



Syllabus for the Objective type test to be conducted by Kerala Devaswom Recruitment Board in connection with the recruitment to the post of Assistant Engineer (Civil) in Travancore Devaswom Board . The notification inviting application for the post will be published shortly.

**Maximum Marks : 100**

***Module 1: General Knowledge and Current Affairs (Total 20 marks)***

**(a) Salient Features of Indian Constitution**

Salient features of the Constitution, Centre-State Relations – Legislative - Administrative and Financial, Services under the Union and the States, Emergency Provisions , Amendment Provisions of the constitutions.

**(b) Social Welfare Legislations and Programmes**

Social Service Legislations like Right to Information Act, Prevention of atrocities against Women and Children, Food Security Act, Environmental Acts etc. Social Welfare Programmes like Employment Guarantee Programme, Organ and Blood Donation etc.

**(c) Geographical Features of Kerala**

Physiography, Geology, soils, climate, rainfall, river and river projects, famous sites.

(d) **The Colonial Interventions** - British land revenue administration in Malabar - Tenurial reforms of Travancore and Cochin - English education and printing press.

**(e) Kerala Renaissance**

Narayana Guru and other reformers, Anti - caste movement - reform movements in Kerala. Caste organizations - Temple entry movements, Nationalist movements in Kerala - Malabar Rebellion of 1921 – Nature of the Revolt - Salt Satyagraha. Travancore state congress and the struggle for Responsible Government. Cochi Rajya Praja Mandalam . Left movements - Karshaka Sangham in Malabar – Punnapra vayalar . Aikya Kerala Movement - First Communist Ministry Historic Legislations – Liberation Movements. 'Kerala Model' Development – Panchayat Raj and Peoples planning.

**(f) Awakening through Literature**

Literature and culture – Origin and Development of Malayalam Language. Novel, Drama, Poetry, Purogamana Sahitya Prasthanam, Nataka Prashtanam,

Library movement etc. Art forms of kerala. Kerala festivals and Celebrations.

**(g) Current Affairs**

Important world, national and regional events related to the political and scientific fields, sports, cinema and literature etc.

**(h) Computer Knowledge**

Computer and its components, Electronic spreadsheet features, Formatting worksheet, using of Openoffice Base, Tools in Auto CAD, Network Security.

(a) **CIVIL ENGINEERING MATERIALS AND CONSTRUCTION**

Traditional materials: timber, stone, brick, tiles - their manufacture, properties and code requirements; Modern materials: steel, paints, plastics, rubber, polymer, fibre reinforced plastics-their manufacture, properties and use.  
Building Construction: Stone masonry; brick masonry - Rules for bonding, stretcher and header bonds and English Bond; Doors, Windows, sunshades and lintels; Stairs - proportioning and designing of different types of staircases for residential and commercial buildings; Different types of roofs; Plastering and pointing; Formwork for construction; Damp proofing.

(b) **CONCRETE TECHNOLOGY AND REINFORCED CONCRETE STRUCTURES**

Concrete: ingredients - cement, fine aggregates and coarse aggregates- properties and testing; Water cement ratio; admixtures.  
Fresh concrete - workability, compaction, curing; Strength of concrete, elasticity, shrinkage and creep; Durability of concrete; Testing of hardened concrete, destructive and non destructive testing methods; Concrete mix design, Quality control and acceptance criteria; Special Concretes  
Reinforced Concrete Structures: Strength properties and behaviour of concrete and reinforcing steel. Limit state design concepts. Designing of members subjected to flexure, shear, torsion, axial forces and combinations; uniaxial and biaxial bending of columns; Design of simply supported and continuous beams and slabs; one way and two way slabs; isolated and combined footings.

(c) **STEEL STRUCTURES**

General principles of elastic method of design of steel structures; Bolted and welded connections; Tension and compression members; laterally supported and unsupported beams; Unsymmetrical bending; built up beams. Plate girders; members subjected to axial force, uniaxial and biaxial moments; Introduction to the limit state design philosophy of steel structures.

