

CIVIL ENGINEERING

5 th semester				6 th semester			
<i>Subject Code</i>	<i>Theory</i>	<i>Contact Hours). L-T-P</i>	<i>Credit C</i>	<i>Subject Code</i>	<i>Theory</i>	<i>Contact Hours). L-T-P</i>	<i>Credit C</i>
MA-301	Optimization in Engg	3-0-0	3	CE-332	Water and Waste Water Management	3-0-0	3
CE-311	Structural Analysis-II	3-1-0	4	CE-302	G.I. S & Remote Sensing	3-0-0	3
CE-351	Transportation Engg – II	3-0-0	3	CE-312	Steel Structure Design	3-0-0	3
CE-313	Concrete Structure Design-I	3-0-0	3	CE-322	Water Resources Engg-I	3-0-0	3
CE-341	Geotechnical Engg-II	3-1-0	4	CE-324	Fluid Dynamics & Hydraulic Machines	3-0-0	3
CE-301	Surveying – II	3-0-0	3	EL-I	Elective – I	3-0-0	3
Total		20	20	Total		18	18
<i>Practicals / Sessional</i>				<i>Practicals / Sessional</i>			
CE-371	Environmental Engineering Lab.	0-0-3	2	CE-372	Steel Structure Design Practice	0-0-3	2
CE-373	Concrete structures Design Practice	0-0-3	2	CE-370	Environmental Engg Design Practice	0-0-3	2
CE-375	Transportation Engg. Design Practice	0-0-3	2	CE-374	Survey Field Work-II	0-0-3	2
Total		9	6	Total		9	6
GRAND TOTAL		29	26	GRAND TOTAL		27	24

MODULE-I (15 Hours)

Two variable LP model, Graphical sensitivity analysis, The Simplex method, Computational details, Simplex algorithm, Artificial Starting solution, Degeneracy, Alternative optima, unbounded solution. Duality and Sensitivity analysis, primal Dual relation, Transportation Model, Non-traditional transportation model, Assignment model, Hungarian method, Networks, Shortest route problem, Maximal flow method.

MODULE-II (13 Hours)

Integer linear programming, Illustration Branch & Bound Algorithm, Cutting-plane algorithm, Dynamics programming, Knapsack model, Decision analysis & Game Theory, Simulation modelling, Monte-Carlo simulation for discrete events.

MODULE-III (12 Hours)

Nonlinear programming, Unconstrained optimizations, unimodal function, Necessary & sufficient conditions, Newton Raphson method, constrained algorithm, Direct search method, gradient method.

TEXT BOOKS

1. H. A Taha, Operations Research: An Introduction, Pearson Education, (7th Edition); Ch-2[2.1,2.2 (2.2.1, 2.2.2), 2.3], Ch-3[3.1, 3.3, (3.3.1, 3.3.2) 3.4, 3.5], Ch-4[4.1, 4.2, 4.4 (4.4.1), 4.5 (4.5.1, 4.5.2)], Ch-5[5.1, 5.3(5.3.1, 5.3.2), 5.4(5.4.1)], Ch-6[6.1, 6.3 (6.3.1, 6.3.2), 6.4 (6.4.1, 6.4.2)], Ch-9 [9.1, 9.2(9.2.1, 9.2.3)], Ch-10 [10.3.1 Ch-14 :14.3, 14.4], Ch-18 [18.1, 18.4], Ch-20[20.1(20.1.1), 20.2 (20.2.1, 20.2.2)], Ch-21[21.1]

REFERENCE BOOKS

1. F.S Hiller, G. J. Libermen, An Introduction to Operations Research: Concepts & Cases, (8th Edition), TMH Publication.
2. Kalyanmay Dev, Optimization for Engineering Design, PHI Publications

MODULE – I (13 Hours)

Analysis of continuous beams & frames using: Slope-deflection method, Moment distribution method, Kani's method.

MODULE – II (14 Hours)

Plastic analysis, Plastic modulus, shape factor, plastic moment of resistance, plastic analysis of continuous beams and simple rectangular portals.

MODULE – III (13 Hours)

Matrix formulation of force and displacement method, Computer oriented stiffness matrix approach. Solution of continuous beams, plane rigid jointed and pin jointed frame.

TEXT BOOKS

1. C.K. Wang, Indeterminate Structural Analysis, McGraw Hill Book Company
2. Pandit & Gupta, Matrix method of structural analysis, Tata McGraw Hill
3. Manicka Selvam, Limit Analysis of Structures, Dhanpatrai & Sons

REFERENCE BOOKS

1. C.S. Reddy, Basic Structural Analysis, Tata McGraw Hill
2. B.G. Neal, Plastic Analysis, Chapman & Hall

CE-351 TRANSPORTATION ENGINEERING - II (3-0-0)

MODULE- I (16 Hours)

Various Systems of Transportation, their relative merits and demerits with focus on Indian Scene

Railway Engineering

Traffic and land surveying, land acquisition, super elevation, equilibrium and cant deficiency, gradients. Permanent way formation: ballast, sleeper, rails, and joints. Testing and maintenance of track, wear and tear in rail, creep, and its prevention. Points and crossings: construction and operation, signaling and interlocking arrangements.

Tractive resistance and hauling capacity of locomotives, electric traction, its principle and operation. , Station Yards and platforms. Station Building. Marshalling Yard, Turn tables, Level crossing.

MODULE II (16 Hours)

Airport Engineering : Airport Development in India; airport planning and site selection and classification of airports. Wind direction, duration and intensity; use of Wind Rose diagram. Obstructions, zoning laws, approach zones, turning zones. Principle of design of run ways, their configuration and orientation. Design of taxiways. Location and utility of aprons, landing strips, hangars Typical airport layout, terminal building, gate position, administrative building, control tower. Air port marking, and lighting. Air Traffic Control – Airway and airport traffic control, instrumental landing system and air navigational aids.

MODULE III (8 Hours)

Bridge Engineering

Classification of bridges; considerations for location, site investigation leading to the choice of bridge types, bridge piers and abutments, bridge super structure – slab, arch, girder and trusses; limitation of their adoption; differentiation between highway and railway bridges.

TEXT BOOKS

1. SC Saxena & Arora, Railway Engineering, Dhanoat Rai & sons
2. Shehagal & Bhanot, Airport Engineering
3. Khanna, Arora & Jain Airport Engineering ,Nemchand & Bros

REFERENCE BOOKS

1. J.S Mundrey, Railway Track Engg- Tata Mc Graw Hill
2. D.J Victor Bridge Engg, Oxford & IBH
3. Ponnuswami, Bridge Engg., Tata Mc Graw Hill

CE-313 CONCRETE STRUCTURE DESIGN– I (3-0-0)

MODULE – I (14 Hours)

Properties of Concrete and Reinforcement, Brief comparison among working stress, ultimate load and limit state design.

Working stress method – Design for flexure, shear and compression (axially loaded short column).

Limit state of collapse; flexure, shear and torsion (application to rectangular beam, T-beam and L-beam section).

Design of singly and doubly reinforced rectangular beam T-beam and L-beam, Design of one way and two way slab. Limit state of serviceability; deflection of beam and slab.

MODULE – II (13 Hours)

Limit state of collapse in compression: - Short and long column, Design of short column:- Axially loaded column, column subjected to axial load and uni-axial bending, column subjected to axial load and bi-axial bending (square, rectangular and circular column), Design of long column.

MODULE – III (13 Hours)

Design of Staircase: waist slab type and cantilever type. Design of isolated column footing:- pad type and sloping type.

