### ANNA UNIVERSITY, CHENNAI
### UNIVERSITY DEPARTMENTS
### B.E. CIVIL ENGINEERING (PART TIME)
### REGULATIONS – 2017
### CURRICULA AND SYLLABI I - VII SEMESTERS

#### SEMESTER I

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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

UNIT V  LAPLACE TRANSFORMS  9

OUT COMES:

- 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.

TEXT BOOK:


REFERENCES:

PTPH7101 PHYSICS FOR CIVIL ENGINEERING

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3 0 0 3

OBJECTIVE:
- To introduce the 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 absorptions - 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 NATURAL DISASTERS
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 firefighting equipment - Prevention and safety measures.

TOTAL: 45 PERIODS

OUTCOME:
- The students will have the knowledge on physics related to civil engineering and that knowledge will be used by them in various applications.

REFERENCES:

PTCY7101 CHEMISTRY FOR CIVIL ENGINEERING

OBJECTIVE:

- 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
Introduction-chemical and electrochemical corrosions-mechanism of electrochemical and galvanic corrosions-concentration cell corrosion-passivity-soil, pitting, inter-granular, water line, stress and microbiological corrosions-galvanic series-factors influencing corrosion-measurement of corrosion rate. Corrosion control-material selection and design-electrochemical protection- sacrificial anodic protection and impressed current cathodic protection. Protective coatings- metallic coatings (hot dipping, metal cladding, galvanizing, tinning, electroplating, electroless plating), non-metallic inorganic coatings, organic coatings (paints).

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 - magnetite, 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, filtration, and disinfection. Desalination by reverse osmosis method.

OUTCOME:

• Will be familiar with corrosion and its control.
• Will know the characterization techniques.
• Will know the water quality analysis for industrial applications.

TEXTBOOKS:

REFERENCES:

PTGE7151    COMPUTING TECHNIQUES
(Common to all branches of Engineering and Technology) 3 0 0 3

OBJECTIVE:

• To learn programming using a structured programming language.
• To provide C programming exposure.
• To introduce foundational concepts of computer programming to students of different branches of Engineering and Technology.

UNIT I    INTRODUCTION

Introduction to Computers – Computer Software – Computer Networks and Internet - Need for logical thinking – Problem formulation and development of simple programs - Pseudo code - Flow Chart and Algorithms.

UNIT II    C PROGRAMMING BASICS

UNIT III  ARRAYS AND STRINGS  9

UNIT IV  POINTERS  9
Macros - Storage classes –Basic concepts of Pointers– Pointer arithmetic - Example Problems - Basic file operations

UNIT V  FUNCTIONS AND USER DEFINED DATA TYPES  9

TOTAL :45 PERIODS

OUTCOME:
At the end of the course, the student should be able to:
• Write C program for simple applications
• Formulate algorithm for simple problems
• Analyze different data types and arrays
• Perform simple search and sort.
  Use programming language to solve problems

TEXTBOOKS:

REFERENCES:

PTCE7101  STRENGTH OF MATERIALS I  L T P C
3 0 0 3

OBJECTIVES:
• To learn fundamental concepts of stress, strain and deformation of solids with applications to bars, beams and thin shells.
• To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
• To understand the effect of torsion on shafts and springs.
• To analyse a computer two dimensional state of stress and plane trusses.

UNIT I  STRESS, STRAIN AND DEFORMATION OF SOLIDS  10
UNIT II  ANALYSIS OF PLANE TRUSSES  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- introduction to torsion of rectangular sections-warping

UNIT V  DEFLECTION OF BEAMS  9
Double Integration method – Macaulay’s method – Area moment method – Conjugate beam method for computation of slopes and deflections in determinate beams- deflection due to shear.

TOTAL: 45 PERIODS

OUTCOMES:
The students will have
- Thorough understanding of the fundamental concepts of stresses and strains in one dimensional and two dimensional states.
- The ability to analyse determinate beams and plane trusses.
- A sufficient knowledge in designing shafts to transmit required power and also springs for its maximum energy storage capacities.

TEXTBOOKS:

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

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

OUT COMES:

- 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.

TEXT BOOK:


REFERENCES:

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 MINEROLOGY

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 and earthquakes - causes and mitigation , seismic zonation – seismic zones of India.

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:

OBJECTIVES:
• 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, streak-line and path-lines - Stream function and velocity potentials - Flow nets; (b) Dynamics - Dimensional Concepts of System and Control volume - Application of control volume to continuity, energy and momentum - Euler’s equation of motion along a stream line - Bernoulli’s equation - Applications to velocity and discharge measurements - Linear momentum equation and moment-of-momentum equations and their applications.

