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**DEPARTMENT OF CIVIL ENGINEERING**

**Ph.D. COMMON ENTRANCE TEST SYLLABUS**

1. **STRUCTURAL ENGINEERING**

* **Engineering Mechanics;**

System of forces, free-body diagrams, equilibrium equations; Internal forces in structures; Frictions and its applications; Centre of mass; Free Vibrations of un-damped SDOF system.

* **Strength of Materials**

Bending moment and shear force in statically determinate beams; Simple stress and strain relationships; simple bending theory, flexural and shear stresses, shear centre; Uniform torsion, Transformation of stress; buckling of column, combined and direct bending stresses.

* **Steel Structure**

Principles of limit state method, Built-up sections and frames, Design of connections, Design of Industrial roofs, Design of simple members and frames. Concept of plastic analysis - beams and frames.

* **Concrete Structure**

Design principle using Limit state method, Design of beams, slabs, columns, Limit state and ultimate load design concepts, Analysis of beam sections, Bond and development length. Pre-stressed concrete beams.

* **Structural Analysis**

Statically determinate and indeterminate structures, Displacement methods, Analysis of trusses, arches, beams, cables, and frames, Stiffness and flexibility methods, Influence lines. Analysis of trusses, arches, beams, cables and frames; Displacement methods: Slope deflection and moment distribution methods.

1. **CONSTRUCTION MATERIALS AND MANAGEMENT**

* **Construction Planning and Management**

Construction activity, Use of Basic principles of network - analysis in form of CPM and PERT, Quality assurance principles, Basic principles of Economic analysis and methods, Cost optimization and resource allocation, Project profitability.

* **Construction Materials**

Construction Materials: Structural Steel – Composition, material properties and behavior; Concrete - Constituents, mix design, short term and long-term properties.

1. **TRANSPORTATION ENGINEERING**

* **Surveying**

Various types of surveying (based on methods and instruments), classifications, principles of surveying, instruments required for linear measurement, minor instruments for setting out right angle.

* **Highway Engineering**

Geometric design of highways - cross-sectional elements, sight distances, horizontal and vertical alignments. Geometric design of railway Track – Speed and Cant. Concept of airport runway length, calculations and corrections; taxiway and exit taxiway design.

1. **GEO TECHNICAL ENGINEERING**

Three-phase system and phase relationships, index properties; Unified and Indian standard soil classification system; Permeability - one dimensional flow, Seepage through soils – two - dimensional flow, flow nets, uplift pressure, piping, capillarity, seepage force;

1. **HYDRAULICS AND HYDROLOGY**

* **Fluid Mechanics**

Basic Concepts and Definitions – Distinction between a fluid and a solid, Fluid as a continuum, Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity, , vapour pressure, boiling point, surface tension, capillarity, Bulk modulus of elasticity, compressibility.

* **Hydrology**

Scope of Hydrology, Hydrological Cycle, Water-Budget Equation, Forms of precipitation, Measurement of Precipitation, Rain-gauge Network, Preparation and Presentation of Rainfall Data, Mean Precipitation over an area, Depth-Area-Duration Relationship, Intensity.

1. **ENVIRONMENTAL ENGINEERING**

Need for protected water supply. Demand of Water: Types of water demands -domestic demand, industrial, institutional and commercial, public use, fire demand, Factors affecting per capita demand, Variations in demand of water, Peak factor, Design period and factors governing design period.

**REFERENCE TEXT BOOKS:**

1. Design of Steel Structures by N. Subramanian,Oxford University Press
2. Limit state design of steel structures, McGraw Hill Education (India)publisher.
3. Reinforced concrete structures (Limit state design), ASIN: B079ZYBGDX · Publisher: STANDARD BOOK HOUSE SINCE 1960; 3rd edition (22 February 2018).
4. Construction Planning And Management by P S Gahlot, B M Dhir , New Age International (P) Ltd., Publishers
5. Engineering Mechanics by S.S Bhavikatti,.New Age Engineering Mechanics, (English, Papaerback, S S Bhavikatti).
6. Transportation Infrastructure Engineering, Lester Hoel , By (author) Nicholas Garber , By (author) Sadek, A Multimodal Integration, SI Version,Publication City/Country Florence, KY, United States.
7. Textbook of Soil Mechanics and Foundation Engineering Geotechnical Engineering Series (PB 2018) Paperback – 1 January 2018. by Murthy V. N. S. (Author), C B S Publishers.
8. Construction Materials, Methods and Techniques 3Rd Edition by Spence, Thomson India.
9. Fundamentals of Solid Mechanics, A Treatise on Strength of Materials by M L Gambhir Publisher; Phi Learning Pvt. Ltd-New Delhi.
10. Engineering Hydrology – Subramanya.K; Tata Mcgraw Hill NewDelhi-2008 (Ed)
11. Dr. P N Modi and Seth, Hydraulics and Fluid Mechanics Including Hydraulic Machines, Standard Book House, Delhi, 2015.
12. Garg, S.K. Environmental Engineering, Vol.I, Khanna Publishers, New Delhi, 2010
13. Surveying – Vol. – I, B.C. Punmia, Ashok Kumar Jain, Lakshmi Publication, 2016.