TEXT BOOKS

1. Dr. B. C. Punmia, A. K. Jain, A.K. Jain, Limit State Design of Reinforced Concrete, Laxmi Publishers.
2. P.C. Varghese, Limit State Design of RCC Structure, PHI

REFERENCE BOOKS

1. Jain & Jaykrishna, Limit State Design of Reinforced Structure, Nem Chand & Bros
2. S. N. Sinha, Reinforced Concrete Structure , Tata McGraw Hill Publication

CE-341 GEOTECHNICAL ENGINEERING – I (3-1-0)

MODULE-I (16 Hours)

Stress distribution in soil: Boussinesq and Westergaard solution for vertical stress under point load, line load, strip load, uniformly loaded circular and rectangular areas, isobar and pressure bulb concept, Pressure distribution on horizontal and vertical planes at various loading conditions, Use of Newmark's chart, Approximate methods-equivalent point load method, two-to-one method, 60 degree distribution method, Contact pressure distribution due to loaded areas, Concept of active zone in soil.

Lateral earth pressure and retaining structures: Earth pressure at rest, active and passive earth pressure, earth pressure theories for cohesionless and cohesive soil, Rankine's theory, Coulomb's wedge theory, Rebhann's construction and Culmann's graphical methods, stability of retaining walls.

MODULE-II (12 Hours)

Stability of earth slopes: Stability of infinite slopes, stability analysis of finite slopes, friction circle method, Swedish method of slices, Fellenius' method for locating centre of critical slip circle, Bishop's method, use of Taylor stability number and chart.

Subsoil exploration: methods: Direct (test pits, trenches), semi-indirect (borings), indirect methods. Planning of exploration program: spacing and depth of boring, soil sampling, types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear test, geophysical methods, seismic refraction and electrical resistivity methods.

Cofferdams: Types, description.

Mat foundation: Introduction, common types of mat foundations, bearing capacity of mat foundations, differential settlement of mats, field settlement observations for mat foundations.

MODULE-III (12 Hours)

Pile foundations:

Introduction, Types of piles and their structural characteristics, estimating pile length, installation of piles, estimating pile capacity (Meyerhof's, Vesic, Janbu, IS Code Methods), Pile driving formulas, negative skin friction, Group efficiency, Ultimate capacity of group piles, settlements of group piles.

Well & Caisson foundation: basic concept, components, and comparison.

TEXT BOOKS:

1. K. R. Arora ,Soil Mechanics and Foundations, Standard publisher
2. B. M. Das ,Principle of Foundation Engineering, , PWS Publication
3. V.N.S. Murthy ,Soil Mechanics and Foundation Engineering , CRC Publisher

REFERENCE BOOKS:

1. S. B. Sehgal, Soil Mechanics ,CBS Publication
2. M.E. Harr, Foundations of Theoretical Soil Mechanics, Mc Grawtill
3. Peck, Hansen and Thornburn, Foundation Engineering, John Willey
4. C. Venkataramaih, Principles of Soil Mechanics and Foundation Engineering, New Age International

CE-301

SURVEYING – II

(3-0-0)

MODULE-I (14 Hours)

Curves: Horizontal curves (simple, compound, transition), vertical curves.

Triangulation: Strength of figure, selection of station, inter-visibility of stations, base line measurement, satellite stations, height and distance.

MODULE-II (14 Hours)

Trigonometrical levelling :

Introduction to photogrammetric survey and mapping

Introduction to Astronomical survey: Motion of heavenly bodies, celestial coordinates, astronomical triangle.

MODULE-III (12 Hours)

Advanced Survey Instruments:

Electronic Distance Measurement (EDM): Geodimeter, tellurometer, distomat; total station; GPS; DGPS.

TEXT BOOKS

1. B.C. Punmia, A.K.Jain ,Surveying Vol. II & III- Laxmi Publishers
2. Kanetkar & Kulkarni ,Surveying and leveling Vol II -, Chartar Book House

REFERENCE BOOKS

1. David Clark ,Plane and geodetic surveying - Vol II - Constable ,Lodon
2. P.B. Shahani ,Advanced surveying- Oxford & IBH
3. P. Som & B. N. Ghose ,Advanced surveying, CBS Publication

CE-332 WATER AND WASTE WATER MANAGEMENT (3-0-0)

MODULE-I (14 Hours)

Water treatment: Necessity of water treatment, Layout of modern water treatment plant, water treatment processes, Pre-treatment of water, Primary treatment, coagulation & flocculation, filtration, Disinjection, Advanced water treatment processes, roof water harvesting & ground water recharge.

Water quality control: Introduction, clean water act, safe drinking water act.

MODULE-II (12 Hours)

Wastewater treatment: Pre-treatment, primary treatment, Secondary or Biological treatment (Trickling filter, Activated sludge process, Aerobic & Anaerobic sludge digestion), Introduction to advanced treatment of wastewater.

MODULE-III (14 Hours)

Distribution of water: Requirement, Layout, Methods.

Disposal of newage effluent: Disposal by dilution, Disposal on land.

Solid waste management: Introduction, Classification, Composition & properties of MSW, Management & treatment of MSW.

TEXT BOOKS

1. S. K. Garg ,Sewage, waste water & waste disposal Engineering, Khanna Publishers
2. Environmental engineering by Peavy, Rowe & Techobanglous, Tata Mc Graw Hill, New Delhi.
3. G. S. Birdi , Water supply & Sanitary engineering,Dhanpat, Rai Publication.

REFERENCE BOOKS

1. S. K. Garg , Water supply engineering ,Tata Mc Graw Hill
2. E. W. Steel,Water supply & sanitary engineering ,East West Publication

CE-302 G.I.S. AND REMOTE SENSING (3-0-0)

MODULE – I (12Hours)

Remote Sensing : Fundamental Concepts of Remote Sensing

Energy sources and radiation principles, Energy interaction with atmosphere and earth surface features, History of remote sensing.

Sensors and Platforms

Introduction & types, active and passive sensors, sensor resolution, types of platforms.

Satellite Remote Sensing

Earth resource satellites-Types and Characteristics, Thermal and Multispectral remote sensing, Microwave remote sensing, Fundamentals of satellite image interpretation, Image Classification, Mosaicing and enhancement

Digital Image Processing

Concept and Principle, Pre-processing, Image rectification and Restoration, Enhancement and classification, Contrast manipulation, Post classification smoothing

MODULE – II (14 Hours)

GIS Introductory Concepts

Definition, Basic concepts, Components of GIS- Hardware & Software components. Data in GIS, Data types, Sources of Data & typical GIS datasets, Data Quality & Sources of Error – micro Level Components (Positional accuracy, Attribute accuracy, Logical consistency, Resolution), Macro Level Components (Completeness, Time, Lineage), Usage Components (Accessibility and Direct and Indirect costs), Sources of Error

Data Models and Database :

Data Models and Data structures - Hierarchical, Network & Relational, Raster & Vector

Organizing GIS Database: Characteristics, Database design-conceptual design, logical design, physical design, Database creation, Database updating and Linkages

GIS Tools :

Organizing data, Data input (Digitisation, Scanning and Raster and Vector Conversion), Verification, Data storage & Retrieval, Manipulation (Referencing to Co-ordinate system, Projection), Editing (Geometrical and Attribute), Analysis (Spatial modelling and integration-GIS analytical models), Data Representation & Cartographic communication, Concept and background of Digital Surface Modelling (DSM) and Digital Elevation Model (DEM), Need for Digital Surface Modelling and the methods of representation of Digital Surface Modelling, Implementation of GIS-Need and awareness of implementing GIS, System Requirements, Evaluating Alternatives, System Justification, Implementation of Action Plan, System Acquisition and Start-up.

MODULE – III (14 Hours)

Remote Sensing and GIS Applications

Land cover and Land use mapping, Terrain analysis and land evaluation, Applications in environmental studies, Geological and Geomorphologic mapping, Application in soil and forest studies, Coastal zone management, Disaster Management, Agriculture (Land Suitability Analysis), Soil, Forestry,

Rural-Urban Planning and Management. Transportation Engineering, Traffic Management & Geotechnical Engineering.

TEXT BOOKS

1. Lillesand T.M. & Kiefu R.W., Remote Sensing and Image Interpretation , John Wiley and Sons, New York, 1994.
2. B. Bhatta, Remote sensing and GIS ,Oxford University press.
3. Floyd F. Sabins Jr.. Remote Sensing, Principles and interpretation , W.H. Freemanes & Co., New York, 2nd Edition, 1987.

