kanpur,
AIM
- To learn the different principles and techniques of management in planning, organizing, directing and controlling.

OBJECTIVES
- To study the Evolution of Management
- To study the functions and principles of management
- To learn the application of the principles in an organization

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

UNIT II PLANNING

UNIT III ORGANISING

UNIT IV DIRECTING

UNIT V CONTROLLING
System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS

OUTCOMES:
- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

TEXTBOOKS:
REFERENCES:

PTCE8711 PROJECT WORK L T P C 0 0 9 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.

OUTCOMES:
- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

PTCE8004 COMPUTER AIDED DESIGN OF STRUCTURES L T P C 3 0 0 3

OBJECTIVES:
- The overall idea of implementing a computer aided design with advantages and demerits. To learn different software techniques in finite element analysis and to optimize the structural components.

UNIT I INTRODUCTION 9
Fundamental reason for implementing CAD - Software requirements – Hardware components in CAD system – Design process - Applications and benefits.

UNIT II COMPUTER GRAPHICS 9
Graphic Software – Graphic primitives - Transformations - 2 Dimensional and 3 Dimensional transformations – Concatenation - Wire frame modeling - Solid modeling - Graphic standards - Drafting packages – Auto CAD.

UNIT III STRUCTURAL ANALYSIS 9
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 – Applications of KBES- Rules and decision tables - Inference mechanisms - simple applications

OUTCOMES:
- Students will be able to implement ideas of computer aided design with advantages and demerits.

TEXTBOOKS:

REFERENCE:

PTCE8005  DESIGN OF PLATE AND SHELL STRUCTURES  L T P C
3 0 0 3

OBJECTIVE:
- To learn the design of plate and shell and spatial structures

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

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

UNIT III  ANALYSIS OF THIN SHELLS
Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic paraboloid - Classification of shells - Types of shells - Structural action.

UNIT IV  DESIGN OF SHELLS
Spherical dome, Conical shell and Cylindrical shell.

UNIT V  SPACE FRAMES
Space Frames – Configuration – Types of nodes – General principles of design philosophy – Behaviour.

TOTAL: 45 PERIODS

OUTCOMES
- The students will have indepth knowledge in the analysis and design of plates, shells and space frame structures
TEXTBOOKS:

REFERENCES:

PTCE8006 DESIGN OF 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 INTRODUCTION 9
Historical developments – Basic principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of prestressing – Freyssinet, Magnel, Lee-McCall and Gifford Udall anchorage systems – Analysis of sections of stresses by stress concept, strength concept and load balancing concept – Losses of prestress in post-tensioned and pre-tensioned members.

UNIT II DESIGN FOR FLEXURE AND SHEAR 9
Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per I.S.1343 Code – Design of sections of Type I and Type II post-tensioned and pre-tensioned beams – Check for strength limit based on I.S. 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams – Design for shear based on I.S. 1343 Code.

UNIT III DEFLECTION AND DESIGN OF ANCHORAGE ZONE 9
Factors influencing deflections – Short term deflections of uncracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel’s method, Guyon’s method and I.S. 1343 code – design of anchorage zone reinforcement – Check for transfer bond length in pre-tensioned beams.

UNIT IV COMPOSITE BEAMS AND CONTINUOUS BEAMS 9
Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.

UNIT V MISCELANEOUS STRUCTURES 9
Design of tension and compression members – Tanks, pipes and poles – Partial prestressing – Definition, methods of achieving partial prestressing, merits and demerits of partial prestressing.

TOTAL: 45 PERIODS
OUTCOMES:
- Student shall have a knowledge on methods of prestressing and able to design various prestressed concrete structural elements.

TEXTBOOKS:

REFERENCES:

PTCE8013 INDUSTRIAL STRUCTURES

OBJECTIVE:
- To learn the layout, functional aspects and design of structures used in industries.

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

UNIT II FUNCTIONAL REQUIREMENTS

UNIT III DESIGN OF STEEL STRUCTURES
Industrial roofs – Crane girders – Mills buildings – Bunkers and Silos - Chimney.

