### COURSE STRUCTURE : IV B.Tech., I Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>SUBJECT</th>
<th>Periods/Week</th>
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<th>Max. Marks</th>
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33
## COURSE STRUCTURE: IV B.Tech., II Semester

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26
UNIT – I

UNIT – II
REMOTE SENSING – I: Basic concepts and foundation of remote sensing – Elements involved in remote sensing, electromagnetic spectrum – Spectral reflectance and spectral regions remote sensing terminology and units.

UNIT – III

UNIT – IV

UNIT – V

UNIT – VI
GIS SPATIAL ANALYSIS: Computational analysis methods (CAM) – Visual analysis methods (VAM) – Data storage – Vector data storage – Attribute data storage – Overview of the data manipulation and analysis – Integrated analysis of the spatial and attribute data.

UNIT – VII
WATER RESOURCES APPLICATIONS - I: Land use/Land cover in water resources – Surface water mapping and inventory – Rainfall – Runoff relations and runoff potential indices of watersheds – Flood and drought impact assessment and monitoring – Watershed management for sustainable development and Watershed characteristics.
UNIT – VIII

TEXT BOOKS

REFERENCES
UNIT – I
INTRODUCTION : Definition of terms – Sewage, sullage, refuse, garbage – Objectives of sewerage works systems of sewage collection and disposal – Conservancy systems – Water carriage systems – Merits and demerits - Sewerage systems – Combined, separate, partially separate and combined systems - Merits and demerits.

UNIT – II
QUANTITY OF SEWAGE : Estimation of quantity of municipal waste water – Estimation of quantity of storm water – Different types of sewers, design flows through sanitary sewers, storm sewers and combined sewers - Hydraulic design of sewers – Sewer appurtenances – House drainage and plumbing systems.

UNIT – III

UNIT – IV
PRELIMINARY AND PRIMARY SEWAGE TREATMENT : Concept of waste water treatment, primary, secondary and tertiary treatment – Conventional treatment process flow diagrams of municipal wastewater treatment plants – Functions of each unit principles and design of screens, grit chamber, and primary setting tanks.

UNIT – V

UNIT – VI
SLUDGE MANAGEMENT : Quantity and characteristics and types of sludge - Sludge conditioning and dewatering - Handling, treatment, sludge utilization and disposal - Tertiary treatment – Removal of nitrogen, phosphorus, refractory organic, heavy metals, suspended solids and pathogenic bacteria.

UNIT – VII
UNIT – VIII

TEXT BOOKS

REFERENCES
UNIT - I
RIVETED PLATE GIRDERS: Design of cross section - Curtailment of flange plates - Connection of flange angles to web and flange angles to flange plates - Design of vertical, horizontal and bearing stiffeners.

UNIT – II
WELDED PLATE GIRDERS : Design of cross section of plate girders - Design of vertical, horizontal and bearing stiffeners.

UNIT - III
ROOF TRUSSES : Different types of trusses – Design loads – Load combinations - IS Code recommendations - Structural details – Design of simple roof trusses involving the design of purlins, members and joints.

UNIT - IV
TUBULAR TRUSSES : Design of tension members, compression members and flexural members – Tubular trusses – Connections.

UNIT – V
GANTRY GIRDER : Gantry girder impact factors - Longitudinal forces - Design of gantry girders.

UNIT – VI

UNIT – VII
STEEL - CONCRETE COMPOSITE CONSTRUCTION : Design principles – Shear connections – Composite beam design.

UNIT – VIII
PLASTIC ANALYSIS : Introduction to plastic analysis –Shape factor, plastic hinge, collapse loads for simply supported beams, propped cantilevers, and two span continuous beams - Design simple beams.

TEXT BOOKS
2. N. Subramanian, Design of Steel Structures, 1st Edition, Oxford University Press, 2010
REFERENCES

IS Codes: IS -800 – 2007, IS – 875 – Part III and Steel Tables are to be permitted into the examination hall.
UNIT - I
INTRODUCTION TO TRAFFIC ENGINEERING: Significance and scope - Characteristics of vehicles and road users - Skid resistance and braking efficiency (Problems) - Components of traffic engineering - Road, traffic and land use characteristics

TRAFFIC CHARACTERISTICS: Basic characteristics of traffic - Volume, speed and density - Relationship among traffic parameters.

