



HINDUSTAN PETROLEUM CORPORATION LIMITED

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CIN NO: L23201MH1952GOI008858

SYLLABUS FOR COMPUTER BASED TEST **CIVIL ENGINEERING POSITIONS**

Strength of Materials

Stress, strain, elastic constants, axial loading and deformation, torsion of circular shafts, shear force and bending moment diagrams, bending stress in beams, shear stress in beams, deflection of beams (double integration method, moment area method), columns and buckling (Euler theory), thin cylinders and spheres

Fluid Mechanics

Fluid properties, fluid statics, pressure measurement, buoyancy and stability, fluid kinematics, control volume analysis, Bernoulli's equation, laminar flow, turbulent flow, flow through pipes, boundary layer theory, dimensional analysis, similitude

Building Materials & Construction

Properties of cement, properties of aggregates, properties of concrete, timber, steel, bricks, concrete technology basics, mix design concepts, building components (foundation, walls, roofs), construction practices, formwork, scaffolding

Structural Analysis

Types of structures, determinate structures, truss analysis (method of joints, method of sections), beams analysis, frames analysis, influence lines, energy methods (Castigliano's theorem), deflection of determinate structures, indeterminate structures, force method, displacement method, slope deflection method, moment distribution method, matrix stiffness method, influence lines for indeterminate structures, introduction to structural dynamics, plastic analysis

Geotechnical Engineering

Soil formation, soil classification, phase relationships, permeability, seepage, effective stress principle, compaction, consolidation, shear strength of soils (Mohr-Coulomb theory), earth pressure theory (Rankine theory, Coulomb theory), bearing capacity of foundations, settlement analysis, shallow foundations, pile foundations, retaining walls, slope stability analysis, soil exploration methods

Transportation Engineering

Highway planning and development, traffic characteristics, geometric design of roads, pavement materials, traffic surveys, basic pavement design

Hydraulics & Hydraulic Machines

Open channel flow, uniform flow, non-uniform flow, hydraulic jumps, flow measurement in channels, turbines (Pelton, Francis, Kaplan), pumps (centrifugal pumps, reciprocating pumps)

Design of Reinforced Concrete Structures

Working stress design, limit state design, design of beams (flexure, shear, torsion), design of slabs (one-way slabs, two-way slabs), design of columns, footings, bond and anchorage, serviceability limits, detailing of reinforcement

Design of Steel Structures

Properties of structural steel, limit state design concepts, tension members, compression members, beams, beam-columns, bolted connections, welded connections, plate girders, industrial buildings

Environmental Engineering

Water quality parameters, water treatment processes, sedimentation, filtration, disinfection, water supply systems, distribution networks, wastewater characteristics, sewer design, biological treatment processes, sludge treatment, solid waste management, air pollution basics

Water Resource Engineering

Hydrological cycle, rainfall analysis, runoff estimation, flood routing, groundwater hydrology, irrigation systems, reservoir planning

Construction Planning & Management

Construction equipment, estimation, costing, CPM, PERT, resource allocation, contract management, project scheduling, risk management basics

Advanced Structural Design

Multi-storey building analysis, wind load analysis, seismic load calculation, ductile detailing, structural modeling concepts

Earthquake Engineering

Seismology basics, response spectra, dynamic analysis of structures, time period estimation, base shear calculation, IS 1893 provisions, seismic design philosophy

Prestressed Concrete Structures

Prestressing systems, losses in prestress, analysis of PSC beams, design for flexure, design for shear, end block design, cable profiles

Smart Materials & Structures

Shape memory alloys, piezoelectric materials, structural health monitoring, sensors, actuators, vibration control

NOTE: The syllabus/topics mentioned are indicative in nature. Candidates are expected to possess significant knowledge/proficiency pertaining to the relevant subjects and their qualifying degree.