Devi Ahilya University, Indore, India Institute of Engineering & Technology				II Year B.E. (Civil Engg.) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
VLR4C4 : Design of RCC Structures – I	L	T	P	L	T	P	Total
Duration of Theory Paper: 3 Hours	3	1	2	3	1	1	5

Learning Objectives:

1 . To bring about an understanding of the behavior of reinforced concrete.

2 . To bring about an understanding of the design philosophies.

3 . T o perform analysis and design of reinforced concrete members.

COURSE CONTENTS

Unit-I.

Basic Principles of Structural Design : Basic concepts of Reinforced concrete, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design, Partial load factors. Neutral Axis Depth, limiting values of neutral axis for different grades of steel, Balanced, Under Reinforced and Over Reinforced Sections, Limit state of collapse in flexure, assumptions, stress strain curves for concrete and steel, Stress block, Moment of Resistance of beam Sections.

Unit-II.

Design of Beams by L.S.M: Limit state of collapse in shear, design shear strength of concrete, design strengths of vertical / inclined stirrups and bent up bars in, Design of beam for flexure, shear and bond. Design of singly reinforced rectangular beams, Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement, Redistribution of moments in continuous beams.

Unit-III.

Design of slabs by L.S.M : Classification of slabs , Effective spans ,Imposed loads on slabs (IS: 875), strength and stiffness requirements, minimum and maximum permitted size, spacing and area of main and secondary reinforcement as per IS 456 -2000, Design of one way cantilever, simply supported, slabs and sunshades, Design of continuous slabs using B.M coefficients, check for stiffness, curtailment of tension reinforcement, Tension and torsion reinforcement requirement.
Design of two way slab.

Unit -IV.

Design of columns by L.S.M: Classification of Columns, Limit state of collapse in compression, assumptions, limiting strength of short**,** axially loaded compression members, effective length of compression members, slenderness limits for columns, minimum eccentricity for column loads, longitudinal and transverse reinforcement as per I S 456-2000, Design of axially loaded short columns with lateral ties / helical reinforcement,

Design of column footings Types of footings, Footings with uniform thickness and sloped footings, minimum thickness, critical sections, minimum reinforcement, distribution of reinforcement, development length, anchorage, cover, minimum edge thickness requirements as per IS 456-2000 – Design of isolated footing (square and rectangular) and combined footings by limit state,

Unit -V.

Design of Staircases by L.S.M: Types of stairs according to geometry and structural behavior planning a staircase, effective span of stairs, effective breadth of flight slab, distribution of loads on flights Staircases with waist slab having equal and unequal flights with different support conditions, Slab less tread-riser staircase.

NOTE: - All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids)

Suggested Books: -

1. Plain & Reinforced Concrete Vol. I & II – O.P. Jain & Jay Krishna
2. Limit State Design by P.C.Varghese ; Prentice Hall of India, New Delhi
3. Design of Reinforced Concrete Elements by Purushothman; Tata McGraw Hill, New Delhi
4. Reinforced Cement Concrete by Gupta & Mallick, Oxford and IBH
5. Reinforced Cement Concrete by P. Dayaratnam, Oxford and IBH
6. Plain & reinforced concrete - Rammuttham
7. Plain & reinforced concrete – B.C. Punnia
8. Structural Design & Drawing by N.K.Raju.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Understand the general mechanical behavior of reinforced concrete.
2. To understand the principles involved in analysis and design of reinforced concrete structures.
3. Analyze and design reinforced concrete flexural members.
4. Analyze and design reinforced concrete compression members.
5. Analyze and design for vertical and horizontal shear in reinforced concrete.
6. Analyze transfer and development length of concrete reinforcement.
7. Analyze and design for deflection and crack control of reinforced concrete members.
8. To employ the code of practice for design of reinforced concrete structural members and elementary structural systems.