UNIT-II
TRAFFIC MEASUREMENT : Traffic volume studies - Objectives - Types of volume studies – Concept of PCU- Data collection and presentation – Speed studies – Types of speeds - Objectives of speed studies - Methods of conducting speed studies - Data collection and presentation - Statistical methods for analysis of speed data - Origin and destination studies - Pedestrian studies - Basic principles of traffic flow.

UNIT-III
HIGHWAY CAPACITY : Definition of capacity – Importance of capacity – Factors affecting capacity - Concept of level of service - Different levels of service - Concept of service volume - Peak hour factor.

PARKING STUDIES : Types of parking facilities – On street and off street parking facilities - Parking studies - Parking inventory study – Parking survey by patrolling method - Analysis of parking data and parking characteristics - Multi storey car parking facility - Design standards.

UNIT-IV
TRAFFIC CONTROL AND REGULATION : Traffic problems in urban areas - Importance of traffic control and regulation - Traffic regulatory measures - Channelisation – Principle and design of intersections, grade separations and interchanges - Traffic signals – Saturation flow - Design of traffic signals and signal co-ordination (Problems) - Signal phasing and timing diagrams - Traffic control aids and street furniture, street lighting, computer applications in signal design.

UNIT-V
TRAFFIC AND ENVIRONMENT : Detrimental effect of traffic on environment – Air pollution – Pollutants due to traffic – Measures to reduce air pollution due to traffic - Noise pollution – Measures to reduce noise pollution.

UNIT-VI
TRAFFIC SIGNS AND ROAD MARKINGS : Types of traffic signs - Cautionary, regulatory and informative signs - Specifications - Pavement markings - Types of markings – Lane markings and object markings - Standards and specifications for road markings.
UNIT-VII
HIGHWAY SAFETY: Problem of highway safety - Types of road accidents - Causes - Engineering measures to reduce accidents - Enforcement measures - Educational measures - Road safety audit - Principles of road safety audit.

UNIT-VIII
TRAFFIC MANAGEMENT: Traffic management - Transportation system management (TSM) - Travel demand management (TDM) - Traffic forecasting techniques, restrictions on turning movements - One-way Streets - Traffic segregation - Traffic calming - Tidal flow operations - Exclusive bus lanes - Introduction to intelligent transportation system (ITS).

TEXT BOOKS

REFERENCES
1. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.
2. Guidelines of Ministry of Road Transport and Highways, Government of India.
UNIT - I

UNIT – II
TWO HINGED ARCHES : Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses - Tied arches – Fixed arches.

UNIT – III
CABLES : Equation of cable – Analysis of cables under uniformly distributed and concentrated loads - Cables supported at different levels - Length of cable – Effect of temperature changes on cables- Anchor cables.

UNIT-IV
SLOPE DEFLECTION METHOD : Analysis of single bay, single storey, portal frame including side sway - Shear force and bending moment diagrams.

UNIT – V
MOMENT DISTRIBUTION METHOD : Analysis of single bay, single storey portal frames including side sway – Shear force and bending moment diagrams.

UNIT – VI
FLEXIBILITY METHODS : Flexibility coefficients - Flexibility matrices - Sign convention - Application to continuous beams - Temperature stresses - Lack of fit – Support settlements.

UNIT – VII
STIFFNESS METHOD : Stiffness coefficients - Stiffness matrices – Application to continuous beams - Effect of support displacements– Temperature stresses.

UNIT – VIII
BEAMS CURVED IN PLAN : Circular beams loaded uniformly and supported on symmetrically placed columns – Semi-circular beams simply supported on three equally spaced supports.

TEXT BOOKS
REFERENCES
UNIT - I

UNIT – II
FREQUENCY OF SOIL SYSTEMS : Determination of viscous damping – Transmissibility - Systems with two and multiple degrees of freedom - Vibration measuring instruments.

UNIT – III

UNIT – IV
DYNAMIC SOIL PROPERTIES : Dynamic soil properties - Laboratory and field testing techniques - Elastic constants of soils - Correlations for shear modulus and damping ratio in sands, gravels, clays and lightly cemented sand - Liquefaction of soils.

