SYLLBUS FOR PH.D ENTRANCE - GEOTECHNICAL ENGINEERING AND ENGINEERING GEOLOGY

Soil Mechanics: Origin of soils, soil classification, three-phase system, fundamental definitions, relationship and interrelationship, permeability and 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 and clays. Deep foundations-pipe types, dynamic & static formulae, load capacity of piles in sands & clays, negative skin friction.

Engineering Geology and Geotectonics: Rock characterisation, RMR, RQD; Rock slope stability, landslides, Bearing capacity; Plate tectonic theory and basic structural geology principles

SYLLBUS FOR Ph.D ENTRANCE – WATER RESOURCE ENGINEERING

Fluid Mechanics: Properties of fluids, Newton's law, Hydrostatic law, Pascal's law, Flow measurement devices, Buoyancy and Floatation, Ideal Fluid flow, Flow net, Boundary layer theory, Laminar and turbulent flow, Prandlt's theory

Hydraulic Engineering: Darcy's law, Bernoulli's principle, Major and minor losses in pipes, Power generation through pipe, Pipes in series and parallel, Classification of channels, Prismatic channels, Most economical sections, Distorted-undistorted models, Dimensional analysis, Buckingham's pi theorem, dimensionless numbers, model laws, Groundwater flow

Hydraulic machinery: Principle of momentum, impact of jet, working principle of Pelton Wheel, Francis and Kaplan turbines, Centrifugal and Reciprocating pumps, Velocity diagrams, Indicator diagram, Characteristic curves, Miscellaneous pumps.

Watershed management: Rainfall, Runoff, Unit hydrograph, Catchment area, Culturable command area, Crop patterns, Soil-water interaction, Duty-delta, Lacey's theory, Kennedy's theory, Irrigation works, Spillways, Dams

SYLLBUS FOR Ph.D ENTRANCE - CONSTRUCTION MANAGEMENT

Project Management: Introduction, Project life cycles, forms of organization, project feasibility, project clearances and scheduling.

Decision Analysis in Project: Selection of vendors and contractors, weighted rating, RII, Cronbach Alpha Analysis, Procurement Management.

Project Finance: Cost Estimation, NPV, IRR, Payback Period, Cash Flow.

Project Controls: Information Monitoring, Control Process, internal and external project control, performance analysis and variance.

Project Closure: Project reviews, close out manual, closing of contract.

SYLLABUS FOR PH.D. ENTRANCE – TRANSPORTATION GEOTECHNICS

Subgrade: Functions, Importance of subgrade soil properties on pavement performance, subgrade soil classification for highway engineering purpose soils as per PRA system, revised PRA system, Burmister system, Compaction system

Storm water Drainage: General principles, subsoil Drainage. Frost action soil: Frost susceptible soils, depth of frost penetration, loss of strength during frost melting. Compaction of soils, field and laboratory method of soil compaction, equipment used in field compaction. Design of surface and subsurface drainage system, pumping system, water body, holding ponds.

Flexible and Rigid Pavement Design: 1-layer, 2-layer, 3-layers theories for stresses in flexible pavements, EWLF, ESWL, Stresses in Rigid pavement: load and temperature stresses, combined stresses. Factor affecting pavement design, CBR method as specified by IRC, AASHTO method, Fatigue and rutting as a failure criterion. Joints and reinforcement requirement in rigid pavements. IRC method for rigid pavement design.

Pavement maintenance and management process: Introduction to pavement distress, types of distress, Application of system concepts to pavement management, pavement management levels-Network & Project level, functions - Data need, Pavement life cycle, assessment of pavement performance, evaluation of pavement structural capacity, distress & safety, combined measures of pavement quality, data management