

Department of Civil Engineering, JUIT

PhD Entrance Examination 2024 – Syllabus

Engineering Mathematics

Taylor's Series, Fourier series, Mean, median, mode and standard deviation, Random Variables – Discrete and Continuous, Poisson and Normal Distribution; Linear regression, Newton's and Lagrange polynomials; numerical differentiation; Integration by trapezoidal and Simpson's rule

Structural Engineering and Construction Materials & Management: Simple stress and strain relationships, SFB and BMD, flexural and shear stresses, Torsion, buckling of column. Indeterminacy of structures, Trusses and Arches, Analysis of Indeterminate structures (Slope deflection, Moment Distribution, etc). Design of beams, slabs, columns using different design philosophy; Analysis of Prestressed concrete beams. Design of tension and compression members, Simple and eccentric Connections, Concept of plastic analysis. Structural Steel – Composition, material properties and behaviour; Concrete - Constituents, mix design, short term and long-term properties, Types of construction projects; Project planning and network analysis - PERT and CPM; Cost estimation.

Geotechnical Engineering: Index properties, Permeability, Seepage through soils, capillarity, effective stress, Compaction, One dimensional consolidation, Shear Strength, Earth pressure theories, Shallow foundations, Deep foundations, pile load test

Water Resources Engineering:

Fluid Properties, Continuity Equation, Laminar and Turbulent Flow, Concept of boundary layer, Flow in pipes, pipe networks, Flow measurement in channels and pipes, Energy-depth relationships, specific energy, critical flow, hydraulic jump, uniform flow, gradually varied flow and water surface profiles Hydrologic cycle, precipitation, evaporation, evapo-transpiration, watershed, infiltration, unit hydrographs, hydrograph analysis, reservoir capacity, flood estimation and routing Types of irrigation systems and methods; Crop water requirements - Duty, delta, evapo-transpiration; Gravity Dams and Spillways; Lined and unlined canals, Design of weirs on permeable foundation; cross drainage structures.

Environmental Engineering and Geomatics Engineering

Water and Waste Water Quality and Treatment, Air Pollution, Municipal Solid Wastes: 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

Transportation Engineering: Geometric design of highways, Geometric design of railway Track, Highway Pavements, Design of flexible and rigid pavement using IRC codes, Traffic studies on flow and speed, peak hour factor, accident study, statistical analysis of traffic data; Microscopic and macroscopic parameters of traffic flow, fundamental relationships; Traffic signs; Signal design by Webster's method; Types of intersections; Highway capacity.