



**National Institute of Technology Calicut**  
**NITC Campus P.O, Kozhikode – 673601, Kerala, India**

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**Syllabus for Written Test for the post of Assistant Professor Grade II (Pay Level -10)**

**DEPARTMENT OF CIVIL ENGINEERING**

**Mechanics and Strength of Materials:** System of forces, free-body diagrams, equilibrium equations, center of gravity, bending moment and shear force in statically determinate beams, simple stress and strain relationships, simple bending theory, flexural and shear stresses, torsion and buckling of columns

**Structural Analysis:** Statically determinate and indeterminate structures by force/ energy methods and displacement methods

**Concrete Structures:** Limit state design concepts, design of beams, slabs, and columns

**Steel Structures:** Limit state design concepts, design of tension and compression members

**Construction Materials and Management:** Construction materials: Structural steel – composition, material properties and behavior; Concrete - constituents, mix design, short-term and long-term properties. Construction Management: Types of construction projects; Project planning and network analysis - PERT and CPM. Cost estimation

**Soil Mechanics:** Three-phase system and phase relationships, index properties; Unified and Indian standard soil classification system; Permeability - one dimensional flow, Seepage through soils – two dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force; Principle of effective stress and quicksand condition; Compaction of soils; One- dimensional consolidation, time rate of consolidation; Shear Strength, Mohr's circle, effective and total shear strength parameters

**Foundation Engineering:** Sub-surface investigations - Drilling bore holes, sampling, plate load test, standard penetration and cone penetration tests; Earth pressure theories - Rankine and Coulomb; Stability of slopes – Finite and infinite slopes, Bishop's method; Shallow foundations – Terzaghi's and Meyerhoff's bearing capacity theories, effect of water table; Combined footing and raft foundation; Deep foundations – dynamic and static formulae, Axial load capacity of piles in sands and clays, pile load test, pile under lateral loading, pile group efficiency, negative skin friction

**Fluid Mechanics:** Properties of fluids, fluid statics; Continuity, momentum and energy equations and their applications; Potential flow, Laminar and turbulent flow; Flow in pipes, pipe networks; Concept of boundary layer and its growth; Concept of lift and drag

**Hydraulics:** Forces on immersed bodies; Flow measurement in channels and pipes;

Dimensional analysis and hydraulic similitude; Channel Hydraulics - Energy-depth relationships, specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles

**Hydrology:** Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, reservoir capacity, flood estimation and routing, surface runoff models, ground water hydrology - steady state well hydraulics and aquifers; Application of Darcy's Law

**Irrigation:** Types of irrigation systems and methods; Crop water requirements - Duty, delta, evapotranspiration; Gravity Dams and Spillways; Lined and unlined canals, Design of weirs on permeable foundation; cross drainage structures

**Transportation Infrastructure:** Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments

**Highway Pavements:** Highway materials - desirable properties and tests; Desirable properties of bituminous paving mixes; Design factors for flexible and rigid pavements; Design of flexible and rigid pavement using IRC codes

**Water and Wastewater Quality and Treatment:** Basics of water quality standards – physical, chemical and biological parameters; Unit processes and operations; Water requirement; Water distribution system; Drinking water treatment. Sewerage system design, quantity of domestic wastewater, primary and secondary treatment. Effluent discharge standards

**Air Pollution:** Types of pollutants, their sources and impacts, air pollution control, air quality, standards

**Municipal Solid Waste:** Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal)

**Principles of Surveying:** Errors and their adjustment; Maps - scale, coordinate system; Distance and angle measurement - Levelling and trigonometric levelling; Traversing and triangulation survey; Total station; Horizontal and vertical curves.

**Photogrammetry and Remote Sensing:** Scale, flying height; Basics of remote sensing and GIS.