(d) **SOIL MECHANICS AND FOUNDATION ENGINEERING:**

Soil formation, Three phase system, Index properties of soils, Soil classification, Hydraulics of soils, Stress distribution in soils, Soil compaction, One dimensional consolidation, Effective stress and pore water pressure, Shear strength of soils, Soil exploration, Earth pressure and its determination, Stability of slopes by various approaches.  
Foundation Engineering: Bearing capacity - Theoretical methods and In-situ tests, Loads for foundation design, Depth of foundation, proportioning of footings, Geotechnical and

structural design of isolated, combined and raft foundations. Determination of Pile capacity (static and pile load test). Analysis and design of pile groups, Settlement of foundations, Design of retaining walls.

(e) **TRANSPORTATION ENGINEERING**

Introduction and Terminology; Principles of transportation engineering; Traffic Engineering; Vehicular and road user characteristics, traffic studies, junctions and signals, traffic control devices. Highway alignment and geometric design: Highway alignment, cross-sectional elements, horizontal alignment and vertical alignment. Highway design and construction: design of flexible and rigid pavements, WBM and bituminous concrete roads and highway maintenance, highway drainage.

(f) **HYDROLOGY AND WATER RESOURCES ENGINEERING**

Hydrologic cycle, Precipitation: types, measurement, intensity, duration, temporal and spatial analysis. Infiltration, soil moisture, evaporation, transpiration, Groundwater Aquifers, Runoff: components, factors, hydrographs, unit hydrograph, flood estimation. Irrigation: objectives, methods, irrigation water requirements. Components of irrigation system and design principles; Water Power Engineering: Basic principles, types of schemes.

(g) **ESTIMATION, COSTING, AND SPECIFICATIONS**

Methods of estimating, line estimate and detailed estimate, measurements, taking out Quantities, typical estimates for buildings, and Civil Engineering works, Specifications for all types of building items; Analysis of rates, data for various building items, Earth work calculations; Valuation of buildings.

(h) **SOLID MECHANICS**

Fundamentals of force system. Concept of Rigid body and deformable bodies. Free body diagrams. Centroid and moment of inertia of plane areas. Simple stress and strain. Hooke's law. Mechanical properties of materials. Elastic constants. Simple flexure theory, Bending stress and shearing stress distribution across sections. Deflection of beams, Macaulay's method for deflection of statically determinate beams. Compound stresses - analytical method, graphical method - Mohr's circle of stresses. Torsion, transmission of power through hollow and solid shafts. Beams of uniform strength. Combined bending and torsion. Strain energy. Columns & struts. Elastic stability of columns. Bending moment and shear force diagrams for simply supported beams, cantilever beams and overhanging beams. Analysis of simple trusses.

(i) **STRUCTURAL ANALYSIS:** Definition of statically determinate and indeterminate structures.

Deflection of beams: moment area method, conjugate beam method, strain energy method and unit load method; Rolling loads and influence lines for statically determinate beams and bridge trusses; Three hinged arches, cables and suspension bridges; Analysis of indeterminate beams, frames and trusses: consistent deformation method, slope deflection method, moment distribution method, Kani's method; Plastic analysis of simple beams and frames.

## **(j) ENVIRONMENTAL ENGINEERING.**

Essentials of water and wastewater engineering systems, quantities, sources, water distribution systems, planning and analysis. Waste water collection, House drainage, Water and wastewater characteristics, Drinking water standards; Unit operations and processes of water and wastewater treatment. Design of treatment units. Water pollution control: Effluent standards. Disposal of wastewater. Stream sanitation. Water quality indices; Solid waste management: Characteristics, treatment disposal; Air Pollution Control: Sources and Characteristics, effects, Control; Noise Pollution Control, measurement & analysis; Hazardous solid waste: Classified wastes, Disposal of hospital wastes; EIA: Introduction, case studies. Concept of environment and environmental health – sustainable development - inclusiveness of environment in development, biodiversity as index of environmental health, ecosystem health and concepts in eco-toxicology, habitat degradation and ecosystems, International environmental movement, environmental concerns in India, environmental policies and programmes in India, Environmental history of India, Environmental issues in India and Kerala; Environmental education and ethics.