UNIT III DIMENSIONAL ANALYSIS AND MODEL STUDIES
Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pi-Theorem - Dimensionless parameters - Similitude 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 ADVECTION 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:

PTCE7202 PLANE AND GEODETIC SURVEYING L T P C 3 0 0 3

OBJECTIVES:
- To introduce the rudiments of plane surveying and geodetic principles to Geoinformatics Engineers.
- To learn the various methods of plane and geodetic surveying to solve the real world problems.
- To introduce the concepts of Control Surveying
- To introduce the basics of Astronomical Surveying

UNIT I FUNDAMENTALS OF CONVENTIONAL SURVEYING 9
Classifications and basic principles of surveying – Chain survey – Basic principles and applications of Plane Table and Compass - Levels and staves - Methods of levelling - Booking - Reduction - Curvature and refraction - Contouring.

UNIT II THEODOLITE SURVEYING 9
Horizontal and vertical angle measurements - Temporary and permanent adjustments – Heights and distances–Tacheometric surveying – Trigonometric levelling – Horizontal curves in route surveying – classification, functions and requirements - methods of setting out simple curves.

UNIT III CONTROL SURVEYING AND ADJUSTMENT 9

UNIT IV ASTRONOMICAL SURVEYING 9
Astronomical terms and definitions - Motion of sun and stars - Celestial coordinate systems – different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of time, longitude, latitude and azimuth by altitude and hour angle method
UNIT V MODERN SURVEYING

Total Station: Advantages - Fundamental quantities measured – Parts and accessories – working principle – On board calculations – Field procedure - Errors and Good practices in using Total Station

GPS: System components – Signal structure – Selective availability and antispooﬁng – receiver components – Planning and data acquisition – Data processing - Errors in GPS - Applications

OUTCOMES:
At the end of the course the student will be able to understand

- The use of various surveying instruments in mapping
- The error and adjustments procedures associated with surveying and mapping
- The methods used for establishment of horizontal and vertical control
- Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth

TEXTBOOKS:

REFERENCES:

PTCE7203 STRENGTH OF MATERIALS II

OBJECTIVES:
- To learn the computation of deflection of beams and trusses using energy principles and to know the concept of analysis of indeterminate beams.
- To estimate the load carrying capacity of columns and analysis of three dimensional state of stress.
- To understand the concept of theories of failure of materials, unsymmetrical bending, shear center and fracture of materials.

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
Unsymmetrical bending of beams - symmetrical and unsymmetrical sections, shear centre – stresses on curved beams for simple solid sections – Winkler Bach Formula – Thick cylinders – Compound cylinders - residual stresses, stress concentration, fatigue.torsion of thin walled sections

TOTAL: 45 PERIODS

OUTCOMES:
- Students will have thorough 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:

PTGE7153  ENVIRONMENTAL SCIENCE AND ENGINEERING

OBJECTIVES:
- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth’s interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.
UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY
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
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
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

UNIT V HUMAN POPULATION AND THE ENVIRONMENT

TOTAL : 45 PERIODS
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:

PTCE7301 HIGHWAY ENGINEERING

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-Road signs and safety.

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 AND MAINTENANCE 10
Highway construction materials, properties, testing methods – Construction practice including modern materials and methods of concrete and flexible pavements, Highway drainage – Special considerations for hilly roads; Evaluation and Maintenance of pavements.
UNIT V HIGHWAY ECONOMICS AND FINANCE


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

REFERENCES:

1. Partha Chakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005
3. Indian Road Congress (IRC), Guidelines and Special Publications on Planning and Design of Highways.

PTCE7302 SOIL MECHANICS L T P C 3 0 0 3

OBJECTIVES:

- To impart knowledge to classify the soil based on index properties and to assess their engineering properties based on the classification. To familiarize the students about the fundamental concepts of compaction, flow through soil, stress transformation, stress distribution, consolidation and shear strength of soils. To impart knowledge of design of both finite and infinite slopes.

UNIT I SOIL CLASSIFICATION AND COMPACTION


UNIT II EFFECTIVE STRESS AND PERMEABILITY

Conductivity – Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer – Factors influencing permeability of soils – Seepage - Two dimensional flow – Laplace’s equation – Introduction to flow nets – Simple problems. (Sheet pile and wier).

UNIT III

STRESS DISTRIBUTION AND SETTLEMENT


UNIT IV

SHEAR STRENGTH

Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – Measurement of shear strength - Direct shear, Triaxial compression, UCC and Vane shear tests – Pore pressure parameters – Cyclic mobility – Liquefaction.