UNIT IV DESIGN OF R.C. STRUCTURES
Corbels, Brackets and Nibs – Silos and bunkers –Chimney - Principles of folded plates and shell roofs

UNIT V PREFABRICATION
Principles of prefabrication – Prestressed precast roof trusses - Construction of roof and floor slabs - Wall panels.

TOTAL: 45 PERIODS

OUTCOMES:
- At the end of this course the student shall be able to design some of the structures used in industries.

TEXT BOOKS:
REFERENCES:

PTCE8017 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES L T P C 3 0 0 3

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 9
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 STRENGTH AND DURABILITY OF CONCRETE 9
Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete - Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness.

UNIT III SPECIAL CONCRETES 9

UNIT IV TECHNIQUES FOR REPAIR AND PROTECTION METHODS 9
Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, Cathodic protection.

UNIT V REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES 9
Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake - Demolition Techniques - Engineered methods - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:
• Students must gained knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.

REFERENCES:
OBJECTIVE:

- To study the layout, functional aspects and principles involved in the selection of different types of Power Plant Structures.

UNIT I  FUNDAMENTALS OF POWER PLANTS  9

UNIT II  HYDRO ELECTRIC POWER PLANTS  9
Elements of hydro-electric power plants – Advantages and disadvantages of water power – General and essential elements of Hydro electric Power Plant – Structural requirements – Selection of site for hydro electric plant – Penstocks and surge Tanks in Power Station.

UNIT III  THERMAL POWER PLANTS  9
Planning, Analysis of thermal power plants – Layout – Ash handling – Dust collection – Induced draught and natural cooling towers – Air/water pollution by thermal power plants.

UNIT IV  NUCLEAR POWER PLANTS  9

UNIT V  NON CONVENTIONAL POWER PLANTS  9

TOTAL: 45 PERIODS

OUTCOMES

- The student will be able to understand the operations of different types of power plants. The students will be able to analyse and design various power plant components like surge tanks, cooling towers and containment structures.

TEXTBOOKS:


REFERENCES

OBJECTIVE:
• To learn the design of prefabricated structures

UNIT I  INTRODUCTION  10
Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization – Systems
Production – Transportation – Erection - Disuniting of Structures.

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
Design of Structural components - Beam Column Corbel Stress limitations – Handling without
cracking, handling with controlled cracking – Design for stripping forces

UNIT IV  JOINTS IN STRUCTURAL MEMBERS  8
Joints for different structural connections – Beam to Column, Beam to Beam, Column to Column,
Column to Foundation, Connections between wall panels, Connections between floor panels -

UNIT V  DESIGN FOR EARTHQUAKES AND CYCLONES  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

OUTCOMES:
• The student shall be able to design some of the prefabricated elements and also have the
knowledge of the construction methods in using these elements.

TEXTBOOKS:
1. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge Based Process Planning for
3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in
the Use of Precast Concrete, Netherland Betor Verlag, 1978.

REFERENCES:
2. Glover C.W, Structural Precast Concrete, Asia Publishing House, 1965
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 AND MATERIALS  8
Design Philosophy - Modern concepts – Materials used - High Performance Concrete, Fibre Reinforced Concrete, Light weight concrete, Self Compacting Concrete, Glass, High strength steel.

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 – Buckling analysis of tall structures.

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

TOTAL:  45 PERIODS

OUTCOMES:
- At the end of this course the student should have an understanding on the behaviour of tall buildings subjected to lateral building. The students should have knowledge about the principles of designing safer tall structures as per the existing codes.

TEXTBOOKS:

REFERENCES:
OBJECTIVES:

- To impart knowledge to the students on the properties of materials for concrete by suitable tests, mix design for concrete and special concretes.