UNIT – V

UNIT – VI
DESIGN OF MACHINE FOUNDATIONS : Analysis and design of block foundations for reciprocating engines - Dynamic analysis and design procedure for a hammer foundation - IS code of practice - Design procedure for foundations of reciprocating and impact type machines. UNIT – VII
MACHINE FOUNDATIONS ON PILES : Introduction - Analysis of piles under vertical vibrations - Analysis of piles under translation and rocking - Analysis of piles under torsion - Design procedure for a pile supported machine foundation.

UNIT – VIII
VIBRATION ISOLATION : Types and methods of isolation - Active isolation and passive isolation - Dynamic properties of isolation materials.
TEXT BOOKS


REFERENCES


IV B.Tech. I Semester

10BT70107: DESIGN AND DRAWING OF IRRIGATION STRUCTURES
(Elective)

L  T  P  C
4  1  -  4

Design and drawing of the following irrigation structures.

1. Surplus weir
2. Tank sluice with tower head
3. Trapezoidal notch fall
4. Canal regulator
5. Type III Siphon aqueduct.
6. Sloping glacis weir

Final Examination pattern: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS


UNIT – I
INTRODUCTION: Basic concept of EIA - Initial environmental examination - Elements of EIA - Factors affecting EIA - Impact evaluation and analysis - Preparation of environmental base map - Classification of environmental parameters.

UNIT – II

UNIT – III
ENVIRONMENTAL IMPACT ON SOIL AND GROUND WATER: Prediction and assessment - Soil quality - Methodology for the assessment of soil and groundwater - Delineation of study area - Identification of activities.

UNIT - IV

UNIT – V
ASSESSMENT OF IMPACT ON VEGETATION AND WILDLIFE: Assessment of impact of developmental activities on vegetation and wildlife - Environmental impact of deforestation – Causes and effects of deforestation.

UNIT – VI
ENVIRONMENTAL AUDIT: Environmental audit and environmental legislation - Objectives of environmental audit - Types of environmental audit - Audit protocol - Stages of environmental audit - Onsite activities - Evaluation of audit data and preparation of audit report.

UNIT-VII
ENVIRONMENTAL ACTS: Post audit activities - The Environmental protection act - The water act - The air act - Wild life act.

UNIT-VIII
CASE STUDIES: Case studies and preparation of environmental impact assessment statement for various industries.
TEXT BOOKS

REFERENCES
UNIT – I
BRIDGE LOADING STANDARDS: Highway bridge loading standards - Impact factor - Railway bridge loading standards (BG ML Bridge) - Various loads in bridges - Importance of site investigation in bridge design.

UNIT – II
BOX CULVERT : General aspects - Design loads - Design of box culvert subjected to class AA tracked vehicle only.

UNIT – III
DECK SLAB BRIDGE : Effective width method of analysis and design of deck slab bridge (simply supported) subjected to class AA tracked vehicle only.

UNIT – IV
BEAM AND SLAB BRIDGE (T-BEAM BRIDGE) : General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT – V
PLATE GIRDER BRIDGE : Elements of a plate girder and their design - Design of a deck type welded plate girder – Bridge of single line B.G.

UNIT – VI
COMPOSITE BRIDGES : Advantages – Design of composite bridges consisting of RCC slabs over steel girders including shear connectors.

UNIT – VII

UNIT VIII

TEXT BOOKS
3. Relevant IRC & Railway Bridge Codes.
REFERENCES
UNIT - I
PLANNING: Classification of industries and industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT - II

UNIT - III
STEEL ROOF STRUCTURES: Industrial roofs – Crane girders – Mill buildings.

UNIT - IV
DESIGN OF R.C. STRUCTURES: Design of folded plates and cylindrical shell roofs.

UNIT V
PREFABRICATION: Principles of prefabrication – Prestressed precast roof trusses - Functional requirements for precast concrete units.

UNIT VI
BUNKERS AND SILOS: Design of bunkers and silos – RCC and steel.

UNIT VII
GRID FLOORS: Analysis and design of grid floors.

UNIT VIII
CHIMNEYS: Design of chimneys - RCC and Steel.

TEXT BOOKS

REFERENCES
UNIT – I
GROUND IMPROVEMENT: Need and objectives - Identification of problematic soils - Mechanical, hydraulic, physico-chemical, electrical, thermal and strengthening methods - Selection of suitable ground improvement technique based on soil condition.

