Course Content for CE503PC: Structural Engineering – I (RCC)

B.Tech. III Year I Sem. L T P C

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Course Objectives:

- • Identify the basic components of any structural system and the standard loading for the RC structure.
- • Identify and tell the various codal provisions given in IS. 456.
- • Describe the salient feature of limit state method, compare with other methods and the concepts of limit state of collapse and limit state of serviceability.
- • Evaluate the behaviour of RC member under flexure, shear and compression, torsion and bond.

Course Outcomes:

- • Compare and Design the singly reinforced, doubly reinforced and flanged sections.
- • Design the axially loaded, uniaxial and biaxial bending columns.
- • Classify the footings and Design the isolated square, rectangular and circular footings.
- • Distinguish and Design the one-way and two-way slabs.

UNIT - I

- Introduction- Structure - Components of structure - Different types of structures - Equilibrium and compatibility – Safety and Stability - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load – Forces – What is meant by Design? – Different types of materials – RCC, PSC and Steel – Planning of structural elements - Concepts of RCC Design – Different methods of Design - Working Stress Method and Limit State Method – Load combinations as per Limit state method - Materials - Characteristic Values – Partial safety factors – Behaviour and Properties of Concrete and Steel - Stress Block Parameters as per IS 456 -2000.
- Limit state Analysis and design of sections in Flexure – Behaviour of RC section under flexure - Rectangular, T and L-sections, singly reinforced and doubly reinforced Beams – Detailing of reinforcement

UNIT – II

- Design for Shear, Bond and Torsion - Mechanism of shear and bond failure - Design of shear using limit state concept – Design for Bond – Anchorage and Development length of bars - Design of sections for torsion - Detailing of reinforcement

UNIT - III

- Design of Two-way slabs with different end conditions, one-way slab, and continuous slab Using I S Coefficients - Limit state design for serviceability for deflection, cracking and codal provisions.

UNIT – IV

- Design of compression members - Short Column - Columns with axial loads, uni-axial and bi-axial bending – Use of design charts - Long column – Design of long columns - I S Code provisions.

UNIT – V

- Design of foundation - Different types of footings – Design of flat isolated square, rectangular, combined footings for two columns.

TEXT BOOKS:

- • Limit state design of reinforced concrete – P.C. Varghese, PHI Learning Pvt. Ltd.
- • Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill.
- • Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers.

REFERENCE BOOKS:

- • Reinforced concrete structures, Vol. 1, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd.
- • Fundamentals of Reinforced concrete design by M. L. Gambhir, Prentice Hall of India Pvt.Ltd.
- • Design of Reinforced Concrete Structures by N. Subramanian, Oxford University Press.
- • Design of concrete structures by J.N. Bandhyopadhyay, PHI Learning Private Limited.
- • Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & Company.
- • Design of Reinforced Concrete Foundations – P.C. Varghese, Prentice Hall of India.