REFERENCE BOOKS

1. Stan Marany, GIS Solutions in Natural Resource Management, Onward Press,USA,1999
2. Longley, Geographical Information System (Vol.1 and Vol.2), Goodchild et. al, John Wiley and sons, 1999.
3. Stan Arnoff, Geographical Information System: A Management Perspective,WDL Publications, Canada.

CE-312

STEEL STRUCTURE DESIGN

(3-0-0)

MODULE – I (14 Hours)

Basics of Design of Steel Structure. Riveted, Bolted & welded connection. Design of tension member, compression member, design of columns including, lacing and battening. Design of base plate: Slab base and gusseted base plate.

MODULE – II (13 Hours)

Design of Beams, Design of plate girder, Design of Gantry girder

MODULE – III (13 Hours)

Design of roof truss, Design of overhead pressed water tanks

(Use of IS : 800 & steel tables are to be permitted in examination)

TEXT BOOKS

1. B. C. Punmia, A.K. Jain, A.K. Jain, Design of steel structures, Laxmi Publishers
2. S. K. Duggal, Design of steel structures, Tata McGraw Hill Publisher
3. L. S. Negi, Design of steel structures, Tata McGraw Hill Publisher.
4. Ram Chandra, Design of steel structures, Vol. I, Standard Publishers

REFERENCE BOOKS

1. Subramaniam, Design of Steel Structures, Oxford Publishers.

CE-322

WATER RESOURCES ENGINEERING – I

(3-0-0)

MODULE-I (14Hours)

Hydrology

Introduction: Hydrologic cycle, water budget equation, Application in water resources, Sources of Data

Precipitation: Precipitation, Rainfall and its Measurement, Types of rain gauges, Rain gauge network, Averaging Precipitation data, Precipitation losses, DAD curve, Adjustment of rainfall data

Runoff: Introduction, Runoff and factors effecting runoff, flow mass curve, Flow duration curve, hydrograph, unit hydrograph, Synthetic unit hydrograph, Instantaneous unit hydrograph, SPF, PMF

MODULE-II (13Hours)

Irrigation Systems

Definition of irrigation, Necessity and types of irrigation, Advantage, Disadvantage, Different techniques of distribution of irrigation water, Quality of irrigation water, Indian crops, crop seasons and Multiple cropping and hybrid crops, water requirements of crops, Optimum utilization of irrigation water, Irrigation efficiencies, Consumptive use of irrigation water, Soil-moisture-irrigation relationship, Estimation of depth and frequency of irrigation

Canal Irrigation

Alluvial and non-alluvial canals, Alignment of canals, Distribution system for canal irrigation, Determination of required channel capacity, Channel losses, Bed load, suspended load and total

load, Sediment transport theory and design of unlined and lined canals irrigation channels, Types of canal linings.

MODULE-III (13 Hours)

Floods and Flood Routing: Rational formulae, empirical formulae, unit hydrograph method, flood-frequency analysis, hydrologic reservoir routing, hydrologic channel routing, hydraulic method of flood routing, flood forecasting, flood control

Hydraulics of Rivers : Importance of rivers and necessity of controlling them, Types of rivers and their characteristics, Behavior of rivers, Control of rivers, River training works

Water Logging of land: Causes, Preventive and curative measures, Reclamation of waterlogged lands, Drainage of irrigated lands, Saline and alkaline lands

TEXT BOOKS

1. K. Subramanya, Engineering Hydrology , Tata McGraw-Hill Publishing Company Ltd, NewDelhi
2. Bharat Singh, Nem chand & Bros, Fundamentals of Irrigation Engineering, Roorkee,
3. Santosh Ku. Garg, Irrigation Engineering and Hydraulic Structures, Khanna Publishers, Delhi

REFERENCE BOOKS

1. R. K. Sharma and T.K. Sharma, Irrigation Engineering, S. Chand & Company New Delhi.

CE-324 FLUID DYNAMICS & HYDRAULIC MACHINES (3-0-0)

MODULE-I (14Hours)

Flow in open channels.

Introduction, Types of flow in channels, Geometrical properties of channel section, Velocity distribution in a channel section, Most economical sections of channels.(Rectangular, Trapezoidal, Triangular and circular channel section).Specific energy and critical depth, Specific force.

Non-uniform flow in channels:

Introduction, Gradually varied flow, Classification of channel bottom slopes, classification of surface profiles. Hydraulic jump, Application of Hydraulic jump, Surges in open channels.

MODULE-II (13Hours)

Boundary layer theory

Introduction, Thickness of boundary layer, Boundary layer along a long thin plate and its characteristics, Laminar boundary layer, Turbulent boundary layer, Separation of boundary layer, Methods of controlling boundary layer.

Impact of jets

Introduction, Force exerted by fluids jet on stationary flat plate, Force exerted by fluids jet on moving flat plate, Force exerted by fluids jet on a stationary curved vane and moving curved vane .

MODULE-III (13 Hours)

Hydraulic Turbines

Introduction, Elements of hydraulic power plants, Classification of Turbines, Work done and efficiencies of Pelton wheel, Francis and Kaplan Turbines.

Pumps

- a. Reciprocating pump-Introduction, Components and types of reciprocating pump, Coefficient of discharge, slip, Percentage slip and negative slip of reciprocating pump.
- b. Centrifugal pumps-Introduction, Component and types of centrifugal pump, Working of centrifugal pump and efficiency, Specific speed, Cavitation in centrifugal Pumps.

TEXT BOOKS

1. Modi and Seth, Fluid Mechanics and Hydraulic Machine , Standard Book House.
2. K. Subramanya, Theory and Application of Fluid Mechanics, Tata McGraw Hill.

REFERENCE BOOKS

1. W.B. Streeter, Fluid Mechanics, McGraw Hill Publications.

ELECTIVE-I

CE-326	WATER POWER ENGINEERING
MA- 302	FINITE ELEMENT METHODS IN ENGINEERING
CE-344	PAVEMENT DESIGN
CY-201	ENGINEERING MATERIALS

CE-326

WATER POWER ENGINEERING

(3-0-0)

MODULE-I (14Hours)

Hydropower: Introduction, Sources of energy, Hydro Power, Estimation of Hydropower Potential, Classification of Hydel power plants, Low head & High head plants, Run-of-river plants, Dam storage Power plants, Diversion canal power plants, Pump storage power plants, General arrangements of different Types of Power plants, Advantages and Disadvantages,

Electrical loads: General, Load Curve, Load Factor, Capacity Factor, Utilization Factor, Diversity factor, Load Duration curves, Firm power, Secondary power, Prediction of Loads.

MODULE-II (13Hours)

Water Conveyance Systems: Types of Water Conveyance Systems, Classifications of Penstocks, Economical diameter of Penstocks, Anchor Blocks, types of Valves, Bands and Manifolds.

Water Hammer, Resonance in Penstocks, Channel Surges, Surge Tanks, Intakes, types of Intakes, Losses in Intakes, Trash Rack, types of Trash Rack.

MODULE-III (13 Hours)

Hydel Powerhouse Plan, General Arrangements of Surface and Underground Power Stations.

Electrical and Mechanical Equipments in Hydel Powerhouses, Hydraulic features of Turbines, Turbine size, Draft tube.

TEXT BOOKS

1. M.M. Dandekar & K.N. Sharma ,Water Power Engineering , Vikas Publishing House, New Delhi
2. R. S. Varshney ,Hydropower Structures, Nem Chand & Bros

REFERENCE BOOKS:

1. P.S. Nigam ,Hydropower Handbook, Nem Chand Bros
2. Emil Mosoyoni , Hydropower Handbook
3. Gruthree Brown, Hydro Electric Engineering, Vol. I & II

ME-302

FINITE ELEMENT METHOD

(3-0-0)

MODULE – I (14 hours)

Introduction; Discretisation; Shape functions for linear and quadratic elements in one-dimension, two-dimensions and three-dimensions; Isoparametric elements; Serendipity elements; Strain-displacement matrix; Jacobi operator; Treatment of boundary conditions in finite element equations.