UNIT V

SLOPE STABILITY


TOTAL: 45 PERIODS

OUTCOME:

- Students are able to classify the soil and assess the engineering properties, based on index properties. Students understand the basic concepts soil mechanics and able to design both finite and infinite slopes.

TEXTBOOKS:


REFERENCES:


PTCE7303

STRUCTURAL ANALYSIS I

L T P C
3 0 0 3

OBJECTIVES:

- To introduce the students to basic theory and concepts of classical methods of structural analysis and to find the deflection of determinate plane frames.

UNIT I

DEFLECTION OF DETERMINE FRAMES

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 MATRIX FLEXIBILITY 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 V MATRIX STIFFNESS METHOD

TOTAL: 45 PERIODS

OUTCOMES:
• Students will have the knowledge of analysing a structure using the classical methods and are able to draw the shear force and bending moment diagrams.

TEXTBOOKS:

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

PTCE7311 PLANE AND GEODETIC SURVEYING LABORATORY

OBJECTIVE:
• To familiarize with the various surveying instruments and methods.

EXERCISES:
1. Determination of area of polygon by base line method using chain
2. Chain traversing
3. Fly levelling
4. Check levelling
5. Study of theodolite and its accessories
6. Measurement of horizontal and vertical angles using theodolite
7. Determination of tacheometric constants
8. Determination of elevation of an object using single plane method when base is accessible/inaccessible
9. Determination of distance and difference in elevation between two inaccessible points using double plane method.
10. Heights and distances by stadia tacheometry
11. Heights and distances by tangential tacheometry
12. Study of Total station and GPS (demonstration only)

TOTAL: 60 PERIODS

OUTCOMES:
- At the end of the course the student will be able to use various surveying instruments like chain, level and theodolite for mapping.

REFERENCES:

PTCE7401 APPLIED HYDRAULIC ENGINEERING

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
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.

TOTAL: 60 PERIODS

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:

PTCE7402  DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES  L T P C  3 0 0 3

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 WORKING STRESS 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, importance of cracked and uncracked section.

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.-Introduction to flat slab - Types of staircases - design of dog-legged staircase.
UNIT IV  LIMIT STATE DESIGN OF COLUMNS AND FOOTING

Types of columns – design of short columns for axial load, combined axial load with uniaxial and biaxial bending - use of design aids. Design of footing for masonry and reinforced walls – design of axially and eccentrically loaded square and rectangular footings – design of combined rectangular footings for two columns only- Introduction to strap footing, raft/mat foundation.

UNIT V  MASONRY MEMBERS

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:

PTCE7403  RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

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

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 gauage on curves- Level Crossings. .

UNIT II  RAILWAY CONSTRUCTION AND MAINTENANCE

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  7
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  10

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, ACourse in Railway Engineering, DhanapatRai and Sons, Delhi, 1998

REFERENCES:

PTCE7404  STRUCTURAL ANALYSIS II  L T P C
3 0 0 3

OBJECTIVE:
• To learn the method of drawing influence lines and its uses in various applications like beams, bridges and plane trusses.
• To analyse the arches, suspension bridges and space trusses.
• Also to learn Plastic analysis of beams and rigid frames.

UNIT I  MOVING LOADS AND INFLUENCE LINES  9
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- introduction to folded plates.

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 of influence line and its uses in analysis of beams, stiffening girder in bridges and plane trusses.

TEXTBOOKS:

REFERENCES:

PTCE7405 WATER SUPPLY ENGINEERING
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, Coagulation and flocculation –Clariflocculator-Plate and tube settlers - Pulsator clarifier - sand filters - Disinfection - Residue Management –Construction, Operation and Maintenance aspects.

UNIT IV ADVANCED WATER TREATMENT


UNIT V WATER DISTRIBUTION AND SUPPLY


TOTAL: 45 PERIODS

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 limit state design of steel components subjected to tension, compression and bending and timber structures.

UNIT I SECTIONS AND JOINTS 12
Types of steel structures – Properties of rolled steel sections and Light gauge steel sections – Riveted and bolted connections – Failures of joints – Single and multiple bolted lap and butt joints under axial and eccentric loading – Strength of fillet and butt welded joints – Design of riveted, bolted and welded joints- HSFG bolts

UNIT II TENSION MEMBERS 8
Design of simple and built-up members subjected to tension –Effective area of angles connected to gussets – shear lag-lug angles.