UNIT I  CONSTITUENT MATERIALS
Cement-Different types-Chemical composition and Properties-Tests on cement-IS Specifications-Aggregates-Classification-Mechanical properties and tests as per BIS grading requirements-Water-Quality of water for use in concrete

UNIT II  CHEMICAL AND MINERAL ADMIXTURES
Accelerators-Retarders- Plasticizers- Super plasticizers- Water proofers- Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline-Their effects on concrete properties

UNIT III  PROPORTIONING OF CONCRETE MIX
Principles of Mix Proportioning-Properties of concrete related to Mix Design-Physical properties of materials required for Mix Design- Design Mix and Nominal Mix-BIS and ACI Methods of Mix Design-Mix Design Examples

UNIT IV  FRESH AND HARDENED PROPERTIES OF CONCRETE
Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS-Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete-Determination of Young’s Modulus

UNIT V  SPECIAL CONCRETES
Light weight and Heavy weight concretes-High strength concrete- Fibre reinforced concrete- Ferro cement -Ready mix concrete-SIFCON- Shotcrete -Polymer concrete-High performance concrete-Their production, properties and applications

TOTAL : 45 PERIODS

OUTCOMES:

- The student will possess the knowledge on properties of materials required for concrete tests on those materials and design procedures for making conventional and special concretes.

TEXTBOOKS:

1. Santhakumar, A.R; Concrete Technology , Oxford University Press, New Delhi, 2007
2. Shetty, M.S; Concrete Technology, S.Chand and Company Ltd, New Delhi 2003

REFERENCES:

3. IS: 10262-1982 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi
OBJECTIVE:
- The student acquires the knowledge on the Geotechnical engineering problems associated with soil contamination, safe disposal of waste and remediate the contaminated soils by different techniques thereby protecting environment.

UNIT I  GENERATION OF WASTES AND CONSEQUENCES OF SOIL POLLUTION  8
Introduction to Geoenvironmental engineering – environmental cycle – sources, production and classification of waste – causes of soil pollution – factors governing soil pollution interaction clay minerals failures of foundation due to waste movement.

UNIT II  SITE SELECTION AND SAFE DISPOSAL OF WASTE  10

UNIT III  TRANSPORT OF CONTAMINANTS  8

UNIT IV  WASTE STABILIZATION  10

UNIT V  REMEDIATION OF CONTAMINATED SOILS  9
Exsitu and insitu remediation-solidification, bio-remediation, incineration, soil washing, electro kinetics, soil heating, vetrification, bio-venting

TOTAL:  45 PERIODS

OUTCOMES:
The students completing the course will have ability to
- describe the fundamentals of Geo-environmental engineering and waste soil interactions
- carryout advanced soil characterisation
- apply soil-water-contaminant interactions in the design of waste containment systems and contaminated site remediation

TEXTBOOKS:

REFERENCES:
PTCE8016 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS

OBJECTIVE:
- 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
9
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
9
Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space.

UNIT III DYNAMIC PROPERTIES OF SOILS
9

UNIT IV DESIGN PROCEDURES
9
Design criteria – dynamic loads – simple design procedures for foundations of reciprocating, impact and rotary type machines - Codal provisions (Simple cases).

UNIT V VIBRATION ISOLATION
9
Vibration isolation technique - foundation isolation - isolation by location-isolation by barriers-active and passive isolation methods.

TOTAL: 45 PERIODS

OUTCOMES:
- Students are able to perform site specific response analysis to develop design spectra and to do detailed liquefaction analysis using SPT data.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- 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 - TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 8
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 10
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 9
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 10

UNIT V - STABILIZATION OF PAVEMENTS 8

TOTAL : 45 PERIODS

OUTCOMES:
- Students will have adequate knowledge to design flexible and rigid pavements based on IRC guidelines. Further they know various techniques to evaluate performance of pavements.

TEXTBOOKS:

REFERENCES:
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

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

OUTCOME:
- Graduates will demonstrate basic knowledge of rock mechanics and able to design effectively slopes, underground openings, foundations and other geotechnical related problems in different types of rocks.