## **(k) CONSTRUCTION AND PROJECT MANAGEMENT.**

Introduction: project forms, management objectives and functions, Organizational chart of a Construction company, Manager's duties and responsibilities; public relations; Leadership and team - work; ethics, morale, delegation and accountability. Man and Machine: Man-power planning, training, recruitment, motivation, welfare measures and safety laws. Machinery for Civil Engineering: Earth movers and hauling costs, factors affecting purchase, rent, and lease of equipment, and cost-benefit estimation. Planning, scheduling and Project Management: Planning stages, construction schedules project specification, monitoring and evaluation; Bar-chart, CPM, PERT, network formulation and time computation. Departmental Procedures: specifications, tendering, contracting and arbitration.

## **(l) FLUID MECHANICS**

Introduction and Terminology, Basic properties of fluids, Pressure and its measurement, Hydrostatic pressure on surfaces, Kinematics of fluid flow, Dynamics of fluid flow, Velocity and Accelerations, Stream Lines, Equation of Continuity, Bernouli's Equation, Irrotational and Rotational Flow, Velocity Potential and Stream Functions, Continuity, Momentum and Energy Equation, Navier Stoke's Equation, Euler's Equation of Motion, Application to Fluid Flow Problems, Pipe Flow, Darcy's Equation, Losses, Water hammer, Depth, velocity and Discharge measurements. Dimensional analysis, Similitude and Model studies, dimensionless Parameters, Laminar Flow Between Parallel, Stationary and Moving Plates, uniform flow in open channels, Non uniform flow, Critical flow, Rapid and gradually varied flow and its concept and Design, Hydraulic jump. Centrifugal pumps- Vertical turbine pumps.

## **(m) HYDRAULIC STRUCTURES**

Reservoir planning, Types and Design of Dams and Weirs, Types, methods and Design of Energy Dissipation Structures, Spillways- Types, Functions and Designs. Flood control: Introduction, flood plain management, flood plain definition, hydrologic and hydraulic

analysis of floods, storm water management. Flood control alternatives: structural and non structural measures. Flood damage and net benefit estimation: damage relationships, expected damages, risk based analysis.

Canals – Types, Designs, Distribution Systems for Canal Irrigation, Canal Capacity, Canal Losses, Alignment of Canals, Most Efficient Section, Lined Canals, Their Design, Regime Theory, Critical Shear Stress, Bed Load, Design of Head Regulators, Canal Falls, Aqueducts- Measuring Flumes, Canal Outlets, Sluice Gates, Gates for Outlet works, Valves for Outlet works, Canal Drops, Escapes, CD Works, Design of river training works. Retaining Walls, Bulk Heads, Rockfill Dam, Cofferdam, Grouting. Seepage and its control in Hydraulic structures. Failure and Restoration of Hydraulic structures. Rivers, Their behavior, Control and Training – River Morphology, Sedimentation of reservoirs and Canals, Causes and Reclamation of Water Logged and Saline Soils for Agricultural purposes. Conjunctive Use of Surface and Groundwater in the command area. Rain water harvesting.

#### **(n) SURVEYING.**

Introduction and Terminology, Basic Principles of Surveying, Measurement of horizontal Distances, Chain surveying, Compass surveying, Compass traversing, Introduction to Leveling, Reduction of Leveling, Contouring, Plane table surveying, Theodolite surveying, Trigonometric leveling. Tachometry, Curve setting, Computation of area and volumes, Electronic Distance measurement, Hydrographic surveying, Photogrammetry and Remote sensing, Preparation of Maps, Map Reading, Errors and its Classification, Precision and Accuracy, Probability Analysis. Principles and uses of Electronic Theodolite, Total station, Features of Total Station, Characteristics of Total Station, Modern Surveying, Remote Sensing (RS). Global Position System (GPS), Maps, Global Information System (GIS)

NOTE : It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.