UNIT III COMPRESSION MEMBERS 8
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 11
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- design of brackets

UNIT V TIMBER 6
Study of properties and strength of natural and laminated timber – Allowable stresses in compression, tension and flexure as per IS Code – Types of joints with nails and bolts – Design of simple compression members as per IS code– Design of beams for strength and stiffness as per IS code.

TOTAL: 45 PERIODS

OUTCOME:
- The students will 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 to plan and execute a detailed site investigation programme, to select geotechnical design parameters and type of foundations. Also to familiarize the students for the geotechnical design of different types of foundations and retaining walls.

UNIT I SITE INVESTIGATION AND SELECTION OF FOUNDATION


UNIT II SHALLOW FOUNDATION


UNIT III FOOTINGS AND RAFTS

Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum depth for rigid behaviour – Applications – Floating foundation – Special foundations – Seismic force consideration – Codal provision

UNIT IV PILE FOUNDATION

Types of piles and their functions – 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 – Codal provision.

UNIT V RETAINING WALLS


TOTAL: 45 PERIODS

OUTCOME:

- Students are able to plan, execute a detailed site investigation programme, selection of appropriate geotechnical design parameters and type of foundations. Students are capable of carrying out geotechnical design for different types of foundations and retaining walls.

TEXTBOOKS:

REFERENCES:

OBJECTIVES:
• To introduce the students 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
UNIT II  CROP WATER REQUIREMENT  8
Necessity and importance— Crop and crop seasons in India –Duty, Delta, Base Period–
Factors affecting Duty-Irrigation efficiencies— Consumer use of water-Irrigation requirements of
crops - Standards for irrigation water- Planning and Development of irrigation projects.

UNIT III  DIVERSION AND IMPOUNDING STRUCTURES  9
Head works –Weirs and Barrages –Types of impounding structures - Factors affecting, location of
dams - Forces on a dam -Design of Gravity dams; Earth dams, Arch dams – Spillways
-Energy dissipaters.

UNIT IV  CANAL IRRIGATION  11
Classification of canals- Alignment of canals – Design of irrigation canals– Regime theories -
Canal Head works – Canal regulators - Canal drops – Cross drainage works – Canal
Outlets, Escapes –Lining and maintenance of canals – Other methods of Irrigation: Surface, 
Subsurface – Merits and Demerits.

UNIT V  IRRIGATION WATER MANAGEMENT  8
Modernization techniques – Rehabilitation – Command Area Development - Systems of rice
intensification - Water delivery systems - Participatory Irrigation Management – Farmers’ 
organization and turn over – Water users’ associations - Economic aspects of irrigation.

TOTAL: 45 PERIODS

OUTCOMES:

- 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:

PTCE7504  WASTEWATER 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
Characteristics and composition of sewage-- population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm 
drainage-Storm runoff estimation – sewer appurtenances – corrosion in sewers – prevention and 
control – sewage pumping-drainage in buildings-plumbing systems for drainage.
UNIT II PRIMARY TREATMENT OF SEWAGE

UNIT III SECONDARY TREATMENT OF SEWAGE

UNIT IV DISPOSAL OF SEWAGE

UNIT V SLUDGE TREATMENT AND DISPOSAL

TOTAL: 45 PERIODS

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

UNIT I QUANTITY ESTIMATION

UNIT II RATE ANALYSIS AND COSTING

UNIT III SPECIFICATIONS AND TENDERS

UNIT IV CONTRACTS

UNIT V VALUATION

OUTCOMES:
- The student will be able to estimate the quantity and cost for a typical structure and will be prepare the tender and contract document. The student will be able to perform valuation for building and land.

TEXTBOOKS:

REFERENCES:
2. Tamil Nadu Transparencies in Tenders Act, 1998
3. Arbitration and Conciliation Act, 1996
OBJECTIVE:
- Students will be exposed to various problems associated with soil deposits and methods to evaluate them. The different techniques will be taught to them to improve the characteristics of difficult soils as well as design techniques required to implement various ground improvement methods.

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 10
Dewatering Techniques - Well points – Vacuum and electroosmotic methods – Seepage analysis for two dimensional flow for fully and partially penetrated slots in homogeneous deposits – Design for simple cases.

UNIT III INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS 10

UNIT IV EARTH REINFORCEMENT 9
Concept of reinforcement – Types of reinforcement material – Reinforced earth wall – Mechanism – Simple design - Applications of reinforced earth; Functions of Geotextiles in filtration, drainage, separation, road works and containment applications.

UNIT V GROUTING TECHNIQUES 8

TOTAL: 45 PERIODS

OUTCOME:
- Based on the knowledge gained student will be in a position to identify and evaluate the deficiencies if any in the deposits of the given project area and capable of providing alternative methods to improve its quality so that the structures built on it will be stable and serve the intended purpose.