TEXTBOOKS:

REFERENCES:

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 MANAGEMENT  
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

OUTCOME
- Students would have gained knowledge on characteristics of traffic elements, traffic survey, traffic regulation and traffic management measures.

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

REFERENCES:
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  8
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  8
Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.

UNIT III  ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT  10
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  10

UNIT V  EIA CASE STUDIES  9
EIA Case Studies on Highway, Railway, Airways and Waterways Projects

TOTAL: 45 PERIODS

OUTCOME
- Students would have understood the impact of Transportation projects on the environment, Environmental Laws on Transportation Projects and the mitigative measures adopted in the planning stage

TEXTBOOKS:

REFERENCES:
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

UNIT IV BUS TRANSPORTATION
Characteristics and 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.

OUTCOME
- The students would have gained knowledge on comprehensive traffic and transport planning for cities with special emphasis on bus and rail system planning.

TEXTBOOKS:

REFERENCES:
UNIT I BASIC ISSUES
Definition of Human settlement, Urban area, Town, City, Urbanisation, Suburbanisation, Urban sprawl, Peri-urban areas, Central Business District (CBD), Classification of urban areas – Trend of Urbanisation at International, National, Regional and State level.

UNIT II PLANNING PROCESS

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION
Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights, Special Economic Zones.

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS

UNIT V LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM
Town and Country Planning Act, Land Acquisition and Resettlement Act etc., Urban Planning Standards and Regulations, Involvement of Public, Private, NGO, CBO and Beneficiaries.

TOTAL : 45 PERIODS

OUTCOMES:
The students completing the course will have the ability to
- describe basic issues in urban planning
- formulate plans for urban and rural development
- plan and analyse socio economic aspects of urban and rural planning

REFERENCES:
2. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai

PTGE8551 ENGINEERING ETHICS AND HUMAN VALUES
L T P C
(3 0 0 3)

OBJECTIVES:
- The course explains various moral issues through predominant theories. It educates the code of ethics as well as the industry standards and how they can be used for ensuring safety and reducing the risk. The course enunciated the Rights and Responsibilities of individuals. Various other ethical global issues also have been explained along with case studies.

UNIT I HUMAN VALUES
UNIT II ENGINEERING ETHICS

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

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

UNIT V GLOBAL ISSUES

TOTAL : 45 PERIODS

OUTCOMES:
- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

TEXTBOOK

REFERENCES:

WEB SOURCES:
1. www.onlineethics.org
2. www.nspe.org
3. www.globalethics.org
4. www.ethics.org

PTCE8001 AIR POLLUTION AND CONTROL ENGINEERING L T P C
3 0 0 3

OBJECTIVE:
- To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.
UNIT I  INTRODUCTION
Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards –Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants.

UNIT II  METEOROLOGY

UNIT III  CONTROL OF PARTICULATE CONTAMINANTS

UNIT IV  CONTROL OF GASEOUS CONTAMINANTS

UNIT V  INDOOR AIR QUALITY MANAGEMENT
Sources types and control of indoor air pollutants, sick building syndrome types – Radon Pollution and its control- Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

TOTAL: 45 PERIODS

OUTCOMES:
The students completing the course will have

- an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management
- ability to identify, formulate and solve air and noise pollution problems
- ability to design stacks and particulate air pollution control devices to meet applicable standards

TEXTBOOKS:

REFERENCES:

56
OBJECTIVE:
- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

UNIT I INTRODUCTION

UNIT II ENVIRONMENTAL ASSESSMENT
Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives

UNIT III ENVIRONMENTAL MANAGEMENT PLAN

UNIT IV SOCIO ECONOMIC ASSESSMENT
Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis- Public Consultation

UNIT V CASE STUDIES

OUTCOMES:
The students completing the course will have ability to
- carry out scoping and screening of developmental projects for environmental and social assessments
- explain different methodologies for environmental impact prediction and assessment
- plan environmental impact assessments and environmental management plans
- evaluate environmental impact assessment reports

TEXTBOOKS:

TOTAL: 45 PERIODS
REFERENCES:

PTCE8014 INDUSTRIAL WASTEWATER ENGINEERING L T P C 3 0 0 3

OBJECTIVE:
- To provide knowledge on sources and characteristics of Industrial Wastewaters, Techniques and approaches for minimizing the generation of wastewaters at the source and application of physico-chemical, biological and advanced treatment methods for recovery, reuse and disposal of wastewaters in Indian Industries.