UNIT – II
DENSIFICATION IN GRANULAR SOILS: Principles of soil densification – Properties of compacted soil - Compaction control tests - Specification of compaction requirements – In-situ densification methods in granular soils – Blasting, virbo-compaction, vibro-replacement, dynamic tamping, stone columns/granular piles and sand/gravel compaction piles - Vibration at the ground surface, impact at the ground surface - Vibration at depth, impact at depth.

UNIT - III

UNIT – IV
STABILISATION: Modification by admixtures - Shotcreting and guniting technology - Modification at depth by grouting - Methods of stabilization: mechanical, cement, lime, bituminous, chemical stabilization with calcium chloride, sodium silicate and gypsum - Objectives of grouting - Grouts and their properties - Grouting methods: ascending, descending and stage grouting - Hydraulic fracturing in soils and rocks - Post grout test.

UNIT – V
CONFINEMENT: In-situ ground reinforcement - Ground anchors – Rock bolting and soil nailing.

UNIT – VI

UNIT – VII
GEOSYNTHETICS: Properties – physical, mechanical, hydraulic, endurance, degradation, tests – Types: Geotextiles, geogrids, geomembranes etc. - Functions and applications - Design for drainage, separation, filtration, reinforcement, multiple functions.

UNIT - VIII
TEXT BOOKS

REFERENCES
UNIT – I
INTRODUCTION: Concepts of systems analysis - Systems approach to water resources planning and management - Role of optimization models - Objective function and constraints - Types of optimization techniques.

UNIT – II
LINEAR PROGRAMMING – I: Formulation of linear programming models - Graphical method - Simplex method - Application of linear programming in water resources.

UNIT – III
LINEAR PROGRAMMING – II: Revised simplex method - Duality in linear programming - Sensitivity and post optimality analysis.

UNIT – IV
DYNAMIC PROGRAMMING: Belman’s principles of optimality forward and backward recursive dynamic programming - Case of dimensionality - Application of dynamic programming for resource allocation.

UNIT – V

UNIT – VI
SIMULATION: Application of simulation techniques in water resources.

UNIT – VII
WATER – RESOURCES ECONOMICS: Principles of economics analysis – Benefit cost analysis - Socio-economic intuitional and pricing of water resources.

UNIT – VIII
WATER RESOURCES MANAGEMENT: Planning of reservoir system – Optimal operation of single reservoir system – Allocation of water resources – Optimal cropping pattern – Conjunctive use of surface and sub-surface water resources.

TEXT BOOKS
REFERENCES

UNIT – I
INTRODUCTION TO AIR POLLUTION: Scope, significance and episodes - Air pollutants – Classifications – Natural and artificial – Primary and secondary, point and non- point, line and areal sources of air pollution - Stationary and mobile sources.

UNIT – II
EFFECTS OF AIR POLLUTION: Effects of air pollutants on man, material and vegetation - Global effects of air pollution – Green house effect, heat islands, acid rains, ozone holes etc.

UNIT-III
THERMODYNAMICS OF AIR POLLUTION: Thermodynamics and kinetics of air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc. - Air-fuel ratio - Computation and control of products of combustion.

UNIT – IV
PLUME BEHAVIOUR: Meteorology and plume dispersion - Properties of atmosphere - Heat, pressure, wind forces, moisture and relative humidity - Influence of meteorological phenomena on air quality - Wind rose diagrams.

UNIT-V
POLLUTANT DISPERSION MODELS: Lapse rates - Pressure systems - Winds and moisture plume behaviour - Plume rise models - Gaussian model for plume dispersion.

UNIT-VI
CONTROL OF PARTICULATES: Control of particulates – Control at sources - Process changes - Equipment modifications - Design and operation of control equipments – Settling chambers - Centrifugal separators - Filters dry and wet scrubbers - Electrostatic precipitators.

UNIT – VII
CONTROL OF GASEOUS POLLUTANTS: General methods of control of Nox and Sox emissions – In-plant control measures - Process changes - Dry and wet methods of removal and recycling.

