

## **CIVIL ENGINEERING**

**(DEGREE STANDARD)**

**CODE NO: 262**

**(FOR THE POST OF ASSISTANT DIRECTOR OF TOWN AND COUNTRY PLANNING)**

### **UNIT I: Building Materials and Construction Practices**

Classification, Properties, Uses and Tests for stone, lime, bricks, cement and timber – materials for acoustics and insulation – Classification, construction details and supervision for masonry – Damp Proofing courses – Shoring, scaffolding and Underpinning – Ventilation and Fire resistant construction.

### **UNIT II: Engineering survey**

Survey – Basic principles- Classification - computation of areas – chain survey – Compass surveying – Plane table survey – Levelling – Fly levelling – L.S and C.S – Contour Volumes – Theodolite survey – Traversing – Heights and Distances – Geodetic Observations-Tacheometry – Triangulation – Field Astronomy - Use of EDM – Global Positioning System - Principles of Photogrammetry - Concepts of Digital Elevation Modelling – Concepts of Remote sensing.

### **UNIT III :Strength of Materials and Analysis of Structures**

Simple stress and strain-elastic constants- relationship - - stress and strain in two dimensions, compound stresses- principal stresses- thin and thick cylinders - Bending moments and shear forces in statically determinate beams simple bending theory - flexural shear stress - deflection of flexural members – torsion of circular section - Short and long columns.

Analysis of statically determinate trusses arches and frames - analysis of statically indeterminate structures by slope-deflection and moment-distribution methods - influence lines for determinate and indeterminate structures - basic concepts of matrix methods of structural analysis.

#### **UNIT IV : Concrete and Steel Structures**

Working stress and limit states design concepts - design of members subjected to flexure, shear, compression and torsion (beams, columns isolated footings) - basic elements of Prestressed concrete: analysis of beam sections at transfer and service loads – Codal Provisions.

Design of tension and compression members, beams and beam-columns, column bases - Design of bolted and welded connections - simple and eccentric - plate girders and trusses

#### **UNIT V :Geotechnical Engineering**

Properties of soils - soil classification –Three phase system and inter-relationships - Compaction - permeability and seepage – soil stresses- Compressibility and Consolidation - Shear strength – Laboratory and in - situ tests.

Sub-surface investigation - scope, drilling bore holes, sampling, penetrometer tests, plate load test – earth pressure theories - stability of slopes - foundation types - foundation design requirements – shallow foundations – Types and Design of isolated and combined footings - bearing capacity - effect of shape, water table and other factors- stress distribution - settlement analysis in sands and clays – deep foundations - pile types, dynamic and static formulae - load capacity of piles in sands and clays.

#### **UNIT VI :Hydraulics and Water Resources Engineering**

Hydrostatics - applications of Bernoulli equation, Laminar and turbulent flow in pipes, pipe networks - concept of boundary layer and its growth - flow in channels, Rapidly varied flow - tanks and pipes - hydraulic modeling. Applications of Momentum equation, Kinematics of flow

Hydrologic cycle - Rainfall - draw down – recuperation test – well yield. Water resources of Tamil Nadu – Water policy – flood control – drought management

Duty, delta, Estimation of evapo-transpiration - design of lined and unlined canals, alluvial and non-alluvial canals - waterways – Irrigation methods. Irrigation efficiencies. Water quality and standards- tank irrigation- rehabilitation of irrigation works- ground water well irrigation- conjunctive- Cross Drainage works.

## **UNIT VII :Water Supply and Environmental Engineering**

Sources of water and their characteristics - Surface and Groundwater - Development and selection of source -Water quality – Characteristics - Water quality standards – Intakes - Estimation of demand - Unit processes and operations for water treatment - Maintenance of treatment units - Conveyance and distribution systems of treated water - Rural water supply- Advanced water treatment.

Collection of waste water- Design of sewers - Sewage pumping - Characteristics of sewage - Primary, secondary and tertiary treatment of sewage- Sludge disposal - effluent standards - industrial wastewater management – Rural sanitation – solid waste management - Sources and effects of air pollution, monitoring and control of air pollution - Sources and impacts of noise pollution- measurement of noise and control of noise pollution.

## **UNIT VIII :Transportation Engineering**

Different modes of transport and their characteristics Highway planning in India - Road classification - Geometric design of highways. – Traffic surveys- Traffic signs, road markings and traffic signals. Design and construction of bituminous and concrete roads - Drainage of roads - Maintenance of roads.

Railways-Components of permanent way - geometric design - Points & crossings – Track junctions- Signalling Interlocking and train control. Airport planning Components of Airport - Site selection - Airport zoning- Runways – Harbours & Ports - types - components & their functions - Layout of a harbour - Docks - Breakwaters.

## **UNIT IX: Town Planning and Urban Engineering**

Urbanisation- Trends in India-Planning process– stages,type of survey, collection of data- Development of new towns – urban modern and satellite towns - Smart cities - levels of planning – preparation of regional and development plans/master plan-national planning development controls - building bye – laws – zoning – town and country planning acts – land acquisition acts – principles of rural development– integral rural development programmes – rural housing – use of low cost materials.

## **UNIT X : Concrete Technology and Construction Management**

Types of concrete – testing of fresh and hardened concrete – mix design – quality control – special concreting techniques - concreting equipments – centering and shuttering – slip and moving forms – construction joints.

Construction management – elements and principles of AOA and AON - Construction planning and scheduling – preparation of different types of schedules – methods of scheduling – CPM – PERT – updating of schedules – time-cost trade off – resource planning- Bar Chart- Inventory Management- Construction Contracts.

Types of estimates - Detailed estimates for different types of buildings- methods of valuation – depreciation – fixation of rent- rate analysis- Quantity estimation