INTEGRAL UNIVERSITY, LUCKNOW

Department of Civil Engineering

Syllabus for PhD Entrance Test

Structural Engineering

Concept of stress and strain, elastic constants and principle stresses, Shear force and bending moment diagrams for beams and frames, simple theory of bending, shearing stresses in beams, deflection of beams. Columns and Struts; effective length Euler's and Rankine's theory.

Static and kinematic indeterminacy, analysis of indeterminate structures by different methods, Influence line diagrams for beams and trusses. Betti's law and Maxwell's law of reciprocal deflection, analysis of two hinged and three hinged arch. Matrix method for analysis of beams and trusses

Working stress and limit states design concepts, design of members subject to flexure, shear, compression and torsion (beams, columns and isolated footings), basic elements of prestressed concrete.

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.

Free and forced vibration of a Single Degree of Freedom System. Undamped free & forced vibration of Multi Degree of Freedom Systems. Response spectrum method and Seismic coefficient method for dynamic analysis of structures.

Geotechnical Engineering

Soil classification, three-phase system, fundamental definitions, relationship and inter-relationships, permeability and seepage, effective stress principle, consolidation, compaction, shear strength.

Sub-surface investigation - scope, drilling bore holes, sampling, plate load test, earth pressure theories, stability of slopes - infinite and finite slopes; foundation types - foundation design requirements, bearing capacity, effect of shape, water table and other factors, stress distribution, settlement analysis in sands and clays, deep foundations - pile types, dynamic and static formulae, load capacity of piles in sands and clays.

20.5.17

Transportation Engineering

History of road development: road types and pattern; road alignment; Geometric Design: Cross Sectional elements, camber, shoulder, Sight distance,.

Highway Planning: Geometric design of highways, testing and specifications of paving materials, design of flexible and rigid pavements.

Traffic Engineering: traffic characteristics, traffic surveys, intersection design, traffic signs and signal design

Airport planning and design, runway orientation, wind rose diagram, estimation of runway length and corrections. Harbors, layout and port facilities, design of overlays, inland water operation.

Environmental Engineering

Drinking water standards, water requirements, basic unit operations and unit processes for surface water treatment, distribution of water. Sewage and sewerage treatment, characteristics of waste water. Primary, secondary and tertiary treatment of wastewater, sludge disposal, effluent discharge standards. Domestic wastewater treatment.

Types of air pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle energy recovery, treatment and disposal).

Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

Water Resources Engineering

Hydrostatics, applications of Bernoulli equation, Laminar and turbulent 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 measurement in channels, tanks and pipes, dimensional analysis and hydraulic modeling. Applications of Momentum equation, Potential flow, Kinematics of flow, Velocity triangles and specific speed of pumps and turbines.

Hydrologic cycle, Rainfall, evaporation, infiltration, unit hydrographs, flood estimation, reservoir design, reservoir and channel routing.

25.5.17

Construction Technology and Management

Project cycle, organizations, planning scheduling; Monitoring, updating; management system in construction, Bar charts, milestone charts, work breakdown structures and preparation of networks application of network techniques like PERT, GERT, CPM, AON and AOA techniques.

Legal aspect of contracts and their advantages and disadvantages. Different type of contacts their relative advantage and disadvantage. Elements of tender preparation, process of tender preparation, process of tendering, prequalification of contacts. Contract Negotiation and award of work. Arbitration and arbitration act, powers of arbitrator, arbitration awards.

26.5.17