UNIT – VIII
AIR QUALITY MANAGEMENT: Air quality management – Monitoring of SPM, SO; NO and CO Emission standards.
TEXT BOOKS

REFERENCES
UNIT - I
TRANSPORTATION PLANNING: Transportation planning process - System approach to transportation planning - Stages in transportation planning and difficulties in transportation planning process - Transportation survey - Study area - Zoning - Types of surveys - Inventory of transportation facilities - Land use and economic activities.

UNIT- II
TRANSPORT DEMAND ANALYSIS : Trip purpose - Factors governing trip generation and attraction - Multiple linear regression analysis - Trip distribution models - Gravity model - Modal split models - Probit analysis - Traffic assignment models - All-or-nothing assignment model.

UNIT – III
PAVEMENT ANALYSIS : Types of pavement – Factors affecting design of pavements – Elastic modulus, Poisson’s ratio, wheel load, wheel configuration and tyre pressure – ESWL Concept - Tyre pressure – Contact pressure - Material characteristics – Environmental and other factors.

UNIT – IV
ANALYSIS AND DESIGN OF FLEXIBLE PAVEMENTS :
Analysis: Stresses in flexible pavement – Layered systems concept – One layer system – Boussinesq Two layer system – Burmister theory for pavement design.

UNIT – V
ANALYSIS AND DESIGN OF RIGID PAVEMENTS :
Analysis: Stresses in rigid pavements – Relative stiffness of slab, modulus of sub-grade reaction – Stresses due to warping, stresses due to loads, stresses due to friction.

UNIT – VI
UNIT – VII

UNIT – VIII
HIGHWAY MAINTENANCE: Need for highway maintenance – Failures and their causes in flexible pavements and rigid pavements - Pavement evaluation - Benkleman beam method - Strengthening of existing pavements - Overlays.

TEXT BOOKS

REFERENCES

CODES
GIS SOFTWARE

1. Arc GIS 9.0
2. ERDAS 8.7
3. MapInfo 6.5
4. Any one or Equivalent

LIST OF EXCERCISES

1. Digitization of map/toposheet
2. Creation of thematic maps
3. Study of features estimation
4. Developing digital elevation model
5. Simple applications of GIS in water resources engineering and transportation engineering

CAD SOFTWARE

STAAD PRO or Equivalent

LIST OF EXCERCISES

1. 2-D Frame analysis and design
2. Steel tabular truss analysis and design
3. 3-D Frame analysis and design
4. Retaining wall analysis and design
5. Simple tower analysis and design
6. Analysis and design of solid slab and RCC Tee beam bridges for IRC loading
7. Analysis and design of intz type water tank, circular and rectangular water tanks
8. Analysis and design of plate girder bridge, twin girder deck type railway bridge, truss girder bridges

TEXT BOOKS


REFERENCES


LIST OF EXPERIMENTS

I. ROAD AGGREGATES
   1. Aggregate crushing value
   2. Aggregate impact test
   3. Specific gravity and water absorption
   4. Attrition test
   5. Abrasion test
   6. Shape tests

II. BITUMINOUS MATERIALS
   7. Penetration test
   8. Ductility test
   9. Softening point test
  10. Flash and fire point tests

III. CEMENT AND CONCRETE
   11. Normal consistency and fineness of cement
   12. Initial setting time and final setting time of cement.
   13. Specific gravity and soundness of cement
   14. Compressive strength of cement
   15. Workability test on concrete by Compaction factor, Slump and Vee-bee
   16. Young’s modulus and compressive strength of concrete
   17. Bulking of sand
   18. Non-Destructive testing on concrete (for demonstration)
UNIT - I

UNIT - II
DESIGNING ORGANIZATIONAL STRUCTURES: Basic concepts related to organization – Departmentation and decentralization - Types of organizations – Merits, demerits and adoptability to modern firms.

UNIT - III
OPERATIONS MANAGEMENT: Principles and types of plant layout - Methods of production - Forecasting - Forecasting methods - Work study - Basic procedure involved in method study and work measurement - Statistical quality control: Factors affecting quality - Quality control using control charts (simple problems) - Acceptance sampling.

UNIT - IV
MATERIALS MANAGEMENT: Materials management objectives – Inventory - Types of inventory – Safety stock - Classical EOQ model - Need for inventory control – EOQ simple problems - ABC analysis - Purchase procedure - Stores management.

