

20CE3501 – DESIGN OF REINFORCED CONCRETE STRUCTURES

Offering Branches	CE		
Course Category:	Professional Core	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	20CE3404-Mechanics of Solids	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Demonstrate the knowledge of concrete design philosophies, by working and limit state methodology	K2
CO2	Apply the principles, procedures and current code requirements to the analysis and design of reinforced concrete beams under flexure by limit state method.	K3
CO3	Identify the behavior of reinforced concrete members in bond, anchorage, shear and torsion and design the sections for shear and Torsion	K6
CO4	Analyze and design reinforced concrete One way and Two way slabs.	K6
CO5	Analyze and design reinforced concrete compression members.	K6

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2		2		2			2		2	2	
CO2	2	2	2		2		2			2		2	2	
CO3	3	3	3		3		3			3		3	3	
CO4	2	2	2		2		3			3		3	2	
CO5	2	2	2		2		3			3		3	2	
Avg.	2	2	2		2		2			2		2	2	

1- Low

2-Medium

3-High

Course Content

UNIT-1	Loading standards as per IS 875, grades of steel and concrete, introduction to working stress, ultimate load and limit state methods. Working stress method: Assumptions, flexure of RCC beams of rectangular section, under reinforced, balanced and over-reinforced sections, analysis and design of singly reinforced beams of rectangular sections using working stress method.	CO1
UNIT-2	Limit State Method: RCC beams of rectangular sections under flexure, under reinforced, balanced and over-reinforced sections, analysis and design of singly and doubly reinforced beams of rectangular sections; Design of T beams: effective flange width, analysis and design of T-beams.	CO2
UNIT-3	Shear and Torsion: Limit state of collapse in shear, types of shear failures, truss analogy, shear, span/depth ratio, calculation of shear stress, types of shear reinforcement, design for shear in beams, analysis for torsional moment in a member, torsion shear stress in rectangular sections, reinforcement for torsion in RCC beams.	CO3
UNIT-4	Design of one-way and two-way slabs (using IS 456), method of analysis, classification of slabs, design of one way simply supported slab, behavior of two way slab, types of two way slabs, analysis of two way slabs, design of two way slabs with different edge conditions.	CO4
UNIT-5	Columns: Short columns, minimum eccentricity, column under axial compression, analysis and design of short columns subjected to uniaxial moment, analysis and design of short columns subjected to bi- axial moments. Footings: Design of isolated footings for a column subjected to axial loading.	CO5

Learning Resources

Text Books	1. Pillai and Menon, Reinforced Concrete Design, 3/e, Tata McGraw Hill, 2017.
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	2. A.K. Jain, Reinforced Concrete – Limit State Design, 7/e, Standard book house, 2012.
Reference Books	1. P.C. Varghese, Limit State Design of Reinforced Concrete, 2/e, Prentice Hall of India, 2013. 2. N. Subramanian, Design of Reinforced Concrete Structures, Oxford University, 2014.
e- Resources & other digital material	1. https://nptel.ac.in/courses/105105105/1 2. https://nptel.ac.in/downloads/105105104/