Stress and equilibrium; Boundary conditions; Strain-displacement relations; Stress-strain relations; Temperature effects; Potential energy and equilibrium, Rayleigh-Ritz method; Galerkin's method; Principle of virtual work.

Module – II (12 hours)

Finite element analysis of one-dimensional rods; Element stiffness matrix and load vector for 2-noded bar element and 3-noded bar element; Global stiffness matrix and global load vector; Multipoint constraints. Plane trusses; Beam and frames.

Module – III (10 hours)

One and two-dimensional steady state heat transfer; Torsion; Steady state irrotational fluid flow.

TEXT BOOK

1. Chandrupatla T.R. & Belegundu A.D., Introduction to finite element in engineering, Pearson Education Inc.

REFERENCE BOOKS

1. Segerlind L.J., Applied finite element analysis, John Wiley
2. Cook R.D., Finite element modeling for stress analysis, John Wiley & Sons, NY

CE-344**PAVEMENT DESIGN****(3-0-0)****MODULE—I (13Hours)****Geometric Design of Highways**

Design aspects of Horizontal and Vertical alignments, Interrelationship between geometric elements in rural and urban roads, Variations in geometric standards between plains and hilly regions – Special curves, Design aspects of Intersections and Grade separations, Traffic Rotaries

MODULE—II (15Hours)

Fly over, Cloverleaf junctions and speed change lanes

Structural Design

Theories of Pavement Design, Factors affecting Pavement Design, Wheel Load and Axle Loads, Methods of Flexible Pavement Design, I R C guidelines for design of flexible and rigid pavements, Load and Temperature stresses in Rigid Pavements, Design aspects of joints in Rigid Pavements

MODULE—III (12Hours)

Evaluation of Pavement distress, Design aspects of Flexible and Rigid Overlays. New concepts in pavement design and computer aided applications

TEXT BOOKS

1. Khanna and Justo, Highway Engineering, Nemchand & Brothers
2. L. R. Kadiyali, Principles of Highway Engineering and Practice, Khanna Publishers

REFERENCE BOOKS

1. Yoder and Warwick, Principles of Pavement Design, Tata Mc Graw Hill
2. I R C and other relevant codes
3. P .H. Wright and K. K. Dixon, Highway Engineering, Mc Graw Hill

CY – 201**ENGINEERING MATERIALS****(3-0-0)****MODULE – I (16Hours)****Fuel and combustion:**

Classification, calorific value, Solid fuels (Analysis of coal, manufacture of metallurgical coke), Liquid fuels (Refining of crude oil: fractional distillation, cracking, reforming, knocking, octane number and cetane number), Gaseous fuel (Producer gas, water gas, Biogas, LPG), Combustion calculations.

Water treatment :

Hardness of water & its determination (EDTA method), Types of hardness, Disadvantages of hard water in boiler, Softening techniques (Soda lime, Zeolite and ion-exchange processes), Purification of Drinking water.

MODULE –II (12Hours)**Inorganic Engineering Materials:**

1. Glass: Manufacture of glass, Types.
2. Ceramics: White wares, glazing, optical fibres.
3. Refractories: Classification, manufacture of silica, fire clay and carborundum bricks.
4. Abrasives: Natural and artificial (carborundum, Alundum, Norbide).

Bio & Conducting polymers:

Bio-polymers (Starch, Cellulose), Conducting polymers (Polyacetylene, Polyaniline) Properties and application.

MODULE – III (14Hours)**Composites :**

Constituents of Composites, Types of composites fibre - Reinforced composites, (Fiberglass, Advanced composites, wood) , Aggregate composites , mechanical properties of composites. Processing of composites.

Chromatography :

Thin layer chromatography, Gas-liquid chromatography, Column chromatography, High Performance Liquid Chromatography (HPLC).

TEXT BOOKS

1. Jain & Jain, Engineering chemistry , 15th Edition, Dhanpat Rai Publishing Co., 2007.
2. Shackelford & Muralidhara:, Introduction to Materials Science for Engineers , Sixth Edition 2007, Pearson Education.

REFERENCE BOOKS

1. Materials Science and Engineering, W.D Callister, Wiley sons Inc.
2. Principles of Materials Science and Engineering, W.F Smith, Mc. Graw Hill International edition
3. Chemistry in Engineering and Technology, J.C.Kuriacose and R.Rajaram , Tata Mc Graw Hill Publication.

5th & 6th Semester Sessionals

CE-371 ENVIRONMENTAL ENGINEERING LAB (0-0-3)

1. Physical characteristics: colour, temperature, turbidity, pH
2. Determination of solids, SS, TDS
3. Determination of alkalinity
4. Free mineral acidity & dissolved CO₂
5. Total calcium & magnesium hardness
6. Optimum dose of coagulant by jar test apparatus
7. Biochemical oxygen demand
8. Chlorine demand-break print chlorination
9. Available chlorine in bleaching powder
10. Determination of hexavalent chromium & total chromium

CE-373 CONCRETE STRUCTURE DESIGN PRACTICE-I (0-0-3)

Structural Analysis and Design of a multi storied building (super structure and sub structure) including reinforcement detailing. Introduction to STAAD Pro package:

Problem analysis of plane frame and trusses in STAAD – Plane analysis & design of a building in STAAD – Space.

CE-375 TRANSPORTATION ENGINEERING DESIGN PRACTICES (0-0-3)

Group A:

1. Design of Flexible and Rigid Pavements by IRC Methods.
2. Design of Horizontal and Vertical Curves supported by drawings.
3. Designing of Extra Widening and superelevation at horizontal curves based on case studies.
4. Overlay design of pavement.

Group B:

Traffic Studies:

1. Based on Origin – Destination Survey Data, to prepare the Desire Line Diagram showing the flow volumes.
2. Collection of Traffic Data at: a) any Junction, b) any intersection and c) any rotary and to show the flow values with the direction of flow and determination of capacity.
3. Parking Studies.

CE-372 STEEL STRUCTURE DESIGN PRACTICE (0-0-3)

1. Analysis and design of a roof truss for an industrial building including end connection.
2. Design of columns, columns bases and Grillage foundation.
3. Design of gantry girder of an industrial building.
4. Design of Pressed type overhead water tank including staging & foundation.

CE-370 ENVIRONMENTAL ENGINEERING DESIGN PRACTICE (0-0-3)

1. Design of distribution network
2. Design of water treatment plant
3. Design of sewerage system
4. Design of sewage treatment plant

CE-374 SURVEY FIELD WORK – II (0-0-3)

Part-I

1. Tacheometric survey.
2. Building plan layout.
3. Lay out of simple, compound and transition curve.
4. Determination of Horizontal and Vertical distances using Total station
5. GPS survey.

Part-II

1. GIS laboratory.

CIVIL ENGINEERING

7th semester				8th semester			
<i>Subject Code</i>	<i>Theory</i>	<i>Contact Hours). L-T-P</i>	<i>Credit C</i>	<i>Subject Code</i>	<i>Theory</i>	<i>Contact Hours). L-T-P</i>	<i>Credit C</i>
CE-401	Disaster Management	3-0-0	3	HS-402	Principles and Practices of Management	3-0-0	3
CE-411	Concrete Structure	3-1-0	4	CE-462	Estimation & Construction Management	3-0-0	3
CE-421	Water Resources – II	3-0-0	3	CE-402	Mechanics of Solids – II	3-0-0	3
CE-4EL	Elective-II	3-0-0	3	CE-4EL	Elective – IV	3-0-0	3
CE-4EL	Elective-III	3-0-0	3	CE-4EL	Elective-V	3-0-0	3
Total		16	16	Total		15	15
<i>Practicals / Sessional</i>				<i>Practicals / Sessional</i>			
CE-471	Concrete Structure Design – II	0-0-3	2	CE-492	Seminar	0-0-2	1
CE-473	Water Resources Design	0-0-3	2	CE-494	Major Project	0-0-10	7
CE-491	Seminar – I	0-0-2	1	CE-496	Comprehensive Viva-Voce	0-0-3	2
CE-493	Minor Project	0-0-5	3				
CE-495	Summer Training	0-0-3	2				
Total		16	10	Total		15	10
Grand Total		32	26	Grand Total		30	25