MARKETING: Functions of marketing - Marketing mix - Channels of distribution.

UNIT - V
HUMAN RESOURCES MANAGEMENT (HRM): Nature and scope of HRM - HRD and personnel management and industrial relations - Functions of HRM - Role of HR Manager in an organization - Performance appraisal - Job evaluation and merit rating - Motivation - Importance of motivation - Maslow’s theory of human needs - McGregor’s theory X and theory Y - Herzberg’s two-factor theory.

UNIT - VI
PROJECT MANAGEMENT (PERT/CPM): Network analysis - Program evaluation and review technique (PERT) - Critical path method (CPM) - Identifying critical path - Probability of completing the project within given time - Project cost analysis - Project crashing (simple problems).
UNIT - VII
ENTREPRENEURSHIP : Introduction to entrepreneurship - Definition of an entrepreneur - Entrepreneurial traits - Entrepreneur vs. manager - Entrepreneurial decision process - Role of entrepreneurship in economic development - Social responsibilities of entrepreneurs - Opportunities for entrepreneurs in India and abroad - Women as an entrepreneur.

UNIT - VIII
CONTEMPORARY MANAGEMENT PRACTICES : Basic concepts of Just-In-Time (JIT) system - Total quality management (TQM) - Value chain analysis - Enterprise resource planning (ERP) - Business process outsourcing (BPO) – Globalization - Management challenges - Intellectual property rights - Supply chain management - Role of information technology in managerial decision making.

TEXT BOOKS

REFERENCES
UNIT – I

UNIT – II

UNIT – III

UNIT – IV

UNIT – V

UNIT – VI

UNIT – VII
UNIT – VIII
SHEAR WALLS: Types – Design of shear walls as per IS: 13920 – Detailing of reinforcements.

TEXT BOOKS


REFERENCES


Codes/Tables

IS Codes: IS: 1893, IS: 4326 and IS: 13920 to be permitted into the examinations hall.
UNIT-I
SHALLOW FOUNDATIONS : Bearing capacity – Theories of Prandtl, Terzaghi, Meyerhof, Hansen, Skempton and Vesic – General, local and punching shear failure - Effects of size, depth and shape of footings, tilt and eccentricity of applied loads, water table, compressibility, non-homogeneity and anisotropy of soil - Bearing capacity of isolated footing resting on stratified soils - Button’s theory and Siva Reddy analysis - Settlement of foundation: one, two and three dimensional theories.

UNIT-II
ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS :
Types of foundation – Analysis and structural design of R.C.C. isolated, strap footing, combined footing and mat foundation.

UNIT-III

UNIT – IV

UNIT – V

UNIT-VI
FOUNDATIONS IN PROBLEMATIC SOILS: Foundations in black cotton soils - basic foundation problems associated with black cotton soils - Lime column techniques – Principles and execution - Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

UNIT-VII
DESIGN OF UNDERREAMED PILE FOUNDATIONS : Underreamed piles - principle of functioning of underreamed pile - Analysis and structural design of underreamed pile.
UNIT-VIII
MARINE SUBSTRUCTURES: Introduction - Type of marine structures - Breakwaters, wharves, piers, seawalls, docks, quay walls - Design loads - Wave action - Wave pressure on vertical wall - Ship impact on piled wharf structure - Design of rubble mount break water and wall type break water.

TEXT BOOKS

REFERENCES
UNIT-I
INTRODUCTION : Concept of watershed development - Objectives of watershed development - Need for watershed development in India - Integrated and multidisciplinary approach for watershed management.

UNIT-II

UNIT-III

UNIT-IV

UNIT-V
WATER HARVESTING : Rainwater harvesting - Catchment harvesting - Harvesting structures - Soil moisture conservation - Check dams - Artificial recharge - Farm ponds - Percolation tanks.

UNIT-VI
LAND MANAGEMENT : Land use and land capability classification - Management of forest – Agricultural - Grassland and wild land - Reclamation of saline and alkaline soils.

UNIT-VII
ECOSYSTEM MANAGEMENT : Role of ecosystem - Crop husbandry - Soil enrichment - Inter, mixed and strip cropping - Cropping pattern - Sustainable agriculture - Bio-mass management - Dry land agriculture - Silvi pasture – Horticulture - Social forestry and afforestation.