TEXTBOOKS:

REFERENCES:

PTCE7603  STRUCTURAL DESIGN AND DRAWING  L T P C

2 0 2 3

OBJECTIVES:
- This course aims at providing students with a solid background on the principles of structural engineering design. Students will acquire the knowledge of liquid retaining structures, bridges components, retaining wall and industrial structures.

UNIT I  INTRODUCTION AND PLANNING  6

UNIT II  LIQUID STORAGE STRUCTURES  6
RC Water Tanks- On ground – Circular, underground- Rectangular – Hemispherical Bottomed Steel Water Tank —Design and Drawing

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

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

UNIT V  INDUSTRIAL STRUCTURES  6

TOTAL (L:30+P:30) : 60 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:
4. SP34 Handbook on Concrete Reinforcement and Detailing, Bureau of Indian Standards, New Delhi.

PTMG7751 PRINCIPLES OF MANAGEMENT LT P C 3 0 0 3

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 \hspace{1cm} DIRECTING 9

UNIT V \hspace{1cm} CONTROLLING 9

TOTAL: 45 PERIODS

OUTCOMES:
- The student would have gained the ability to learn the different principles and techniques of management in planning, organizing, directing and controlling.

TEXTBOOKS:

REFERENCES:

PTCE7701 \hspace{1cm} STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING \hspace{1cm} L T P C
\hspace{1cm} \hspace{1cm} \hspace{1cm} \hspace{1cm} 3 0 0 3

OBJECTIVE:
- To understand the behaviour of dynamic loading. Study the effect of earthquake loading on the behaviour of structures. Understand the codal provisions to design the structures as earthquake resistant.

UNIT I \hspace{1cm} SINGLE DEGREE OF FREEDOM SYSTEM 9

UNIT II \hspace{1cm} MULTI DEGREE OF FREEDOM SYSTEM 9
UNIT III  INTRODUCTION TO EARTHQUAKE ENGINEERING


UNIT IV  EARTHQUAKE EFFECTS ON STRUCTURES


UNIT V  CONCEPTS OF EARTHQUAKE RESISTANT DESIGN


OUTCOMES:

- The 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:


PTCE7711  PROJECT WORK

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.

STRATEGY:

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. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

TOTAL: 135 PERIODS
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.

PTGE7071 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 stakeholders- 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.

TEXTBOOKS:

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

PTGE7072 ENGINEERING ETHICS AND HUMAN VALUES L T P C
3 0 0 3

OBJECTIVES
- To emphasise into awareness on Engineering Ethics and Human Values.
- To understand social responsibility of an engineer.
- To appreciate ethical dilemma while discharging duties in professional life.

UNIT I HUMAN VALUES

UNIT II ENGINEERING ETHICS

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION
Engineering as experimentation - engineers as responsible experimenters - codes of ethics - Importance of Industrial Standards - a balanced outlook on law – anticorruption- occupational crime - the challenger case study.

UNIT IV ENGINEER’S RIGHTS AND RESPONSIBILITIES ON SAFETY

UNIT V GLOBAL ISSUES
Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - moral leadership-Sample code of conduct.

TOTAL : 45 PERIODS
OUTCOMES:
- Students will have the ability to perform with professionalism, understand their rights, legal, ethical issues and their responsibilities as it pertains to engineering profession with engaging in life-long learning with knowledge of contemporary issues.

TEXTBOOKS

REFERENCES

PTGE7073 HUMAN RIGHTS L T P C 3 0 0 3

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

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

PTGE7074 TOTAL QUALITY MANAGEMENT L T P C

3 0 0 3

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

OBJECTIVES
- To understand the need for quality, its evolution, basic concepts, contribution of quality gurus, TQM framework, Barriers and Benefits of TQM.
- To understand the TQM Principles.
- To learn and apply the various tools and techniques of TQM.
- To understand and apply QMS and EMS in any organization.

UNIT I INTRODUCTION 9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality - Definition of TQM - Basic concepts of TQM - Gurus of TQM (Brief introduction) - TQM Framework - Barriers to TQM - Benefits of TQM.

UNIT II TQM PRINCIPLES 9

UNIT III TQM TOOLS & TECHNIQUES I 9

UNIT IV TQM TOOLS & TECHNIQUES II 9
Quality circles -- Quality Function Deployment (QFD) -- Taguchi quality loss function -- TPM -- Concepts, improvement needs -- Performance measures -- Cost of Quality - BPR.