UNIT I INTRODUCTION 8

UNIT II INDUSTRIAL POLLUTION PREVENTION 8
Prevention Vs Control of Industrial Pollution – Benefits and Barriers – Waste Minimization Strategies – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay back period.

UNIT III TREATMENT OF INDUSTRIAL WASTEWATERS 10

UNIT IV WASTEWATER REUSE AND RESIDUAL MANAGEMENT 9

UNIT V CASE STUDIES 10
Industrial manufacturing process description, Wastewater characteristics, Pollution Prevention Options and Treatment Flow sheets for selected Industries – Tanneries- Textiles- Pulp and Paper – Metal finishing – Sugar and Distilleries.

OUTCOMES:
The students completing the course will have
- an insight into the pollution from major industries including the sources and characteristics of pollutants

TOTAL: 45 PERIODS
- ability to plan minimization of industrial wastes
- ability to design facilities for the processing and reclamation of industrial waste water

TEXTBOOKS:

REFERENCES:

PTCE8018 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
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 – Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO’s.

UNIT II ON-SITE STORAGE AND PROCESSING

UNIT III COLLECTION AND TRANSFER
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 OFF-SITE PROCESSING
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  9
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

OUTCOMES:
The students completing the course will have
- an understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management
- ability to plan waste minimisation and design storage, collection, transport, processing and disposal of municipal solid waste

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

REFERENCES:

PTGE 8071  DISASTER MANAGEMENT  L T P C
3 0 0 3

OBJECTIVES:
- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

UNIT I  INTRODUCTION TO DISASTERS  9
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don’ts during various types of Disasters.

UNIT II  APPROACHES TO DISASTER RISK REDUCTION (DRR)  9
Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.
UNIT III  INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT  9
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV  DISASTER RISK MANAGEMENT IN INDIA  9
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V  DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS  9
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:
The students will be able to
• Differentiate the types of disasters, causes and their impact on environment and society
• Assess vulnerability and various methods of risk reduction measures as well as mitigation.
• Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

TEXTBOOK:

REFERENCES
1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005

PTCE8012  HYDROLOGY AND WATER RESOURCES ENGINEERING  L T P C
3 0 0 3

OBJECTIVE:
• To introduce the student to the concept of hydrological aspects of water availability and requirements and should be able to quantify, control and regulate the water resources.
UNIT I PRECIPITATION AND ABSTRACTIONS

UNIT II RUNOFF
Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Runoff estimation using empirical - Strange’s table and SCS methods – Stage discharge relationships - flow measurements - Hydrograph – Unit Hydrograph – IUH

UNIT III FLOOD AND DROUGHT
Natural Disasters - Flood Estimation - Frequency analysis - Flood control - Definitions of droughts - Meteorological, hydrological and agricultural droughts - IMD method - NDVI analysis - Drought Prone Area Programme (DPAP)

UNIT IV RESERVOIRS
Classification of reservoirs, General principles of design, site selection, spillways, elevation – area - capacity - storage estimation, sedimentation - life of reservoirs – rule curve

UNIT V GROUNDWATER AND MANAGEMENT
Origin - Classification and types - properties of aquifers - governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas

TOTAL: 45 PERIODS

OUTCOMES
- The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation.
- The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.
- The students will know the basics of groundwater and hydraulics of subsurface flows

TEXTBOOKS

REFERENCES

PTCE8015 INTEGRATED WATER RESOURCES MANAGEMENT

OBJECTIVES:
- To introduce the students to the interdisciplinary analysis of water and design of intervention strategies.
- To develop knowledge base on capacity building on IWRM.
UNIT I  IWRM FRAMEWORK
Definition – meanings –objectives- evolution of IWRM- IWRM relevance in water resources management – Importance of paradigm shift in India: processes and prospective outcomes.