UNIT-VIII
PLANNING AND ADMINISTRATION : Planning of watershed management activities - Peoples participation - Preparation of action plan - Administrative requirements.
TEXT BOOKS

REFERENCES
UNIT – I
INTRODUCTION : Environmental sanitation – Scope - Communicable diseases – Role of environmental engineers in the prevention of diseases – Present status of environmental sanitation in Indian villages, towns and cities – Total sanitation.

UNIT – II

UNIT – III
RURAL WATER SUPPLY : Sanitary protection of wells – Disinfection by Two pot system – Treatment for Fluorides, Arsenic, Iron and Manganese and Nitrates.

UNIT – IV
RURAL SANITATION : Rural latrines – Animal waste disposal – Biomass – Biogas production.

UNIT – V

UNIT – VI

UNIT – VII

UNIT – VIII
OCCUPATIONAL HAZARDS : Hazards in industries – Mining operations – Hazards due to radiological pollution – Preventive measures – Natural and mechanical ventilation and exhaust systems.
TEXT BOOKS

REFERENCES
UNIT I
ARCHITECTURAL DESIGN: Architectural design – Analysis – Integration of function and aesthetics – Introduction to basic elements and principles of design.

UNIT II
SITE PLANNING: Surveys – Site analysis – Development control – Layout regulations - Layout design concepts – Integration of building services – Interior design.

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

UNIT IV

UNIT V
TOWN PLANNING: Planning – Definition, concepts and processes – Aims and objectives of planning – Levels of planning in India and their interrelationship – Planning administration.

UNIT VI

UNIT VII
LAND USE PLANNING: Concept of land use – Locational attributes of land use – Land use planning information system – Activity system and choice of space qualities – System approach and physical planning – Approach to land use planning – Introduction to spatial planning at regional level – Choice theory and advocacy planning and their application action plan and its relevance – Development plan types – Scope and objectives - Principles of landscape design

UNIT VIII
REGIONAL PLANNING AND STANDARDS: Planning practices in India – Method of identifying urban and regional problem – Setting of goals objectives and priorities – Performance standards – Spatial standards and standard for utilities – Classification of regions – Regionalization and delineation techniques for various types of regions – Cluster and factor analysis method.
TEXT BOOKS

REFERENCES
UNIT – I

UNIT – II
METHODS OF PRESTRESSING : Methods and systems of prestressing - Pre-tensioning and post tensioning – Analysis of post tensioning - Different systems of prestressing - Hoyer system - Magnel system, Freyssinet system and Gifford-Udall system.

UNIT – III
LOSSES OF PRESTRESS : Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete - Shrinkage of concrete - Creep of concrete - Relaxation of steel - Slip in anchorage bending of member and frictional losses.

UNIT – IV
ANALYSIS OF SECTION FOR FLEXURE : Analysis of sections for flexure - Prestressed with straight, concentric, eccentric tendons, bent and parabolic tendons.

UNIT – V
DESIGN OF SECTIONS FOR FLEXURE AND SHEAR : Allowable stresses - Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure and shear – Kern lines, cable profile.

UNIT – VI
ANALYSIS OF END BLOCKS : Guyon’s method and Mugnel method- Anchorage zone stresses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

UNIT – VII

UNIT – VIII
DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS : Importance of control of deflections – Factors influencing deflections – Short term deflections of uncracked members prediction of long term deflections.
TEXT BOOKS

REFERENCES

IS Codes
IS 1343 is to be permitted into the examination hall.
UNIT - I
HYDROPOWER : Introduction to water power - Hydropower development - Sources of energy - Estimation of water power potential - Load curve - Load factor - Capacity factor - Utilization factor - Diversity factor - Load duration curve - Firm power - Secondary power - Prediction of load.

UNIT - II
WATER POWER ESTIMATE : Collection and analysis of stream flow data – Mass curve – Flow duration curves – Construction and utility of these curves – Effect of storage and pondage – Estimates of available water power.

UNIT - III
HYDROPOWER PLANTS : Low and high head plants: classification of hydel plants - Run-off- river plants - General arrangement of run-off-river plants - Valley dam plants - Diversion canal plants - High head diversion plants - Storage and pondage.

