

## **Ph. D Written Test Format and Syllabus**

Civil Engineering, Faculty of Engineering

### **Ph.D. Admission Test Format**

The written test consists of two parts.

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| 1. <b>Part A:</b> Research Methodology | 25 questions |
| 2. <b>Part B:</b> Civil Engineering    | 25 questions |

### **Part A: Research Methodology Syllabus:**

#### **Research Fundamentals:**

Meaning of research; objectives of research; characteristics of good research, Research problem: Identification, selection, and techniques for defining research problem, Research process, Research outcomes, Review of Literature, Hypothesis: Definition and Types

#### **Types of Research:**

Types of research, fundamental and applied research, qualitative and quantitative. Research Design: Types of research design – Exploratory, Descriptive, Casual Analytical

#### **Sampling, Data Collection and analysis:**

Types and sources of data: Primary and secondary, Methods of collecting data: questionnaire, interview, observation, case study, experiments etc., Sampling and sampling methods, characteristics of good sample, sampling techniques, Statistical Methods for Data Analysis: measures of central tendency and dispersion

#### **Research Report:**

Main body of report, abstract and keywords, Referencing styles and bibliography. Journal and author indexing

#### **Ethics in Research:**

Biasing: Definition and Types, Plagiarism -Definition and forms, IPR, copyright infringement, AI Generated Content

## **Part B: Civil Engineering Syllabus**

### **Structural Engineering and RCC Design:**

Analysis of determinate and indeterminate structures, bending moment and shear force, deflection of beams, columns, trusses, structural dynamics, and stability of structures. Reinforced Cement Concrete design based on Limit State Method as per relevant Indian Standards including IS 456, detailing provisions, flexure, shear, bond, torsion, slabs, beams, columns, footings, and serviceability requirements. Steel structures, prestressed concrete, earthquake resistant design, and introduction to finite element methods are also included.

### **Geotechnical Engineering:**

Physical and engineering properties of soil, soil classification, permeability, seepage analysis, compaction, consolidation, shear strength, stress distribution in soils, earth pressure theories, bearing capacity, settlement analysis, slope stability, retaining walls, shallow and deep foundations, pile foundations, and ground improvement techniques. Soil exploration methods, laboratory and field testing, geosynthetics, and applications of geotechnical engineering in foundation and infrastructure development are covered along with relevant IS code provisions.

### **Transportation Engineering and Engineering Surveying:**

Highway materials, geometric design of highways, traffic engineering, pavement design, flexible and rigid pavements, transportation planning, railway engineering, airport engineering, and tunnel engineering. Engineering Surveying includes chain surveying, compass surveying, levelling, theodolite surveying, contouring, traversing, curves, tachometry, total station, GPS, remote sensing, and GIS applications. Traffic flow characteristics, road safety measures, pavement maintenance, IRC specifications, and sustainable transportation systems.

### **Environmental and Water Resources Engineering:**

Fluid mechanics, hydraulics, hydrology, irrigation engineering, groundwater hydrology, dams and hydraulic structures, water supply engineering, wastewater engineering, solid waste management, air and noise pollution, environmental impact assessment, and sustainable development concepts are included. Design and analysis of water treatment and sewage treatment systems, water distribution networks, environmental legislation, and pollution control techniques are also emphasized for sustainable civil engineering applications.

### **Building Materials, Concrete Technology and Construction Management:**

Properties, testing, and applications of building materials including cement, lime, aggregates, bricks, steel, timber, glass, bitumen, paints, and composites. Concrete technology covering ingredients of concrete, mix design, workability, admixtures, strength, durability, curing, special concretes, and quality control. Construction planning, estimation and costing, CPM and PERT, contracts, tendering, quality



assurance, safety management, construction equipment, and modern construction practices.