

Placement Preparation: Civil Engineering

A good GATE preparation book will be very helpful - especially for the written tests and also for the interviews.

Structures

Mechanics of Materials

Structural Analysis

1. **Mechanics of materials:** Stress Strain Relationships, Mohr's Circle, Flexure properties, Bending moment and Shear force diagrams for beams, Failure criteria, Torsion and buckling.
2. **Structural Analysis:** Analysis of Statically Determinate structures: Trusses, Arches, Cables; ILD, Work and Energy Methods
3. **Advanced Structural Analysis:** Analysis of indeterminate structures: conjugate beam method, consistent deformation, energy method, slope-deflection and moment distribution; Portal frames, Stiffness Method: matrix approach.
4. **Design of Steel Structures:** Limit States Design Concepts, Bearing and friction type of bolts, Welding, Concentric and eccentric connections, Tension Members, Compression Members, Laterally supported and unsupported beams, Built-up beams, Plate Girders, Composite Beams and Columns, Beam columns, Simple Beam to Column connections, column base plates.
5. **Design of Concrete Structural Systems:** LSM, WSM, Ultimate load method, Analysis & design of beams and one way, 2-way slabs for flexure, shear and torsion and analysis & design of compression members and footings.

Geotechnical Engg

Soil Mechanics

Geotechnical Engg.

1. **Soil Mechanics and Geology:** Water-Air void relationship, Soil grain and aggregate properties, Identification and classification of soils; Permeability of soils, Effective stress law, Seepage through soil including Flow Net diagrams; Capillarity of soils; Stress distribution in soils; Compaction of soils; Consolidation of soils, Consolidation theory.
2. **Geotechnical Engg:** Shear strength of soils; Site investigation and subsoil exploration; Retaining walls, Sheet piles and Bulk-heads, Earth pressure in open cuts; Stability of slopes; Bearing capacity of soils, Shallow foundations, Footings and rafts, Deep foundations.

EWRE

Hydraulic engineering

Environmental Engineering

- 1. Hydraulic Engg:** Fluid Properties, Hydrostatics, Fluid Dynamics, Classification of flows, Dimensional Analysis and hydraulic modeling, Flow through pipes: Friction loss equation, minor losses, application to networks, network design, buried pipelines. Pumping Systems, Flow in open-channels: Energy and momentum equations, specific energy, critical depth, transitions, uniform flow, gradually varied flow profile classification and computation, hydraulic jump, lined and unlined irrigation canal design. Flow Measurement: pitot tube, venturi and orifice meters, weirs and notches, pressure transducers, LDA.
- 2. Water Resources Engg:** Hydrologic Cycle, Precipitation, Evapotranspiration, Infiltration, Runoff, Design: design flood estimation, frequency analysis, flood routing, storm drainage design, Dams: types, forces, failure types and causes; design of gravity dams, Reservoirs: safe yield, capacity design, reliability, design of overflow spillway.
- 3. Environmental Engg:** Water quality: Physical, chemical and biological parameters, Characteristics of waste water, Water and wastewater quality enhancement: unit operation and processes, physical chemical and biological – Plain sedimentation, coagulation and flocculation, filtration, disinfection, softening, adsorption and reverse osmosis. Grit chamber, suspended and attached growth systems for BOD removals, conventional and advanced anaerobic systems; Activated sludge, trickling filter, rotating biological contactors, pond systems, anaerobic digester.

Transportation Engg

- 1. Material:** Highway engineering: Classification of roads, Highway planning; Geometric design – Road cross section, Sight distance and applications, Super elevation, Horizontal and vertical alignment; Types of pavements; Pavement materials – Aggregate and bitumen characteristics, Pavement design – Design elements and loads, CBR and Group Index methods, Rigid pavement design; Pavement construction and maintenance. Airport Engineering: Taxiways, runways and aprons; Wind Rose diagram, Runway orientation; Runway pavement design; Terminal area planning. Docks and Harbors: Definitions of terms, Basic planning principles,
- 2. Networks:** Traffic engineering, Road user and vehicle characteristics; Traffic volume and composition, Speed, Headway, Concentration, Delay; Flow principles; Micro and macroscopic stream characteristics; Traffic studies - Volume, Speed, Delay, O-D and Parking surveys; Statistical applications in traffic engineering; Traffic regulations and control - Traffic signs, Signals, Markings, Islands, and Rotaries; Analysis and design; Types and layout of at-grade and grade separated intersections; Parking facilities; Capacity analysis and Level of Service (LOS) for uninterrupted flow facilities – Performance measures, LOS analysis, Design; Intelligent Transportation Systems (ITS).

BTCM

- 1. Concrete Technology:** Concrete: Cement, Aggregates, Chemical and mineral admixtures; Structure and behavior of concrete; Behavior in the fresh state – workability, placement considerations and pumping, curing of concrete; Properties of hardened concrete – response to various types of loading, constitutive

relations, treatment of concrete as a composite material; High performance concrete, Self Consolidating Concrete, Reactive Powder Concrete, Fiber Reinforced Concrete, fracture mechanics of concrete.

2. **Estimation and Construction Management:** Overview of construction: Construction sequence and discrete construction activities, Construction scheduling, Network analysis, Introduction to resource leveling and allocation, Quantification of various items of construction, Reinforcement bar bending and bar requirement schedules, Principles of rate analysis, Standard data and schedule of rates approximate estimates, valuation