UNIT - IV
PUMPED STORAGE POWER PLANTS : Basic features - Advantages of pumped storage plants - Types of pumped storage plants - Relative merits of two-unit and three-unit arrangement.

UNIT - V

UNIT - VI
WATER CONVEYANCE : Classification of penstocks - Design criteria- Economical diameter - Anchor blocks - Conduit valves - Bends and manifolds.

UNIT - VII

UNIT V - III
POWER HOUSE AND EQUIPMENT : Location of power house – General arrangement of hydroelectric unit – Number and size of units – Power house sub structure – Pumped storage plant.
TEXT BOOKS

REFERENCES
UNIT – I
GROUNDWATER OCCURRENCE : Groundwater hydrologic cycle - Origin of groundwater - Rock properties effecting groundwater - Vertical distribution of groundwater - Zone of aeration and zone of saturation - Geologic formation as aquifers - Types of aquifers - Porosity, specific yield and specific retention.

UNIT – II

UNIT – III
ANALYSIS OF PUMPING TEST DATA – I : Steady groundwater flow towards a well in confined and unconfined aquifers – Dupit’s and Thiem’s equations – Assumptions - Formation constants - Yield of an open well.

UNIT – IV

UNIT – V
SURFACE AND SUBSURFACE INVESTIGATION : Surface methods of exploration – Electrical resistivity and seismic refraction methods - Subsurface methods – Geophysical logging and resistivity logging - Aerial photogrammetry applications along with case studies in subsurface investigation.

UNIT – VI

UNIT – VII
SALINE WATER INTRUSION IN AQUIFER : Occurrence of saline water intrusions - Ghyben- Herzberg relation - Shape of interface - Control of seawater intrusion.

UNIT – VIII
GROUNDWATER BASIN MANAGEMENT : Concepts of conjunction use - Case studies.
TEXT BOOKS

REFERENCES
UNIT – I
WATER QUALITY REQUIREMENTS: Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and brewery industries – Boiler and cooling water treatment methods.

UNIT – II
TREATMENT OF WATER: Water for boiler – Cooling - Softening - Ion exchange – MSP.

UNIT – III

UNIT – IV
LIQUID WASTES AND TREATMENT - I: Origin of liquid waste from textiles, paper and pulp industries - Thermal power plants and tanneries - Special characteristics - Effects and treatment methods - Manufacturing process and design origin of liquid waste from fertilizers, distillers and dairy - Special characteristics - Effects and treatments methods.

UNIT – V
LIQUID WASTES AND TREATMENT - II: Origin of liquid waste from sugar mills, steel plants, oil refineries, and pharmaceuticals plants - Special characteristics - Effects and treatment methods.

UNIT – VI

UNIT – VII
JOINT TREATMENT OF WASTES: Joint treatment of industrial wastes and domestic wastes – Consequent problems – Industrial waste water discharges into streams, lakes and oceans and problems – Land disposal – Aquifer treatment system.

UNIT – VIII
TEXT BOOKS

REFERENCES
UNIT – I
INTRODUCTION: Types of disasters - Natural disasters - Impact of disasters on environment - Infrastructure and development - Concepts of hazards and vulnerability analysis.

UNIT – II
HAZARD ASSESSMENT: Guidelines for hazard assessment and vulnerability analysis - Basic principles and elements of disaster mitigation.

UNIT – III
EARTHQUAKES: Introduction to earthquakes - Intensity scale (MSK-64) - Seismic activity in India - Seismic zones of India - Earthquakes in A.P. - Action plan for earthquake disaster preparedness - Elements at risk, recovery and rehabilitation after earthquake - Earthquake resistant design and construction of buildings.

UNIT – IV
TSUNAMIS: Onset, types and causes – Warning - Element at risk - Typical effects - Specific preparedness and mitigation strategies.

UNIT – V
FLOODS AND CYCLONES: Onset, types, warnings - Elements at risk - Typical effects - Indian floods and cyclones - Hazard zones - Potential for reducing hazards - Mitigation strategies and community based mitigation.

UNIT – VI

UNIT – VII

UNIT – VIII
DISASTER MANAGEMENT: Disaster management organization and methodology - Disaster management cycle - Disaster management in India - Typical cases - Cost-benefit analysis with respect to various disaster management programmes implemented by NGOs and Government of India.
TEXT BOOKS

REFERENCES