

TAMIL NADU PUBLIC SERVICE COMMISSION

SYLLABUS

CODE NO. 155

CIVIL ENGINEERING (DEGREE STANDARD) (FOR THE POST OF ASSISTANT DIRECTOR OF TOWN AND COUNTRY PLANNING)

UNIT I

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

UNIT III

Mechanics of Solids

Simple stress and strain: relationship - elastic constants - 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.

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

UNIT IV

Concrete Structures

Basic 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.

Steel Structures

Design of tension and compression members, beams and beam-columns, column bases - connections - simple and eccentric - plate girders and trusses - plastic analysis of beams and frames.

UNIT V

Geotechnical Engineering

Properties of soils - soil classification - inter-relationships – Compaction - permeability and seepage – 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

Hydrostatics applications of Bernoulli equation, Laminar and turbulent flow in pipes, pipe networks - concept of boundary layer and its growth - uniform flow, critical flow and gradually varied flow in channels, specific energy concept, hydraulic jump - forces on immersed bodies - flow measurement in channels - tanks and pipes - dimensional analysis and hydraulic modeling. Applications of Momentum equation, Potential flow, Kinematics of flow - Velocity triangles and specific speed of pumps and turbines.

Hydrology and Water Resources

Hydrologic cycle - Rainfall - evaporation infiltration, unit hydrographs, flood estimation, reservoir design, reservoir and channel routing, well hydraulics. Water resources of Tamil Nadu – Water policy – flood control – drought management

Irrigation

Duty, delta, Estimation of evapo-transpiration - crop water requirements - design of lined and unlined canals - waterways - head works, gravity dams and Ogee spillways - Designs of weirs on permeable foundation, Irrigation methods. Irrigation efficiencies. Water quality and standards- water logging and salinity- problem soils and reclamation- tank irrigation- rehabilitation of irrigation works- ground water- well irrigation- conjunctive use.

UNIT VII

Water Supply Engineering

Sources of water and their characteristics - Surface and Groundwater - Development and selection of source -Water quality – Characterization - Water quality standards – Intakes - Estimation of demand - Water quality standards - Basic unit processes and operations for water treatment - Maintenance of treatment units - Conveyance and distribution systems of treated water - Rural water supply- Water softening –Demineralization-Desalination.

Wastewater Engineering And Pollution Control

Design of sewers - Sewage pumping - Characteristics of sewage and its treatment - Primary, secondary and tertiary treatment of sewage- sludge disposal - effluent discharge 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 – traffic surveys – traffic signals and markings

Highway planning in India - Road classification - Geometric design of highways. Construction of Earth, WBM, bituminous and concrete roads - Drainage of roads - Maintenance of roads.

Details of components of permanent way - geometric design - points & crossing - signaling Interlocking and level crossings. Airport planning Components of Airport - Site selection - Airport zoning - Harbours & Ports - types - components & their functions - Layout of a harbour - Docks - wet and dry - Break waters.

UNIT IX

Town Planning and Urban Engineering

Ancient and modern planning – stages ,type of survey, collection of data- objects and principles of zoning – role of density and FSI – Development of new towns – urban modern and satellite towns - levels of planning – preparation of regional and national planning development controls - building bye – laws – zoning – town and country planning acts – land acquisition acts – principles of rural development planning – urbanization – 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 – slips 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.

UNIT XI

Estimation , Costing & Valuation

Types of estimates - Detailed estimates for different types of buildings- methods of valuation – depreciation – fixation of rent.

UNIT XII

Computer Applications in Civil Engineering

Types of computers – components of modern computer systems – office automation – word processing – spread sheets and data management – developing flow charts for solving civil engineering problems – CAD – advantages of computer aided drafting over traditional drafting – developing 2D, and3S drawing and solid modelling- Application of GIS in Civil Engineering.

Suggested Reading

1. Mechanics of Structures Vol I & II - S.B.Junnarkar
2. Strength of Materials and Theory of Structures - B.C Punmia, et al
3. R.C Design - Unni Krishnan Pillai and Devadoss Menon
4. Design of R.C Structures Vol I & II - B.C.Punmia
5. Design of R.C Structures - S.Ramamurtham
6. Design of Steel Structures - Ram Chandra
7. Estimating and Costing - B.N.Dutta
8. Soil Mechanics and foundation engineering - B.C Punmia
9. Foundation Design - Teng
10. Soil Mechanics and Foundation Engineering - K.P.Arora
11. Hydrology and Water Resources Engineering - K.C.Patra
12. Principles of Transportation and Highway Engineering - G.V.Rao
13. Surveying and Levelling Vol. I & II - T.P.Kanetkar
14. Surveying Vol. I, II & III - B.C Punmia
15. Environmental Engineering Vol. I & II - Dr.B.C.Punmia
16. Environmental Engineering - Peavy Donald & Rowe
17. Water Supply and Sanitary Engineering - Gurucharan Sing
18. Water Supply and Sanitary Engineering - T.P.Kanetkar
19. PERT & CPM – Principles and applications - L.S Srinath
20. PERT & CPM - Dr.B.C.Punmia, et al.
- 22.Traffic and Transportation Engineering - Kadiyali
- 23.Highway Engineering - Khanna and Justo
- 24.Irrigation Water Management - Principles and Practices - D.K.Mujumdar
- 25.An introduction to Town Planning Techniques - Margerat Robert
- 26.Development control regulations, Chennai Metropolitan 1998
- 27.Elements of Water Resources Engineering - K.N.Duggal