UNIT II  CONTEXTUALIZING IWRM
IWRM in Global and Regional water partnership - MDG goals - UN formulations-Institutional Transformation- bureaucratic reforms and inclusive development.

UNIT III  EMERGING ISSUES IN WATER MANAGEMENT

UNIT IV  IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA

UNIT V  ASPECTS OF INTEGRAL DEVELOPMENT
Capacity building - Solutions for effective Water Management. Case studies on conceptual framework of IWRM – IWRM and regional and global partnership – Emerging issues – IWRM and water resources development

OUTCOME
- At the completion of the course the student should be able to apply appropriate management techniques for planning, operating and maintaining the different components of integrated water resources and drainage system.

TEXTBOOKS:

REFERENCES:

PTCE8019  PARTICIPATORY WATER RESOURCES MANAGEMENT  L  T  P  C
3  0  0  3

OBJECTIVES:
- To gain an insight on local and global perceptions and approaches on participatory water resource management
UNIT I  FUNDAMENTALS: SOCIOLOGY AND PARTICIPATORY APPROACH  6
Sociology – Basic concepts – Perspectives- Social Stratification – Irrigation as a Socio technical Process - Participatory concepts – Objectives of participatory approach

UNIT II  UNDERSTANDING FARMERS PARTICIPATION  10

UNIT III  ISSUES IN WATER MANAGEMENT  9
Multiple use of water – Issues in Inter-sectoral Water Allocation - domestic, irrigation, industrial sectors - modernization techniques – Rehabilitation – Command Area Development - Water delivery systems

UNIT IV  PARTICIPATORY WATER CONSERVATION  10

UNIT V  PARTICIPATORY WATERSHED DEVELOPMENT  10

TOTAL: 45 PERIODS

OUTCOME
• The students shall gain knowledge on the various processes involved in participatory water resource management.
• The students shall be aware of the issues related to water conservation.

TEXTBOOKS:

REFERENCES:

PTCE8003  COASTAL ENGINEERING  L T P C
3 0 0 3

OBJECTIVES:
• To provide an overview of the analysis and design procedures used in the field of coastal engineering
• To enable students to determine the characteristics of waves, coastal structures and shore protection and modeling in coastal engineering

UNIT I  INTRODUCTION TO COASTAL ENGINEERING  9
UNIT II WAVE PROPERTIES AND ANALYSIS

UNIT III TYPES AND WAVE TRANSFORMATION
Tide analysis and prediction, storm surge, seiches and seasonal fluctuations - Long term water level fluctuations – Wave shoaling; wave refraction; wave breaking; wave diffraction

UNIT IV COASTAL STRUCTURES AND SHORE PROTECTION
Risk analysis – design wave – Break waters – Shore protection – groins, seal walls, offshore breakwaters, artificial nourishment

UNIT V MODELING IN COASTAL ENGINEERING
Physical modeling in Coastal Engineering – Limitations and advantages – Role of physical modeling in coastal engineering – Numerical modeling – Modeling aspects – limitations

TOTAL: 45 PERIODS

OUTCOME:
On successfully completing this course unit, students will be able to:
- Calculate the wave transformations
- Appreciate the multi-faceted nature of coastal problems and the techniques of coastal engineering analysis, modeling and design of coastal structures and shore protection.

TEXT BOOKS:

REFERENCES:

PTCE8011 GROUNDWATER ENGINEERING L T P C
3 0 0 3

OBJECTIVES:
- To introduce the student to the principles of Groundwater governing equations and characteristics of different aquifers,
- To understand the techniques of development and management of groundwater.

