

TAMIL NADU PUBLIC SERVICE COMMISSION
SYLLABUS
CIVIL ENGINEERING
(DIPLOMA STANDARD)

CODE: 443

UNIT - I: ENGINEERING MECHANICS

Direct Stresses and strains (Tensile and compressive) due to Axial forces – Deformation of elastic bar due to uni-axial force – Composite Sections – Modular ratio – Relationship between elastic constants - Shear force and bending moment diagrams for statically determinate beams - Geometrical properties of sections - Stresses in beams due to bending – Flexural rigidity – Strength equation - Stresses in shafts due to torsion – Pin jointed perfect frames with vertical loads on nodal points (method of joints only).

UNIT - II: MECHANICS OF STRUCTURE

Deflection of cantilever and simply supported beams for point and uniformly distributed loads – Shear force and bending moment diagrams for statically indeterminate structures (Propped cantilever, Fixed Beams, continuous beams, Non-sway Portal frames) using Mohr's theorems and moment distribution method.

Euler's and Rankin's formula for columns – Effective length for different end conditions - Stresses due to eccentric loads – combined stresses due to direct loads and bending moments in rectangular sections – Conditions for No tension (Circular, square and rectangular) – Stability of earth retaining walls.

UNIT - III: CONSTRUCTION MATERIALS & CONSTRUCTION PRACTICE

Bricks, Lime, Tiles (Athangudi Tiles), Cement, Fine Aggregate, Coarse Aggregate, Timber, Ply wood, Steel, Glass, Plastics, PVC, UPVC, Paints, Mortars, Concrete – M-sand, P-sand – Latest construction Materials and

construction Chemicals - Different types, qualities, requirements, standard specifications, Admixtures for cement mortar and concrete – Green Building Materials, Usage of PPC, Flyash Bricks, Solar Panels, Hollow clay Bricks (Tiles).

Different types of Foundations (Buildings Ocean, Harbour and other ordinary works) Masonry, Floors, Roofs, Interior Works, False ceiling – Wall paneling – Wooden flooring

Precast Block(Under Ground metro, metro slabs) Doors and Windows, Weathering Course, Damp proof course, Plastering, Painting, Colour Washing, Specifications for different works – Maintenance of created(Ocean & Harbours) assets.

Heritage structures – Construction, Traditional Flooring - Athangudi Tiles – List of Heritage Buildings.

UNIT - IV: TRANSPORTATION ENGINEERING

Roads – Different types – methods of formation of water bound macadam Road, bituminous and concrete roads – Hill roads – Requirements – Camber, gradient, super elevation, carriage way, pavements, drainage system, sight distance etc., Traffic Engineering Bridges – Classification of bridges – Site selection and alignment – Foundation, substructure and super-structure.

Sub-grade soil – Soil mass as a three phase system – Grain size classification - Atterberg limits – IS Classification of soils–Compaction – Shear strength - Road Arboriculture – Express Highways – Rapid Transport System.

Railways – Formation of Tracks – Rails – Ballasts – Sleepers – Characteristics of materials – Rail Joints.

Harbour and Ocean structures – Component parts.

UNIT - V: HYDRAULICS

Measurement of pressure in liquids – Pressure distribution and total pressure on immersed surfaces – Types of flow (Laminar, turbulent, steady, unsteady, uniform, non- uniform) – Flow through pipes – Losses, Frictional losses – Hydraulic gradient and total energy lines. Bernoulli's theorem – use of Orifice, Mouthpiece, Hydraulic Coefficient C_d , C_c , C_v Orifice meter and Venturimeters – Flow through channels – Chezy's formula – Bazin's and Manning's formula – Economical sections for open channels, Conditions for Maximum discharge – Pumps – Reciprocating pumps – Centrifugal pumps – Characteristics – Selection and choice for pump – Discharge – Power and efficiency, Ground water – Types of well – Test for yield of wells.

UNIT – VI : SURVEYING AND REMOTE SENSING

Types of Surveys – Chain surveying – Compass surveying – Levelling – Contour surveying – Theodolite surveying – Trigonometrical levelling – Tacheometry – Field work – Simple problems. Curves, Global Positioning System (GPS), Remote sensing – Photogrammetric Surveying and Hydrographic Surveying, Total Station and Geographical Information System (GIS) – Fundamentals of Remote sensing, Photogrammetry – Image interpretation & Analysis.

UNIT - VII: ENVIRONMENTAL ENGINEERING AND POLLUTION CONTROL

Sources of water – Conveyance of water – Treatment of water – Quality of water – Tests on water – Distribution systems – Sewers – Collection and conveyance of sewage – Sewer Appurtenances – Drainage arrangements and Sanitary fittings in buildings – Effluent treatment plants – Treatment and disposal of sewage, Solid waste Management.

Environmental pollution Control – Air – water – Soil – Noise – Pollution Control.

UNIT - VIII: ESTIMATING AND COSTING

Systems of taking out quantities – Trade and Group systems – Material requirement for different items of works – Preparation of data for works – Report writing – Valuation of buildings and properties – Fixation of rents – Approximate estimates – Detailed estimate and Abstract estimate for buildings, wall, sump, septic tanks, compound wall, roads, Harbour – (Floating structures such as jetty, wharf groyne, Break water, quay wall), CMDA Rules and regulations – Buildings Bye laws.

UNIT - IX: STRUCTURAL ENGINEERING

Reinforced cement concrete structure – Analysis and design of singly and Doubly reinforced rectangular and T-beam sections – Cantilever, simply supported, continuous beams – One way and two way slabs – Lintels and Sunshades – Staircases – Rectangular and Circular short Columns – Isolated column footings. (All designs by Limit State Method only) – Basics of Retrofitting (Roof slab, Column & Beam)

Steel structures – Design of Tension and compression members by L.S.M – Different forms of Tension members – Design strength of single Angle Tension member – Design of ties using single Angles and channel section – Design of simple Beams and welded connection by L.S.M – Web Design strength in Bending, Shear – Limiting deflection of Beam.

UNIT-X: CONSTRUCTION MANAGEMENT AND COMPUTER APPLICATIONS

Planning of a project – Factors to be considered – Project reports – Organization structure of construction departments – Construction planning – CPM and PERT networks – Contracts – Tenders and Tender documents – Bill- Supervision and Quality control – Safety measures in construction sites

- Labour legislations - Banking practice - Cash flow diagrams - Financial Management.

Ethics in Engineering - Disaster Management - Types of Natural calamities - Causes - Preparedness - Response and Recovery.

Use of Computers - Application of CAD softwares - Project management softwares - Use of MS word, Excel, PowerPoint - Application of Design and Analysis softwares.

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