UNIT V QUALITY MANAGEMENT SYSTEM 9

TOTAL: 45 PERIODS

OUTCOMES:
- Ability to apply TQM concepts in a selected enterprise.
- Ability to apply TQM principles in a selected enterprise.
- Ability to apply the various tools and techniques of TQM.
- Ability to apply QMS and EMS in any organization.
TEXT BOOK:

REFERENCES:

PTGE7075 INTELLECTUAL PROPERTY RIGHTS L T P C
3 0 0 3

OBJECTIVE:
• To give an idea about IPR, registration and its enforcement.

UNIT I INTRODUCTION
9
Introduction to IPRs, Basic concepts and need for Intellectual Property - Patents, Copyrights, Geographical Indications, IPR in India and Abroad – Genesis and Development – the way from WTO to WIPO – TRIPS, Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II REGISTRATION OF IPRs
10
Meaning and practical aspects of registration of Copy Rights, Trademarks, Patents, Geographical Indications, Trade Secrets and Industrial Design registration in India and Abroad

UNIT III AGREEMENTS AND LEGISLATIONS
10

UNIT IV DIGITAL PRODUCTS AND LAW
9

UNIT V ENFORCEMENT OF IPRs
7
Infringement of IPRs, Enforcement Measures, Emerging issues – Case Studies.

TOTAL : 45 PERIODS

OUTCOME:
• Ability to manage Intellectual Property portfolio to enhance the value of the firm.

TEXTBOOKS
REFERENCES

PTGE7076 FUNDAMENTALS OF NANO SCIENCE L T P C 3 0 0 3

OBJECTIVES:
- To learn about basis of nanomaterial science, preparation method, types and application

UNIT I INTRODUCTION 8
Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II GENERAL METHODS OF PREPARATION 9
Bottom-up Synthesis-Top-down Approach: Co-Precipitation, Ultrasonication, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III NANOMATERIALS 12
Nanoforms of Carbon - Buckminster fullerene- graphene and carbon nanotube, 92 Single wall carbon Nanotubes (SWCNT) and Multi wall carbon nanotubes (MWCNT)- methods of synthesis(arc-growth, laser ablation, CVD routes, Plasma CVD), structure-property Relationships applications- Nanometal oxides-ZnO, TiO₂,MgO, ZrO₂, NiO, nanoalumina, CaO, AgTiO₂, Ferrites, Nanoclays-functionalization and applications-Quantum wires, Quantum dotspreparation, properties and applications

UNIT IV CHARACTERIZATION TECHNIQUES 9
X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques-AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

UNIT V APPLICATIONS 7

OUTCOMES:
Upon completing this course, the students
- Will familiarize about the science of nanomaterials
- Will demonstrate the preparation of nanomaterials
- Will develop knowledge in characteristic nanomaterial

TEXT BOOKS
REFERENCES

PTAI7001 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 10

UNIT II RUNOFF 8
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 9
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 8
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 10
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:
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

OUTCOME:

- At the completion of the course, the student will be able to apply appropriate management techniques different components of water resources under IWRM framework.

TEXTBOOKS:


REFERENCES:

OBJECTIVE:

- 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 - WUA

UNIT II  UNDERSTANDING FARMERS PARTICIPATION 10

UNIT III  ISSUES IN WATER MANAGEMENT  9

UNIT IV  PARTICIPATORY WATER CONSERVATION  10

UNIT V  PARTICIPATORY WATERSHED DEVELOPMENT  10
Concept and significance of watershed - Basic factors influencing watershed development — Principles of watershed management - Definition of watershed management – Identification of problems - Watershed approach in Government programmes — People’s participation – Entry point activities - Evaluation of watershed management measures.

TOTAL: 45 PERIODS

OUTCOMES:

- 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:

REFERENCE:
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:
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 ABSTRACTION OF EARTH AND MAP PROJECTION 12

UNIT III MAP COMPIILATION 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

OUTCOMES:
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.

TEXTBOOKS:
REFERENCES:

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

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

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.

TEXTBOOKS:
REFERENCES:

OBJECTIVES:
- To understand the design and analysis of structures using softwares and to optimize the structural components.

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

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

UNIT III STRUCTURAL ANALYSIS

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

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

OUTCOMES:
- Students acquire the knowledge in computer aided design of structures.

TEXTBOOKS:

REFERENCE:
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

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:
• To learn the design of plate and shell and spatial structures

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

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

UNIT III  ANALYSIS OF THIN SHELLS  5
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  10
Spherical dome, Conical shell and Cylindrical shell.

