

Kadi Sarva Vishwavidyalaya, Gandhinagar

PART-1 (BASIC AWARENESS AND APTITUDE ON RESEARCH) – 50 Marks

PART-2 Syllabus for Ph.D Entrance Test: Civil Engineering (Marks-50)

Structural Engineering: Bending moment and shear force in statically determinate beams. Simple stress and strain relationship: Stress and strain in two dimensions, principal stresses, stress transformation, Mohr's circle. Simple bending theory, flexural and shear stresses, unsymmetrical bending, shear centre. Thin walled pressure vessels, uniform torsion, buckling of column, combined and direct bending stresses. Structural Analysis: Analysis of statically determinate trusses, arches, beams, cables and frames, displacements in statically determinate structures and analysis of statically indeterminate structures by force/ energy methods, analysis by displacement methods (slope deflection and moment distribution methods), influence lines for determinate and indeterminate structures, Basic concepts of matrix methods of structural analysis.

Concrete Technology: properties of raw material and testing of raw materials, properties of concrete and testing of concrete, basics of mix design.

Design of Concrete Structures: Concrete design- basic working stress and limit state design concepts, analysis of ultimate load capacity and design of members subjected to flexure, shear, compression and torsion by limit state methods, Basic elements of prestressed concrete, analysis of beam sections at transfer and service loads.

Design of Steel Structures: Analysis and design of tension and compression members, beams and beam- columns, column bases, Connections- simple and eccentric, beam-column connections, plate girders and trusses, Plastic analysis of beams and frames.

Soil Mechanics: Origin of soils, 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, 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, effect of shape, 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.

Highway Engineering: Basic concepts of Highway Geometric Design, Highway materials and construction, Design of flexible and rigid Pavements

Building Construction: Arches and Lintels, Damp Proofing, Distempering and painting, Doors and Windows, Introduction to Brick Masonry, Plastering and Pointing, Scaffolding, Stairs and Staircases, Stone Masonry, Walls, White washing

Environmental Engineering: Systems of sanitation, Merits and demerits of Environmental Engineering, System of sewerage, Choice of sewerage system, Design & planning of a sewage system, Quantity of sanitary and storm sewage flow, Forms of sewers, Conditions of flow in sewers, Sewers of equivalent section, Self cleansing and limiting velocity, Hydraulic formulas for flow of sewerage in sewers

Fluid Mechanics: Properties of fluids, principle of conservation of mass, momentum, energy and corresponding equations, potential flow, applications of momentum and Bernoulli's equation, laminar and turbulent flow, flow in pipes, pipe networks. Concept of boundary layer and its growth, Uniform flow, critical flow and gradually varied flow in channels, specific energy concept, hydraulic jump. Forces on immersed bodies, flow measurements in channels, tanks and pipes, Dimensional analysis and hydraulic modelling, Kinematics of flow, velocity triangles and specific speed of pumps and turbines.

Hydrology: Hydrologic cycle, rainfall, evaporation, infiltration, stage discharge relationships, unit hydrographs, flood estimation, reservoir capacity, reservoir and channel routing, well hydraulics.

Irrigation: Duty, delta, estimation of evapo-transpiration, Crop water requirements. Design of: lined and unlined canals, waterways, head works, gravity dams and spillways, Design of weirs on permeable foundation, types of irrigation system, irrigation methods, Water logging and drainage, sodic soils.

Surveying: Importance of surveying, principles and classifications, mapping concepts, coordinate system, map projections, measurements of distance and directions, leveling, theodolite traversing, total station