MODULE –I (12Hours)

Hazards and Disaster- Meaning and Concept. The Concept of Disaster Management and Major requirements for coping with Disaster

Types, Occurrences, Characteristics and Counter Measures of the Disasters (Earth quake, Flood, Cyclone, Drought, Volcanic Eruption, Tsunami, Landslides, bushfire, Epidemic)

MODULE II (14Hours)

The Concept of Disaster Management Cycle: Post Disaster Review, Prevention (Needs, Problem Areas, Positive Approaches, Relevant Resources) Mitigation (Guiding Principles, Problem Areas, Requirements, Major Mitigation Components, Relevant Resources, Formulation and Implementation of Mitigation Programs), Preparedness (The Nature of Preparedness, Problem Areas, Preparedness Needs, Maintenance of Preparedness Levels, Funding, Warning Aspects, Precautionary Measures Prior to Disaster Impact, Relevant Resources), Disaster Impact, Response (Characteristics, Problem Areas, Requirements, Follow on, Relevant Resources) Recovery (The basis for Recovery Action, Problem Areas, Major Requirements, Human Factors, Relevant Resources) Development (Impact on National Development, National Development and Disaster Management Policy)

MODULE III (14Hours)

Public Health and its role in Disaster Management: Public health systems, Health promotion and disaster prevention,

Areas of Public Health: Community and Family Health, Global Health, Environmental and Occupational Health, Epidemics

Introduction to risk evaluation: Definition of risk and fundamentals of risk analysis, environmental hazards, exposure and risk assessment, risk evaluation and management, Basic methodology in risk assessment, Dispersion analysis, and HAZOP study. Risk assessment applications for disaster mitigation and management problems.

The Disaster Management Support Requirements : Training, Public Awareness and Research The Role of Community, Government, NGOs and International Agencies in Disaster Management.

Case Studies of Major Disasters: Earthquake, Cyclone, Flood and Drought (From India and Abroad)

TEXT BOOKS:

1. Jon Ingleton (Ed), Tulor Rose , Natural Disaster Management, , 1999
2. R.B. Singh (Ed), Disaster Management, Rawat Publications, 2000.
3. Sachindra Narayan, Anthropology of Disaster Management, Gyan Publishing House, 2000.

REFERENCE BOOKS:

1. Lyenger CBRI, Natural Hazards in the Urban Habitat, Tata McGraw Hill
2. Egbort Bocker and Rienk Van Grondille, Environmental Physics, John Wiley & Sons Ltd., 1999.
3. W. Murk et. al., Environmental Geology , John Wiley & Sons, New York, 1996.
4. Goel S.L. and Kumar Ram, Disaster Management , Deep and Deep Publications, 2001

CE-411 CONCRETE STRUCTURE DESIGN – II (3-1-0)

MODULE – I (13 Hours)

Design of combined footing, Rectangular and trapezoidal type, strap footing, raft or mat foundation, Design of Retaining Wall, Cantilever and counterfort type retaining wall by limit state method.

MODULE – II (13 Hours)

Principles of prestressing and its application to beams, water tank, underground and overhead tank (Intze Tank)

MODULE – III (14 Hours)

Earthquake Engineering

Introduction – Occurrence of earthquake, types and characteristics of seismic waves, Intensity and Magnitude.

Earthquake Resistant Design – Computation of seismic forces as per IS 1893 – 2000, analysis of simple plane frames for earthquake forces by portal method.

Detailing of structures as per IS 13920 – 2000 with some simple problems.

TEXT BOOKS

1. P. C. Vergese, Advanced Concrete Structure, PHI
2. Limit state design of Concrete Structure (as per IS:456 – 2000), B. C. Punmia, A. K. Jain & A. K. Jain, Laxmi Publishers
3. Design of Reinforced Concrete Structure - B. C. Punmia, A. K. Jain & A. K. Jain, Laxmi Publishers
4. Earthquake Resistant Design of Structures - Pankaj Agarwal and Manish Shrikhande ,PHI

REFERENCE BOOKS

1. S. K. Duggal, Earthquake Resistant Design of Structures , Oxford Publishers
2. P. Dayaratnam, RCC Structure, Oxford & IBH
3. Krishna Raju, Advanced Concrete Structure, CBS Publishers & Distributers

CE-421 WATER RESOURCES ENGG – II (3-0-0)

MODULE-I (14 Hours)

Dams : Selection of a dam site, types and selection of dams, earth dams, gravity dams, arch dams, reservoirs and planning of dam reservoirs, check dams.

Canal Regulation Works : Introduction, location of canal falls, type of canal falls, Hydraulic design of different type of falls, Head Regulators, Cross Regulators, Escapes.

MODULE-II (13 Hours)

Cross Drainage Works : Introduction, necessity of cross drainage works, types and selection of cross drainage works, Hydraulic Design of different cross drainage works.

Diversion Head Works : Layout of a diversion headwork and its components, types of diversion head works, theory of seepage, Weirs and Barrages and their various features, Hydraulic Design of Weirs and Barrages,

MODULE-III (13 Hours)

Discharge Facilities

Spillways, Location and types of spillways, various spillway gates, energy dissipaters below spillway, Hydraulic Jump type Stilling Basins, Inlet & Outlet works, Types & Function of intake and outlets. Trash racks.

TEXT BOOKS:

1. K. Subramanya, Engineering Hydrology, Tata McGraw-Hill Publishing Company Ltd, NewDelhi
2. Bharat Singh, Fundamentals of Irrigation Engineering, Nem chand & Bros, Roorkee,
3. Santosh Ku. Garg, Irrigation Engineering and Hydraulic Structures, Khanna Publishers, Delhi

REFERENCE BOOKS:

1. R. K. Sharma and T.K. Sharma, Irrigation Engineering, S. Chand & Company New Delhi.
2. K. Subramanya, Water Resources Engineering through objective questions, Tata McGraw-Hill Publishing Company Ltd, NewDelhi

ELECTIVE-II

CE-413	STRUCTURAL DYNAMICS
CE-441	ENVIRONMENTAL GEO-TECHNIQUES
CE-423	GROUND WATER ENGINEERING
IT-401	ESSENTIALS OF IT

CE- 413

STRUCTURAL DYNAMICS

(3-0-0)

MODULE – I (12 Hours)

Undamped Single Degree of Freedom System:

Degree of freedom, undamped system, frequency and period, amplitude of motion.

Damped Single Degree of Freedom System:

Viscous damping, critically damped system, over damped system, under-damped system, logarithmic decrement.

MODULE – II (15 Hours)

Response of SDOF system to Harmonic Loading:

Undamped harmonic excitation, damped harmonic excitation, response to support motion, force transmitted to foundation, vibration isolation.

Response to General Dynamic Loading:

Impulsive loading & Duhamel's Integral

Response Spectra: Construction of response spectrum, response spectrum for support disturbance.

MODULE – III (13 Hours)

Multi Degree of Freedom System:

Natural frequency, Normal modes, Orthogonality principle, Forced vibration – Modal superposition method, response to base motion.

Dynamic Analysis of Beams

TEXT BOOKS:

1. Mario Paz, Structural Dynamics , CBS Publisher
2. A.K. Chopra, Structural Dynamics, Pearson Education

REFERENCE BOOKS:

1. Rao. V. Dukhipati, Theory of Vibration , PHI
2. W. T. Thomson, Theory of Vibration, Prentice Hall
3. Dr. V. P. Singh, Mechanical Vibration, Dhanpat Rai & Sons

CE-441

ENVIRONMENTAL GEO-TECHNIQUES

(3-0-0)

MODULE – I (12 Hours)

Introduction: Scope, Importance, Waste generation, Subsurface contamination, site selection, environmental consideration, remediation.