UNIT V  SPACE FRAMES  10
Space Frames – Configuration – Node connector- Types – 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:

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
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
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
Analysis and design of composite beams - Shrinkage strain and its importance – 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

OUTCOMES:
- Student will have knowledge on methods of prestressing and able to design various prestressed concrete structural elements.

TEXTBOOKS:

REFERENCES:

PTCE7008 DIGITAL CADASTRE

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

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

OUTCOMES:
- 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:

PTCE7009 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT  L T P C
3 0 0 3

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

TOTAL: 45 PERIODS

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:

REFERENCES:

PTCE7010 GEO-ENVIRONMENTAL ENGINEERING

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 Geo environmental 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

OUTCOME:
• Students are able to assess the contamination in the soil and to select suitable remediation methods based on contamination. Also they are able to prepare the suitable disposal system for particular waste.

TEXTBOOKS:

REFERENCES:
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
Introduction to GIS - Basic spatial concepts - Coordinate Systems - GIS and Information Systems - Definitions - History of GIS - Components of a GIS - Hardware, Software, Data, People, Methods - Proprietary and open source Software - Types of data – Spatial, Attribute data- types of attributes – scales/ levels of measurements.

UNIT II  SPATIAL DATA MODELS

UNIT III  DATA INPUT AND TOPOLOGY

UNIT IV  DATA QUALITY AND STANDARDS
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
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.

TOTAL: 45 PERIODS

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

TEXT BOOKS:

REFERENCE:
OBJECTIVE:

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

UNIT I  LAND RESOURCE MANAGEMENT  6
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  6
Deformation studies of deflection - Dam deformation - structural movement - Pavement yield - shifting sand-bank and shoreline – Landslide Risk Analysis

UNIT III  SOIL CONSERVATION AND MANAGEMENT  9

UNIT IV  URBAN AND TRANSPORTATION MANAGEMENT  12

UNIT V  WATER RESOURCES PLANNING AND MANAGEMENT  12

TOTAL: 45 PERIODS

OUTCOME:

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

TEXTBOOKS:


REFERENCES:

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- Point Source, Non Point Source, 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: Physical, Chemical, Biological- 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.

TEXTBOOKS:


REFERENCES:

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

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

UNIT II  FUNCTIONAL REQUIREMENTS  9

UNIT III  DESIGN OF STEEL STRUCTURES  9
Industrial roofs – Crane girders – pre-engineered and Mills buildings – Bunkers and Silos – pipe/cable racks- Chimney.

UNIT IV  DESIGN OF R.C. STRUCTURES  9
Corbels, Brackets and Nibs - Silos and bunkers –Chimney - Principles of folded plates and shell roofs

UNIT V  PREFABRICATION  9
Principles of prefabrication – Prestressed precast roof trusses - Construction of roof and floor slabs - Wall panels- storage/transportation/handling in yard/site and erection –joints in precast structures.

TOTAL: 45 PERIODS

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

TEXTBOOKS:

REFERENCES:

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

UNIT II   INDUSTRIAL POLLUTION PREVENTION
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

UNIT IV   WASTEWATER REUSE AND RESIDUAL MANAGEMENT

UNIT V   CASE STUDIES
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
• ability to plan minimization of industrial wastes
• ability to design facilities for the processing and reclamation of industrial waste water

TEXTBOOKS:

REFERENCES:
INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS

OBJECTIVE:
- To understand the basics of dynamics – dynamic behaviour of soils – effects of dynamic loads and the various design methods.

UNIT I  THEORY OF VIBRATION

UNIT II  WAVE PROPAGATION

UNIT III  DYNAMIC PROPERTIES OF SOILS

UNIT IV  FOUNDATION FOR DIFFERENT TYPES OF MACHINES

UNIT V  INFLUENCE OF VIBRATION AND REMEDIATION

TOTAL: 45 PERIODS

OUTCOME:
- Students are able to design foundation for different machines, assess the influence of vibrations and selection of remediation methods based on the nature of vibration, properties and behaviour of soil.