UNIT I HYDROGEOLOGICAL PARAMETERS
UNIT II  WELL HYDRAULICS  

UNIT III  GROUNDWATER MANAGEMENT  

UNIT IV  GROUNDWATER QUALITY  
Ground water chemistry - Origin, movement and quality - Water quality standards – Health and aesthetic aspects of water quality - Saline intrusion – Environmental concern and Regulatory requirements.

UNIT V  GROUNDWATER CONSERVATION  
Artificial recharge techniques – Remediation of Saline intrusion – Ground water management studies – Protection zone delineation, Contamination source inventory, remediation schemes - Ground water Pollution and legislation.

TOTAL: 45 PERIODS

OUTCOMES:
- Students will be able to understand aquifer properties and its dynamics after the completion of the course. It gives an exposure towards well design and practical problems of groundwater aquifers.
- Students will be able to understand the importance of artificial recharge and groundwater quality concepts.

TEXT BOOKS:

REFERENCES:

PTCE8030  WATER RESOURCES SYSTEMS ENGINEERING  L T P C  3 0 0 3

OBJECTIVES:
- To introduce the student to the concept of Mathematical approaches for managing the water resources system.
- To make the students 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  6
Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project.

UNIT III  LINEAR PROGRAMMING  10
Operation research - introduction - Problem Formulation-graphical solution- Simplex method – Sensitivity analysis - simple applications

UNIT IV  DYNAMIC PROGRAMMING  11
Optimality criteria Stage coach problem – Bellman’s optimality criteria Problem formulation and Solution - simple applications

UNIT V  SIMULATION  11
Basic principles – Methodology and Philosophy – Model development – input and outputs – Deterministic simulation - simple applications

TOTAL: 45 PERIODS

OUTCOMES:
- The students will be exposed to the economical aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.
- The students will develop skills in solving problems in operations research through LP, DP and Simulation techniques.

TEXT BOOK:

REFERENCES:

PTCE8002  CARTOGRAPHY  L T P C
3 0 0 3

OBJECTIVES:
- To introduce Cartography as science and technology of Map Making.
- The course also introduces its connections with Communication Science, Computer technology and IT.
- To outline the Cartography as a creative art.

UNIT I  MAP – A SPECIAL GRAPHIC COMMUNICATOR  6
UNIT II
ABSTRATION OF EARTH AND MAP PROJECTION
12

UNIT III
MAP COMPILATION AND DESIGN
9
Base map concepts – scanning and digitization – planimetric, topographic and thematic information – sample and census surveys – attribute data tables – Elements of a map - Map Layout principles – Map Design fundamentals – symbols and conventional signs - graded and ungraded symbols - color theory - colours and patterns in symbolization – map lettering

UNIT IV
MAP MAKING
9

UNIT V
MAP TRANSFORMATIONS
9

TOTAL: 45 PERIODS

OUTCOME
At the end of the course, the student shall
• Be familiar with appropriate map projection and co-ordinate system for production of maps.
• Be able compile and design maps for the required purpose.
• Be familiar with co-ordinate and datum transformations.

TEXT BOOKS:

REFERENCES:
4. Thematic Cartography and Geovisualisation 3rd edition by Terry A slocum, Robert B Mc Master, fritz C Kessler, Hugh H Howard, 2008 Pretice Hall
OBJECTIVE:
- To understand the working of Total Station equipment and solve the surveying problems.

UNIT I  FUNDAMENTALS OF TOTAL STATION AND GPS  9
Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid - satellite orbital motion - Keplerian motion – Kepler’s Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept – GNSS

UNIT II  ELECTROMAGNETIC WAVES  9
Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies- Refractive index (RI) - factors affecting RI- Computation of group for light and near infrared waves at standard and ambient conditions- Computation of RI for microwaves at ambient condition - 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 - pressure transducers.

UNIT III  ELECTRO OPTICAL AND MICRO WAVE SYSTEM  9

UNIT IV  SATELLITE SYSTEM  9
GPS - Different segments - space, control and user segments - satellite configuration - GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT V  GPS DATA PROCESSING  9
GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data -data processing – software modules -solutions of cycle slips, ambiguities, RINEX format. Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -basic constellation of satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares available in the market.