MODULE – II (14 Hours)

Types of wastes & usage: Municipal waste, mineral waste, industrial waste, hazardous waste, index properties, strength, compressibility & permeability of municipal & mineral wastes

Usage in road construction, building material, aggregate, cement.

MODULE – III (14 Hours)

Disposal: Land fills for municipal & hazardous waste, components of land fills, layouts, daily cells, Basal lining systems, stability of slopes, ash & mine tailing impoundments, slurry deposition of mine tailing & coal ash in impoundments, layout components, design of tailing dam/ash dykes, geosynthetics, types, application, advantage & disadvantage.

TEXT BOOKS

1. I.S. Oweis & R. P. Khera , Geotechnology of waste management , Butter Worths, London.

REFERENCE BOOKS

2. D. E. Daniel, Geotechnical practice for waste disposal, Chapman & Hall, London
3. Ed. G. V. Rao & G.V.S.S. Raju, Engineering with Geosynthetics, Tata McGraw Hill

CE-423 GROUNDWATER ENGINEERING (EL-II) 3-0-0

MODULE-I (14Hrs.)

Introduction: role of groundwater in the hydrologic cycle, problems and perspectives

Occurrence and movement of groundwater: origin, age, distribution, surface and subsurface investigation of groundwater. Hydrogeology of aquifers, aquifer characteristics, classification of aquifers Darcy's law and its limitations, flow characteristics, general flow equations, flow through saturated porous medium, unsaturated flow, flow nets and its uses

Steady and unsteady radial flows into wells in confined, unconfined and leaky aquifers, Theis, Jacob and Chow's method

MODULE-II (13Hrs.)

Multiple well systems, partially penetrating wells, characteristic well losses, specific capacity

Water wells: design, methods of construction, completion and development, pumping test on wells to determine safe yield, protection, maintenance and rehabilitation of wells Quality of groundwater: measures of quality, groundwater samples, physical, chemical and biological analyses, water quality criteria, and salinity Pollution of groundwater: sources and causes, distribution, attenuation, evaluation and monitoring, remediation, Optimal pumping for contamination control

MODULE-III (13Hrs.)

Saline water intrusion in aquifers: occurrence, shape and structure of the interface, control of saline water intrusion Natural and artificial recharge of groundwater: Concepts, recharge methods, recharge mounds, induced recharge Development and management of Groundwater: Concepts of basin management, groundwater basin investigations, consumptive use, mathematical modeling, examples

TEXT BOOKS

1. Kr Karnath, Ground Water Assessment and Management, Tata Graw Hill
2. K.K. Watson, Ground Water Hydralogy,John,Wiley

REFERENCE BOOKS

1. D.K. TOOD, Ground Water Hydrology , John Wiley & Sons
2. Jacob Beer, Ground Water Hydrology, KLWER Academic Publisher

IT-401 ESSENTIALS OF IT (3-0-0)

MODULE-I (10 Hours)

Fundamentals of Computer Architecture-Introduction-Organization of computer, Central Processing Unit-Execution Cycle- Instruction categories- measure of CPU performance, Memory-Input/Output devices-BUS- addressing modes, System software-Assemblers-Loaders and Linkers-Compilers and

Interpreters, Operating system-Introduction- Process management scheduling-Memory management-Threads. Problem Solving with Algorithms, analysis of algorithms-Asymptotic notations

MODULE-II (12 Hours)

RDBMS-data processing-the database technology-data models, ER-modelling concepts-notations-Extended ER features, Logical database design-Normalization, SQL-DDL statements-DML statements-DCL statements, SQL tuning techniques. Objects oriented concepts-object oriented programming, UML class Diagrams-relationships-Inheritance-Abstract classes-Polymorphism, and Object Oriented Design methodology.

MODULE-III (08 Hours)

System Development Methodologies-Software Development Models, Components of Web Application-Browsers and Web servers, World Wide Web, URL-HTML-HTTP protocol-Web Applications-Application Servers-Web Security.

1. Table Creation and Queries using SQL
2. A Simple project on Database Design
3. Design the Bio- Data From using HTML

All the assignments will be done in the Computer lab.

TEXT BOOKS

1. Abraham Silberschatz and Peter Bear Galvin :, Operating system concepts , Addison welsley.
2. David A. Patterson, John L. Hennessy, Computer Organisation & Design, Elsevier.
3. R. Elmasri, S. Navatne, Fundamental of Database Systems, 4th Edition, Pearson Education.
4. Blaha, Rumbaugh, Object-oriented Modelling & Design with UML, PHI

REFERENCE BOOK

1. Infosys course materials.

ELECTIVE-III

CE-415	BRIDGE ENGINEERING
CE-425	WATER RESOURCES PLANNING AND MANAGEMENT
CE-443	ADVANCED FOUNDATION ENGINEERING

CE-415**BRIDGE ENGINEERING****(3-0-0)****MODULE-I (14 Hours)**

Bridge Superstructure:

Loads for design in Highway and Railway Bridge, Design of bridge slabs by Pigards, Westergaard and effective width methods

MODULE-II (13 Hours)

R.C.C. Girder bridges: Load distribution on girders, Design of tee and hollow girders, balanced cantilever bridges

Steel Bridges: Pratt and Warren girder, design principles of roller and rocker bearing and R.C.C. hinge bearings**MODULE-III (13 Hours)****Substructure:**

Loads and stresses in piers and abutments , Stability Considerations,

Design of solid masonry and column type of piers and abutments,

Design of well and pile foundation.

TEXT BOOKS

- 1.D.J. Victor,Essentials of Bridge Engg ,Oxford & IBH
2. S. Ponnuswamy, Bridge Engineering, Tata McGraw Hill

REFERENCE BOOKS:

2. Bridge Engineering- N.Krishna Raju
3. IRC and IRS Bridge Codes
4. R.C.C. and Steel design hand books

CE-425 WATER RESOURCES PLANNING AND MANAGEMENT (3-0-0)**MODULE – I (13 Hours)**

Introduction: Role of water in national development, assessment of water resources of country, scope of water resources development in context of environment. Water resources planning process, planning for single purpose and multipurpose projects, estimation of different water needs and project formulations, comparison of alternatives, cost benefit analysis.

MODULE – II (13 Hours)

Introduction to Optimization techniques and systems approach, Planning of Reservoir, Reservoir Operation

Irrigation Management, Various Concept of Irrigation Management, Warawandi System, PIM, Volumetric measurement of Irrigation supply, Bench Marking,

MODULE – III (14 Hours)

Evaluation and monitoring of water quality and quality managing water distribution networks for irrigation, flood control and power generation, inter-basin transfer of water

Conjunctive use of surface and ground water, water quality and quality modeling, evaluation of impacts of water resources projects on river regimes and environment, reservoir sedimentation, watershed management and surface water conservation practices.

TEXT BOOKS

1. A.S. Gordman, Principle of Water Resources Planning, Prentice Hall
2. R.K. Linsley and J. B. Franzini, Water Resources Engineering, McGraw Hill

REFERENCE BOOKS

1. Loucles , Water Resources systems planning and Analysis stedinger Haith.
2. James and Lel , Economics of water Resources planning
3. S.K. Gang ,Water Resources planning ,Khanna Publishers

CE-443

ADVANCED FOUNDATION ENGG

(3-0-0)

MODULE-I (13 Hours)

Soil Dynamics: Introduction, types of machine foundation, single degree of freedom system, degrees of freedom of a block foundation, free and forced vibration with & without damping of SDOF system, vibration isolation of foundation.

Dynamic Earth Pressure: Pseudo-static method, displacement analysis.

MODULE-II (13 Hours)

Foundations on difficult soil

Expansive soil: General, Laboratory measurement of swell, classification of expansive soil based on index test, foundation consideration for expansive soil, construction on expansive soil.

Collapsible soil: Definition and types, physical parameters for identification, calculation of collapse settlement, foundation design in soils susceptible & not susceptible to wetting, case history.

MODULE-III (14 Hours)

Dynamic bearing capacity of Shallow Foundations: Pseudo-static analysis, bearing capacity of footings, dynamics analysis.

