

**Department of Civil Engineering
Institute of Technology & Engineering
Indus University, Ahmedababd**

**Ph.D in Civil Engineering
Syllabus for IURAT**

Structural Engineering

- Construction materials
- Structural Mechanics
- Concrete Technology
- Static and kinematic indeterminacy
- Analysis of determinate and indeterminate structures
- Design of concrete and steel structures
- Earthquake and wind loading and its effects on structures.
- Structural Dynamics
- Theory of Elasticity-Analysis of Stress and Strain.
- Finite element method

Construction Project Management:

- Project Planning & Management-Network Scheduling-PERT
- Modern Construction Materials;
- CPM Construction Techniques-RC,
- Modular construction practice
- Construction equipment and management Construction planning,
- Linear and Dynamic programming Construction Methods& Equipment
- scheduling techniques,
- Cost and Quality control.
- Resource Management in Construction;
- Contract Management & Arbitration

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.

Geotechnical Engineering:

- soil classification, three-phase system, fundamental definitions, relationship and interrelationships, permeability & seepage,
- Effective stress principle,
- consolidation, compaction, shear strength.
- Foundation Engineering:
- Sub-surface investigations- scope, drilling bore holes, sampling, penetration tests and plate load test. Earth pressure theories, effect of water table, layered soils.
- Stability of slopes infinite slopes, finite slopes.
- Foundation types-foundation design requirements.
- Shallow foundations bearing capacity, water table and other factors, stress distribution, settlement analysis in sands & clays.
- Deep foundations pile types, dynamic & static formulae, load capacity of piles in sands & clays, negative skin friction.

Hydraulics and Water Resources Engineering

- Hydrologic cycle, Hydrologic system model, Hydrologic processes,
- Precipitation, Infiltration, Rainfall depth, duration, distribution, Evaporation and Transpiration,
- Interception and Depression storage, Streamflow, Hydrograph analysis,
- Rainfall/runoff models (SCS CN model, Rational method), unit hydrograph, hydrologic routing models, Watershed concepts and modelling
- Design of drainage collection systems Stages in water resources planning, data collection and processing, estimation of future water demands,
- Estimation of water yield, hydro-power generation, reservoir losses,
- Water balance of a reservoir, storage requirement for conservation.
- Mass curve method, sequent peak algorithm, flood control storage capacity, reservoir routing.
- Emerging Techniques for River flow and runoff Data Acquisition and Systems Modelling.

Transportation Engineering)

- Geometric design of highways and railways
- Flexible and rigid pavements - components and design Traffic flow characteristics
- highway construction equipment
- Evaluation of pavements, Pavement Maintenance.
- Urban transportation problems, travel demand estimation
- Trip Generation & distribution models, mode split analysis, traffic assignment,
- Travel demand modelling -4 stage modelling