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AKTU B.E./B.Tech CIVIL Sem 7 syllabus

Design of Structure-III

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UNIT - 1 Introduction to steel structures

Advantages and Disadvantages of Steel as a Structural Material. Stress-Strain Curve for Mild Steel, Rolled Steel Sections, Convention for Member Axes, Loads, Dead Load, Live Loads, Environmental Loads, Seismic Forces, Snow and Rain Loads, Erection Loads, Basis for Design, Design Philosophies, Local Buckling of Plate Elements. Introduction to Limit State Design, Limit States of Strength, Limit States of Serviceability, Actions (Loads), Probabilistic Basis for Design.

UNIT - 2 Introduction to Riveted, Bolted and Pinned Connections

Riveted Connections, Patterns of Riveted Joints, Bolted Connections, Types of Bolts, Types of Bolted Joints, Load Transfer Mechanism, Failure of Bolted Joints, Specification for Bolted Joints, Bearing-Type Connections, Prying Action, Tensile Strength of Plate, Efficiency of the Joint, Combined Shear and Tension, Slip-Critical Connections, Combined Shear and Tension for Slip-Critical Connections, Working Load Design, Design of eccentric bolted connections . Simple Welded Connections, Types, Symbols, Welding Process, Weld Defects, Inspection of Welds, Assumptions in the Analysis of Welded Joints, Design of Groove Welds, Design of Fillet Welds, Fillet Weld Applied to the Edge of A Plate Or Section, Fillet Weld for Truss Members, Design of Intermittent Fillet Welds, Plug and Slot Welds, Stresses Due To Individual Forces, Combination of Stresses, Failure of Welds, Distortion of Welded Parts, Fillet Weld Vs Butt Weld, Welded Jointed Vs Bolted and Riveted Joints, Design of eccentric welded connections.

UNIT - 3 Introduction to Tension Members

Types of Tension Members, Net Sectional Area, Effective Net Area, Types of Failure, Design Strength of Tension Members, Slenderness Ratio (λ), Displacement, Design of Tension Member, Lug Angles, Splices, Gusset Plate.

UNIT - 4 Introduction to Compression Members,

Effective Length, Slenderness Ratio (λ), Types of Sections, Types of Buckling, Classification of Cross Sections, Column Formula, Design Strength, Design of Axially Loaded Compression Members, Built-Up Columns (Latticed Columns), Lacing, Batten, Compression Member Composed of Two Components Back-to-Back, Splices, Design of Column Bases.

UNIT - 5 Introduction to Beams

Types of Sections, Behaviour of Beam in Flexure, Section Classification, Lateral Stability of Beams, Lateral-Torsional Buckling, Bending Strength of Beams, Laterally Supported Beams, Laterally Unsupported Beams, Shear Strength of Beams, Web Buckling, Bearing Strength, Web Crippling, Deflection, Design Procedure of Rolled Beams, Built-Up Beams (Plated Beams), Purlins, Beam Bearing Plates, Effect of Holes in Beam, Introduction to Plate Girder, Introduction to Gantry Girder.

Water Resources

UNIT - I

Hydrology: Hydrological Cycle and its components; Water Budget Equation, Precipitation: Types, measurements and analysis, Evaporation and consumptive use: estimation and measurement techniques.

Irrigation: Necessity and types, Advantages & disadvantages of irrigation; Functions of water in plant growth, Methods of Irrigation, Water requirement of crops, Duty and Delta relationship; Irrigation frequency; Irrigation efficiencies; Principal crops and crop season, crop rotation.

Canal irrigation: Classes and alignment, Parts of a canal system,

Command area, curves in channels, channel losses.

Introduction to Sediment Transportation: Suspended and Bed load and its estimation.

UNIT - II

Irrigation channels and Design: Types: lined and unlined, silt theories: Kennedy's and Lacey's Design procedure for irrigation channels, longitudinal cross section, Schedule of area statistics and channel dimensions, cross sections of an Irrigation channel, Lining of Irrigation Canals: Advantages and types; factors for selection of a particular type, design of lined channels, cross section of lined channels, Economics of canal lining. Water Logging and Drainage Design: effects, causes and anti-water logging measures, Drainage of water logged land.

UNIT - III

Regulation and control of canal system: Purpose, Types of canal regulation works and their functional aspects
Irrigation Outlets: Requirements, types, non-modular, semi-module and rigid module, selection criterion
River Training: Objective and need, classification of rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discharge.
Types of Head works: Component parts of a diversion headwork, Failure of hydraulic structures founded on permeable foundations, Principles of design, Bligh's theory, Khosla's theory for determination of pressure and exit gradient. Regulation Works: Falls, Classification; Introduction to design principle of falls, Design of Sarda type and straight glacis fall. Principle and design of Distributory head regulator and cross regulator, canal escape, Bed bars.

UNIT - IV

Canal head works: Functions, Location, Layout of head works. Weir and Barrage, Canal head Regulator, Introduction to the design principles of Weirs on permeable foundations, Design of vertical drop and sloping glacis weir.
Cross drainage works: Necessity and types; Aqueduct, Siphon Aqueduct, super passage, canal siphon, level crossing, Introduction to

design principles of cross drainage works. Investigation and planning of dams and Reservoirs: Zones of storage, Estimation of storage capacity, Reservoir losses, Reservoir sedimentation and its control, life of a reservoir.

UNIT - V

Dams: classification and selection criteria.

Earth Dams: Classification, causes of failure, Phreatic line, and its determination Introduction to stability analysis

Gravity dams: Forces method of analysis, modes of failure and factor of safety, Elementary profile, stability analysis, galleries, joints, control of cracks.

Spillways: Spillway capacity, types of spillways, Design of ogee spillway, Energy dissipation below spillway, Design criteria for Hydraulic Jump type stilling basins with horizontal and sloping aprons, spillway gates.

Hydro-Electric Power: assessment of potential in reference to India, classification of power plants, important terms, types of turbines and their suitability; Power House layout and important structures of a powerhouse.

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