Dynamic Earth Pressure: Pseudo-static method, displacement analysis.

Liquefaction of Soils: Mechanism of liquefaction, evaluation of zone of liquefaction in field.

Sheet pile walls: Cantilever and anchored sheet pile walls, methods of analysis, Braced cuts: General, pressure envelop for braced cut design, design of various components of a braced cut, bottom heaving of a cut in clay, stability of the bottom of a cut in sand, case studies.

TEXT BOOKS

1. Swami Saran , Soil Dynamics and Machine Foundation,
2. B. M. Das, Principle of Soil Dynamics, Thomson Learning Publisher.
3. D.D. Barkan , Dyanamics of Bases and Foundation,

REFERENCE BOOKS

1. P. Srinivasulu and C.V. Vaidyanathan , Handbook of Machine Foundation
2. P.C. Varghese , Foundation Engineering , Prentice Hall India Ltd.
3. I. Q. Khan.,Textbook of Geotechnical Engineering , Tata Mc. Graw Hill

MODULE-I (12 hours)

Introduction to Management: Science, Theory and Practice; Importance and Scope of Management; Evolution of Management Thought; Management and Environment-Environmental Impact on the Management Process; Globalisation and Business Environment; Social Responsibilities and Obligations of Business Management.

Importance of Management in Engineering and Technology - Critical Factors in Managing Technology, Management of Technology and Global Competitiveness, Formulation of a Technology Strategy; Creating the Product-Technology-Business Connection, Technology Planning, Technology as an Instrument of Competition.

MODULE-II (12 hours)

The Process of Management; Planning – Essentials of Planning and Managing by Objectives, Strategies, Policies, Planning Perishes, and Decision Making; Organising – Principles of Organization, Organization Structure, Effective Organizing and Organization Culture; Directing – Crisis Management and Corporate Governance; Staffing – Selection, Training, Development, Appraisal, Knowledge Management; Controlling – The System and Process of Controlling, Control Techniques and Information Technology.

MODULE-III (12 hours)

Functions of Management – Marketing Function of Management, Morden Concept of Marketing, Functional Classification of Marketing, Marketing Mix, Fundamental Needs of Customers, Role of Distribution Channels and Advertising; Financial Functions of Management – Concept of Financial Management, Project Appraisal, Tools of Financial Decision Making, Introduction to Short-Term and Long-Term Sources of Financing.

TEXT BOOKS

1. Harold Koontz and Heinz Weihrich, Essentials of Management, Tata McGraw Hill, 8th Edition, 2010.
2. C. R. Basu, Business Organisation and Managemnt, Tata McGraw Hill, 3rd Reprint, 2008.
3. Tarek Khalil, Management of Technology, Tata McGraw-Hill Edition, 2009.

REFERENCE BOOKS

1. C. B. Gupta, Management – Theory and Practice, 14th Edition, S. Chand & Sons, 2009.
2. I. M. Pandey, Financial Management, Vikas Publications, 9th Edition, 2009.

CE-462 ESTIMATION & CONSTRUCTION MANAGEMENT (3-0-0)**MODULE-I (14Hours)**

Introduction, different types of estimates, approximate estimate, importance and purpose of approximate estimate, methods of building estimate and details of estimate of single storey building including R.C.C. works, doors, windows and other fittings.

Estimation of roads earthwork

Analysis of rates, quantity of materials per unit rate of work, estimating labour, task of outturn work, quantity of materials required, rates of materials and labour, cost index, plinth area rate, analysis of earthwork, brickwork, concrete work etc.

MODULE-II (13Hours)

Methods of measurement of works: General rules, unit of works, Estimation of building project

CPM and PERT: Introduction, elements of network, network rules, constraints, error in network, activity time and floats, critical path analysis of a PERT network, probability of completion of project, resource allocation and resource leveling, updating, controlling and monitoring, bar chart vs. network, modular coordination, I.S. recommendations for modular coordination

MODULE-III (13Hours)

Contract: public works contract, tender, work order, contract document, earnest money, retention money, security deposit, conditions of contract for different work, termination or determination of contract, subletting of contract, Muster Roll Form I, II and III

Valuation: introduction, different methods of valuation, valuation and rent fixation, valuation report preparation.

Safety in construction: Introduction, hazards, need for accident prevention, causes of accident, salient features of a safety program, protective equipments, accident report, safety measures in construction and demolition of buildings, scaffolding, ladders, frameworks etc, safety measures for excavation, fire safety in buildings, safety measures for hot bituminous works.

TEXT BOOKS:

1. Purifoy , Construction Management,Mc Graw Hill
2. B.N.Dutta, Estimating and Costing in Civil Engg.-Theory and Practice, UBS Publication
3. U.K. Srivastava, Construction, Planning and Management , Galgotia Publication

REFERENCE BOOKS:

1. M.Chakraborty , Estimating, costing, specification and valuation in Civil Engg,UBS Publication
2. B. C. Punmia , Building Construction - Laxmi Publication
3. B.C. Punmia and K.K. Khandelwal Project, Planning and Control with PERT and CPM, - Laxmi Publication

CE-402**MECHANICS OF SOLIDS – II****(3-0-0)****MODULE – I (12 Hours)**

Thick Cylinders

Lame's equation for stresses in a thick cylinder, compound cylinder, shrink fit

MODULE – II (14 Hours)

Unsymmetrical bending, shear center , Curved bars

Stresses in a bar with small and large initial curvature, application to crane hook, chain link and closed rings. Curved beams subjected to loads normal to its plane

MODULE – III (14 Hours)

Introduction of Theory of Elasticity

Equation of equilibrium, compatibility equation, stress function (for plane stress and plane strain problem in cartesian coordinates)

Repeated stress and Fatigue in metals, Concept of stress concentration.

TEXT BOOKS

1. Kumar & Ghai, Advanced Mechanics of Material, Khanna Publishers

2. G.H. Ryder, Strength of Materials, Orient Longman

REFERENCE BOOKS

1. D.S. Bedi Strength of Materials, Khanna Publishers

2. L.S. Srinath, Advanced Mechanics of Solids, Tata McGraw Hill

3. Timoshenko, Strength of Materials. Vol. I & II, East West Press

ELECTIVE-IV

CE-432 ENVIRONMENTAL IMPACT ASSESSMENT AND AUDITING

CE-452 TRANSPORTATION PLANNING & TRAFFIC ENGINEERING

CE-444 GROUND IMPROVEMENT TECHNIQUES

CE-432 ENVIRONMENT IMPACT ASSESSMENT & AUDITING (3-0-0)

MODULE – I (14 Hours)

Evaluation of Environmental legislation in India. EIA notification in India. Environmental Clearance of projects in India. ISO 14000 – Environmental Management System Life Cycle Assessment.

Environmental impact assessment methodologies. Subjective assessment study by Matrix and Network method. Use of mathematical models in quantitative impact analysis.

MODULE – II (16 Hours)

Air quality impact analysis & management plan. National ambient Air Quality Standards (NAAQS), Primary and secondary air pollutants, Air pollutant dispersion, Air quality impact prediction and Air Quality Management Plan. Water and wastewater management, Water quality parameters and discharge standards. Impact on water sourcing and quality. Water and wastewater management., Solid waste management, Municipal solid waste, industrial solid waste and hazardous waste. Solid waste impact assessment and management plan., Impact assessment and management plan for other Environmental parameters like noise, ecology and socioeconomic aspects etc.

MODULE – III (10 Hours)

Case study – Integrated steel plant, Thermal Power plant, iron ore mining.

