MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH & STUDIES
(Deemed to be University under section 3 of the UGC Act 1956)

Ph.D ADMISSION TEST (MR-PAT)

Ph.D. in Civil Engineering

Module 1: Structural Engineering

1.1 Advanced Concrete Technology and Material Characterization
1.2 Structural Analysis and Modelling Techniques
1.3 Seismic Design of Structures
1.4 Design of High-rise and Special Structures

Module 2: Geotechnical Engineering

2.1 Soil Mechanics and Shear Strength Parameters
2.2 Foundation Design Principles and Applications
2.3 Soil-Structure Interaction Analysis
2.4 Ground Improvement Techniques and Applications

Module 3: Transportation Engineering

3.1 Highway Geometric Design and Pavement Engineering
3.2 Traffic Flow Theory and Simulation Models
3.3 Intelligent Transportation Systems (ITS)
3.4 Road Safety Engineering and Black Spot Analysis

Module 4: Environmental Engineering

4.1 Wastewater Treatment Technologies and Reuse
4.2 Solid Waste Management and Disposal Techniques
4.3 Air Pollution Control Engineering
4.4 Environmental Audits and Impact Analysis
4.5 Environmental Impact Assessment (EIA) and Compliance

Module 5: Construction Technology and Management

5.1 Project Planning, Scheduling (CPM & PERT)
5.2 Cost Estimation, BOQ, and Tendering Procedures
5.3 Risk Assessment and Mitigation in Construction Projects
5.4 Lean Construction and Sustainable Building Practices

Module 6: Sustainable Development in Civil Engineering

6.1 Sustainable Materials and Technologies
6.2 Life Cycle Assessment in Civil Projects
6.3 Climate Change Impact on Infrastructure
6.4 Green Infrastructure and Urban Resilience
6.5 SDGs and Role of Civil Engineers

Suggested Readings:

1. *Limit State Design of Reinforced Concrete* – P.C. Varghese
2. *Principles of Geotechnical Engineering* – B.M. Das
3. *Traffic Engineering and Transport Planning* – L.R. Kadiyali
4. *Environmental Engineering* – Peavy & Rowe
5. *Construction Planning, Equipment and Methods* – R.L. Peurifoy
6. *Sustainable Construction: Green Building Design and Delivery* – Charles J. Kibert