TEXT BOOKS:

REFERENCES:
PTCE7017 MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES L T P C 3 0 0 3

OBJECTIVE:

• To acquire 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 demolition methods - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

• Students have the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.
TEXT BOOKS:

REFERENCES:
4. Hand Book on “Repair and Rehabilitation of RCC Buildings” – Director General works CPWD, Govt of India, New Delhi – 2002

PTCE7018 MUNICIPAL SOLID WASTE MANAGEMENT L T P C 3 0 0 3

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

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

UNIT II ON-SITE STORAGE AND PROCESSING 8

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

UNIT IV OFF-SITE PROCESSING 12
Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

UNIT V DISPOSAL 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

TOTAL: 45 PERIODS
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 systems for storage, collection, transport, processing and disposal of municipal solid waste

TEXTBOOKS:

REFERENCES:

PTCE7019 PAVEMENT ENGINEERING L T P C 3 0 0 3

OBJECTIVE:
- Student gains knowledge on various IRC guidelines for designing rigid and flexible pavements. Further, the student 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

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

OUTCOME:
- Students are able to design different new pavements and rehabilitate the existing roads using recent technology.
TEXTBOOKS:

REFERENCES:

PTCE7020 POWER PLANT STRUCTURES L T P C
3 0 0 3

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:

PTCE7021  PREFABRICATED STRUCTURES  L T P C  3 0 0 3

OBJECTIVE:
- To understand the principles of prefabrication, behaviour and design of prefabricated components and structural connections.

UNIT I  INTRODUCTION  10

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

UNIT III  DESIGN PRINCIPLES  10
Design of Structural components – Beam, Column and 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 - Dimensions and detailing – Design of expansion joints- Jointing Materials.

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 the prefabricated elements and also have the knowledge of the construction methods in using these elements.

TEXTBOOKS:
REFERENCES:
2. Glover C.W, Structural Precast Concrete, Asia Publishing House, 1965

PTCE7022 ROCK ENGINEERING

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

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

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 – Hydraulic fracturing – Flat jack method – Over coring method

UNIT IV APPLICATION OF ROCK MECHANICS IN ENGINEERING 10

UNIT V ROCK STABILISATION 7

TOTAL: 45 PERIODS

OUTCOME:
- Students are capable of classifying the rock. They can understand stares-strain characteristics, failure criteria, and influence of insitu stress in the stability of various structures and also know various technique to improve the insitu strength of rocks.

TEXTBOOKS:

REFERENCES:
OBJECTIVE:
- To understand the design philosophy of tall buildings, the loading and behaviour of structural systems. 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:
- 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:
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, wavepropagation 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- Meanrefractive 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.

TOTAL : 45 PERIODS

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.

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 10
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 7

UNIT III TRAFFIC ENGINEERING REGULATION AND CONTROL 8

UNIT IV TRAFFIC SAFETY AND ENVIRONMENT 10
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 10
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) - Introduction to Intelligent Transportation Systems (ITS)- ITS Applications in Traffic Management.

TOTAL: 45 PERIODS

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

TEXTBOOKS:

REFERENCES:
1. Partha Chakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005
2. Indian Roads Congress (IRC) Specifications: Guidelines and special publications on Traffic Planning and Management.

PTCE7026 TRANSPORT AND ENVIRONMENT L T P C 3 0 0 3

OBJECTIVE:
• The objective of this course is to create an awareness / overview of the impact of Transportation Projects on the environment and society.

UNIT I INTRODUCTION 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:
TRANSPORTATION PLANNING AND SYSTEMS

OBJECTIVE:

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

UNIT I STUDY AREA AND SURVEYS
Importance of planning and integrated transport facilities in urban areas – Delineation of study area and zoning – Conducting various surveys – Travel patterns, transport facilities and planning parameters.

UNIT II MODES
Basics of trip generation – Trip distribution – Trip assignment and modal split models – Validation of the model.

UNIT III PLAN PREPARATION AND EVALUATION

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.

TOTAL: 45 PERIODS

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:


URBAN PLANNING AND DEVELOPMENT

OBJECTIVES:

- To enable students to have the knowledge on planning process and to introduce to the students about the regulations and laws related to Urban Planning.
UNIT I BASIC ISSUES 8
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 8

UNIT III DEVELOPMENT PLANS, PLAN FORMULATION AND EVALUATION 10
Scope and Content of Regional Plan, Master Plan, Detailed Development Plan, Development Control Rules, Transfer of Development Rights, Special Economic Zones- Development of small town and smart cities-case studies

UNIT IV PLANNING AND DESIGN OF URBAN DEVELOPMENT PROJECTS 9

UNIT V LEGISLATION, DEVELOPMENT AND MANAGEMENT OF URBAN SYSTEM 10
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 and
- plan and analyse socio economic aspects of urban and rural planning

TEXTBOOKS:
3. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi, 2001

REFERENCES:
1. Tamil Nadu Town and Country Planning Act 1971, Government of Tamil Nadu, Chennai
4. CMDA, Second Master Plan for Chennai, Chennai 2008

PTCE7029 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  7
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.

TEXTBOOK:

REFERENCES: