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| CE123 Concrete Structure  | **L-T-P** **2-0-2** **3 credit**  |
| Basic Material Properties & Design Concept: Introduction to Concrete Technology, Composition of Concrete and the properties, Strength and Durability, Modulus of Rupture, Creep and Shrinkage of Concrete, Reinforcing Bars, Types and grade, Stress-Strain Diagram of Steel and Concrete. Concrete Mix Design: Nominal Mix and Design Mix. Design Philosophies, Working Stress Method, Limit State Method, Various Limit States. 4 Lectures Design for Flexure: Introduction, assumption, flexure design of singly reinforced & doubly reinforced and T- beams by Limit State Methods. IS-Coded provisions, Numerical Problems. 4 Lectures Design for Shear, Bond: Shear failure of beams. Shear reinforcement, Curtailment of reinforcement. Bond, Anchorage and Development length, IS-Code provisions, Design of a beam with flexural and shear consideration. Reinforcement Detailing, Numerical Problems. 4 Lectures Design of Compression Members: Short and Long Columns, IS-Code Provisions, Design of Short Columns under Axial compression, Design of Columns under bi-axial bending, use of interaction diagram for design. Lateral ties. Reinforcement Detailing, Numerical Problems. 4 Lectures Design of Footing: Isolated footings for rectangular and circular columns. Reinforcement Detailing, Numerical Problems. 4 Lectures Design of Slabs & Stairs: Effective span, one way and two way slabs. Design of Slabs with various boundary conditions by IS-Code methods. Reinforcement Detailing, Numerical Problems. Types of stairs, Design of Dog Legged & Open Wall Stairs. Reinforcement Detailing, Numerical Problems. 4 Lectures Introduction to Pre-stressed Concrete: Introduction to Pre-stressed Concrete, Pre and Post tensioning systems, Advantages, Basic design concept of Pre-stressed concrete beam, Analysis of prestress and bending stress, Resultant Stress, Thrust Line, Concept of Load balancing, Various losses of stresses. Simple Numerical Problems 4 Lectures  |
| Reference Books: 1. IS 465: 2000. 2. SP-16 3. SP-34 Note: 1. All the Design of Concrete Structural Elements must be based on “Limit State Method” 2. Students are allowed to bring IS 465: 2000 and SP-16 in the examination hall for referring the design solutions. 1. B. C. Punmia; Reinforced concrete structure (Vol - I).  |
| 2. S. UnnikrishnaPillai&DevdasMenon; Reinforcement Concrete Design, Tata McGraw Hill, New Delhi. 3. N.KrishnaRaju; Structural Design and Drawing, Reinforced Concrete and Steel, University Press (India) Ltd. 4. A.M.Nevill; Properties of Concrete 5. Mallick and Gupta; Reinforced Concrete. 6. P.C.Varghese; Limit State Design of Reinforced Concrete Structures. 7. M.K.Hurst, Prestressed Concrete Design, Chapman Hall. 8. James R. Libby, Prestressed Concrete Design and Construction, The Ronald Press Company. 9. N.KrishnaRaju; Prestressed Concrete, Tata McGraw Hill, New Delhi.  |