OUTCOME
- The student shall acquire through working knowledge of modern surveying equipment such as Total Station and GPS so that they will be able to solve all surveying problem faced by our Country.

TEXT BOOKS:

REFERENCES :
PTCE8010 GEOGRAPHIC INFORMATION SYSTEM  L T P C  
3 0 0 3

OBJECTIVES:
- To introduce the fundamentals and components of Geographic Information System
- To provide details of spatial data structures and input, management and output processes.

UNIT I FUNDAMENTALS OF GIS 9

UNIT II SPATIAL DATA MODELS 9

UNIT III DATA INPUT AND TOPOLOGY 9

UNIT IV DATA QUALITY AND STANDARDS 9
Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards – Interoperability - OGC - Spatial Data Infrastructure

UNIT V DATA MANAGEMENT AND OUTPUT 9
Import/Export – Data Management functions- Raster to Vector and Vector to Raster Conversion - Data Output - Map Compilation – Chart/Graphs – Multimedia – Enterprise Vs. Desktop GIS- distributed GIS.

(L:45) TOTAL : 45 PERIODS

OUTCOME
- This course equips the student to have basic knowledge about the GIS its structure, quality and standards.

TEXT BOOKS:

REFERENCE:
OBJECTIVES:

- 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  METHODS OF SURVEYING
Cadastral Survey Methods - Steps in survey of a village - Instruments used for cadastral survey & mapping - Orthogonal, Polar survey methods - Boundary survey - Rectangulation - Calculation of area of land- GPS and Total Station in Cadastral survey.

UNIT III  MAINTENANCE AND MEASUREMENTS

UNIT IV  PHOTOGRAMMETRIC METHODS
Photogrammetry for cadastral surveying and mapping - Orthophoto map – Quality control measures - Organisation of cadastral offices – international scenario.

UNIT V  MAPPING PROCEDURES AND LIS

TOTAL : 45 PERIODS

OUTCOME

- The courses give the knowledge about Land Record System and computational procedure for modernization of the same.
- The students will be in position to understand the Government procedure in Land Record Management.

TEXTBOOKS:

REFERENCES:
2. Alias Abdul Rahman, Siyka Zlatanova, Volker Coors, Innovations in 3D geo information systems
OBJECTIVE

- To solve the Civil Engineering problems with the help of Geoinformatics technique

UNIT I LAND RESOURCE MANAGEMENT

Total Station and GPS Surveys – Topographic and Bathymetric Surveys – Cadastral Information – Soil and Land Use Surveys - Land Information System (LIS) – Real Estate Information System

UNIT II STRUCTURAL STUDIES

Deformation studies of deflection - Dam deformation - structural movement - Pavement yield - shifting sand-bank and shoreline – Landslide Risk Analysis

UNIT III SOIL CONSERVATION AND MANAGEMENT

Soil survey interpretation and mapping - impact of agricultural and industrial activity on soil properties - soil erosion - factors influencing soil erosion - soil contamination using Hyper spectral Remote Sensing - mining pollution- EMR responses with contaminated soil - modeling soil characteristics using satellite data - soil degradation assessment using Remote Sensing and GIS - Land reclamation studies -

UNIT IV URBAN AND TRANSPORTATION MANAGEMENT


UNIT V WATER RESOURCES PLANNING AND MANAGEMENT


TOTAL: 45 PERIODS

OUTCOME

- The student shall be capable of solving Civil Engineering problems with Geoinformatics technology.

REFERENCES:

OBJECTIVES:
- To sensitize the Engineering students to various aspects of Human Rights.

UNIT I

UNIT II

UNIT III
Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

UNIT IV
Human Rights in India – Constitutional Provisions / Guarantees.

UNIT V

TOTAL: 45 PERIODS

OUTCOME:
- Engineering students will acquire the basic knowledge of human rights.

REFERENCES: