

Syllabus for Written Test for Ph.D admission in Various Departments

The syllabus for written test in **all the Departments except Civil Engineering** is GATE2017 syllabus.

Syllabus for Written Test in Civil Engineering:

The Ph.D. Programs, in Full-time (FT) and Part-time (PT) modes, in Civil Engineering department are offered in the following specialisations:

1. Structural Engineering
2. Water Resources Engineering
3. Environmental Engineering
4. Geotechnical Engineering
5. Transportation Engineering
6. Remote Sensing and GIS
7. Construction Technology and Management

The written test will be conducted specialisation wise. The specialisation wise written test consist of multiple choice questions (about 40 Nos) only and duration of written test will be for **ONE HOUR** duration.

The B.Tech candidates who have applied for the PhD program in Civil Engineering are required to attend the written test in any one of the specialisations mentioned above.

The following is the syllabus for the written test (Specialisation wise).

1. Structural Engineering Structural Mechanics - Analysis of Flexure, Torsion, Shear, Compression and Tension - Analysis of Structures-Force and Stiffness methods - Concrete making materials and Technology- Design of Concrete , Steel Structures- Plastic analysis and design-Prestressed Concrete- simple and continuous beams- Structural Dynamics- Analysis of Free and Forced vibrations-Damping- Seismic design- Modal analysis-Finite Element method - Theory of Elasticity-Analysis of Stress and Strain.
2. Water Resources Engineering Fluid Mechanics-Continuity, Momentum and Energy equations- Potential flow- Laminar and Turbulent flow- Flow in Pipes-Boundary layer- Hydraulics-Energy depth relations-Specific Energy- Gradually varied flow-Unsteady free surface flow- Hydrologic Cycle-Precipitation, Evaporation, Watershed, Flood routing, Surface run-off models-Well hydraulics-Hydrograph analysis- Irrigation-Duty, Delta, Crop water requirements-Design of lined and un-lined canals.
3. Environmental Engineering Water and Waste water-Water standards-Surface water treatment-Distribution of water- Sewage and Sewerage treatment-Primary, secondary and tertiary treatment of waste water-Effluent discharge standards- Air pollution-air quality standards- Noise pollution-control and measurement-Municipal solid waste- characteristics-collection and transportation-Engineered systems for solid waste management.

4. Geotechnical Engineering

Engineering properties of soils- Compaction and Consolidation-Foundation engineering- types of foundations – Shallow foundations -bearing capacity theories-Deep foundations; Earth pressure theories and earth retaining structures; Soil dynamics- free and forced vibrations; Rock mechanics-rock mass classification- laboratory and In-situ testing- foundations on rock-tunneling. Soil exploration- sampling, drilling, in-situ tests- bore logs

5. Transportation Engineering

Urban transportation problems, travel demand estimation, Trip Generation & distribution models, mode split analysis, traffic assignment, corridor identification, stated preference methods, components of traffic system, traffic studies, microscopic & macroscopic traffic stream models, highway capacity, geometric design of traffic flow systems, design of at grade intersections, parking facilities, bicycle & pedestrian facilities-stresses in flexible & rigid pavements, design of flexible & rigid pavements, highway construction equipment, pavement construction, Evaluation of pavements, Pavement Maintenance.

6. Remote Sensing and GIS

Remote sensing - Principles and fundamentals of Image Processing; Geographical Information Systems-Fundamentals and Advances, Surveying-Advances and GNSS, Photogrammetry -principles and applications

7. Construction Technology and Management

Project Planning & Management-Network Scheduling-PERT, CPM Construction Techniques-RC & PSC, Modular construction practice-Construction Economics & Finance-Depreciation, Project appraisal Quantitative Methods in Construction Management-Linear and Dynamic programming-Construction Methods& Equipment- Equipment for Earth moving, Material transport, Pile driving, dewatering-Contract Management & Arbitration- types of contracts, disputes-Construction Materials-Concrete, polymers, Sealants