TEXT BOOKS

1. L. Canter, Environmental Impact Assessment, Tata McGraw Hill, New Delhi
2. Rau & Wooten, Environmental impact analysis hand book, Tata McGraw Hill, New Delhi

REFERENCE BOOKS

1. MoEF, Environmental Impact Assessment Manual, New Delhi
2. V. Kulkarni and T. V. RamChandra, Environmental Management, Capital publishing house, New Delhi

CE-452 TRANSPORTATION PLANNING & TRAFFIC ENGINEERING (3-0-0)

MODULE -I (14 Hours)

Transportation Systems, Traffic as a Component of/ a subsystem of Transportation System., Traffic Engg. Definition: Organisation of the Traffic Engg. Dept.; importance under Indian Conditions. , Road User Characteristics, Human factors governing road user behavior. Vehicle Characteristics. Characteristics of Indian Traffic. Planning for pedestrian and bicycle traffic.

MODULE II (13 Hours)

Speed, Journey Time, Delay surveys. Traffic Flow parameters. Speed, Density and Volume relationships.

Parking: Types, Surveys and Analyses. Facilities for Parking. Parking Regulations and Traffic Management Measures. Capacity Analysis: Capacity of Freeways and Express ways in rural areas.

MODULE III (13 Hours)

Study of: Traffic Junctions, Inter Sections and Inter Changes. Design of Rotary/ Roundabouts.

A transport planning morphology. Travel Demand Analysis and Forecasting. Levels of Urban Transportation Planning, Brief Outline of Systems Approach. Trip Generation, Distribution and Modal split Models.

Brief exposure Fto: Simulation Models, Fuzzy Logic and Genetic Algorithms.

TEXT BOOKS:

1. LR Kadiyali, Traffic Engg. & Transport Planning, Khanna Publishers
2. BG Hutchinson, Principles of Urban Transport Systems Planning.

REFERENCE BOOKS

1. Donald Drew, Traffic Flow Theory, Tata Mc. Graw Hill
2. Whol & Martin, Transportation Systems Analysis for Engineers & Planners., Mc Graw Hill

CE-444 GROUND IMPROVEMENT TECHNIQUES (3-0-0)**MODULE – I (14 Hours)**

Introduction, Necessity of ground improvement, Dewatering, methods, Analysis and design of dewatering systems.

Grouting types, Properties, Method of grouting, Ground selection and control.

MODULE – II (13 Hours)

Compaction, Methods of compaction, Engineering prosperities of compacted soil, Field compaction and its control, Soil stabilization, Use of chemical additives.

MODULE – III (13 Hours)

Stone columns, Principle, Design and method of installation, Soil nailing.

Reinforced earth, Concept, Materials, Application and design, Use of geo-synthetics and geo-cells in construction work.

TEXT BOOKS

1. M.J. Tomlinson, Foundation Design and Construction
2. G.A. Leonard, Foundation Engineering, Tata McGraw Hill
3. Alam Singh, Modern Geotechnical Engineering, IBT Publishers

REFERENCE BOOKS

1. Principles of foundation design- B.M. Das- PWS Publishers

ELECTIVE-V

CE-446	ROCK MECHANICS AND TUNNELLING
CE-404	GIS AND REMOTE SENSING
CE-412	PRE-STRESSED CONCRETE DESIGN

CE-446 ROCK MECHANICS AND TUNNELING (3-0-0)

MODULE – I (13 hrs)

Sub-surface investigations in rocks and engineering characteristics or rocks masses. Structural geology of rocks. Classification of rocks.

MODULE – II (13 hrs)

Field and laboratory tests on rocks. Stress deformation of rocks. Failure theories and shear strength of rocks. Bearing capacity of rocks. Stability of rock slopes.

MODULE – III (14 hrs)

Opening in rocks – lined and unlined tunnels, pressure tunnels and tunnels for other purposes. Friction in rocks – time dependent properties of rock masses. Rock bolting and grouting.

TEXT BOOKS

1. C. Jagger and N.G.W. Cock, Fundamentals of rock mechanics, Blackwell Publisher
2. Obert, Leon and W.I. Duvall, Rock mechanics and design of structures in rock, John Wiley
3. I.W. Farmer, Engineering Properties of rocks, Barnes and Noble, New York

REFERENCE BOOKS

1. K.G. Stag and O.C. Zienkiewicz, Rock mechanics in engineering practice, John Wiley
2. Jumikis, Rock mechanics Vol. I & II, CRC Press

CE-404 GIS & REMOTE SENSING (3-0-0)

MODULE – I (13 Hours)

Introduction : Introduction & definition to RS, elements of RS, Active & passive RS, Electromagnetic radiation & their interaction with earth features & atmosphere, spectral windows & spectral signature History of RS, Sensors & Platforms.

Satellite RS : Earth resource satellites – types & characterization, thermal, multi spectral & microwave RS satellite image interpretation.

Digital image processing : Concept & principle, Pre-processing, Image Enhancement & classification, Image transformation.

MODULE – II (14 Hours)

Introduction & GIS Terminology: Introduction to GIS, concepts, terminology, components of GIS, Data in GIS, Data representation, Raster, vector, GIS software, advantages of GPS & GIS.

Database & Data Models: Database system DBMS, Data models, data structure, GIS database.

Process of GIS: Introduction, Data capture, Data source, Lining of spatial & attribute data, organizing data for analysis.

Geospatial analysis: Introduction Geospatial analysis, Integration & modeling of spatial data, Geospatial data analysis methods. Planning, Implementation & Management of GIS: Introduction, Planning of project, Implementation of project, Management of project, Keys for success.

MODULE – III (13 Hours)

Geologic application : Introduction to geospatial analysis, integration & modeling of spatial data, geospatial data analysis methods. Planning, Implementation & Management of GIS, Introduction, Planning of project, Implementation of project, Management of project, keys for success. Application of RS&GIS, Meteorological, Oceanographic & hydrologic application, Geologic application, Vegetation

application, Application in environmental studies, Disaster management, Transportation & Geotechnical Engineering, Rural-Urban planning.

TEXT BOOKS

1. Lilles and T.M. & Kiefu R.W., Remote Sensing and Image Interpretation ,John Wiley and Sons, New York, 1994.
2. B. Bhatta , Remote sensing and GIS ,Oxford Press
3. Floyd F. Sabins Jr.. , Remote Sensing, Principles and interpretation , W.H. Freemanes & Co., New York, 2nd Edition, 1987.

REFERENCE BOOKS

1. Stan Marany, GIS Solutions in Natural Resource Management , Onward Press, USA, 1999.
2. Longley, Geographical Information System (Vol.1 and Vol.2)- Goodchild et. al, John Wiley and sons, 1999.
3. Stan Arnoff, Geographical Information System: A Management Perspective-, WDL Publications, Canada, 1989

CE-412 PRESTRESSED CONCRETE DESIGN (3-0-0)

MODULE-I (12 Hours)

Prestressing Concept:

Materials: for Prestressed concrete, Basic principles, Prestressing systems, Pretensioning and post tensioning, Losses in prestress, Analysis of sections for flexure.

MODULE-II (14 Hours)

Design of beams: Analysis and design for bending and shear, short-term and long term.

Deflection of uncracked members.

Circular prestress, analysis and design of prestressed concrete pipe and water tanks.

MODULE-III (14 Hours)

Continuous beams: Design concept, concordancy of cables, primary and secondary Moment, design considerations, design of end blocks.

TEXT BOOKS

1. N.K. Raju, Prestressed concrete, Tata Mc Graw Hill.
2. P. Dayaratnam , Prestressed concrete structure, Oxford & IBH.

REFERENCE BOOKS

1. S. Ramamrutham, Prestressed concrete- Dhanpat Rai & Sons.
2. Design of prestressed concrete structure- Lin- CBS Publishers.
3. I.S. 1343-1980.

7th Semester Sessionals

CE-471 CONCRETE STRUCTURE DESIGN (0-0-3)

Practice –II

1. Design and detailing of Seismic resistant design and detailing of building structures
2. Design and detailing of overhead intz water tank
3. Design and detailing of strap foundation, raft foundation and pile foundation
4. Design and detailing of culverts

CE-473 WATER RESOURCES DESIGN PRACTICE (0-0-3)

1. Design of irrigation channel
2. Design of canal falls
3. Design of cross drainage works
4. Design of diversion head works (weirs and barrages)
5. Design of different types of dams
6. Design of different types of spillways