

Code: 20CE3501

**III B.Tech - I Semester – Regular / Supplementary Examinations
NOVEMBER 2024**

**DESIGN OF REINFORCED CONCRETE STRUCTURES
(CIVIL ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.

2. All parts of Question must be answered in one place.

BL – Blooms Level

CO – Course Outcome

Use of IS: 456-2000 and SP – 16 design charts are permitted.

			BL	CO	Max. Marks
UNIT-I					
1	a)	Construct a short note on working stress method and ultimate load method.	L3	CO1	7 M
	b)	A singly reinforced concrete beam is of width 400 mm and effective depth 615 mm. It is reinforced with 8 Nos. 20 mm mild steel bars. Assuming M-25 concrete, and Fe-250 grade of steel. Predict its moment of resistance according to the working stress method.	L2	CO1	7 M
OR					
2		A concrete beam has 300 mm breadth and 535 mm effective depth; effective cover 50 mm, reinforced with 3 nos. 20 mm diameter steel bars at tension side. M20 concrete and Fe 415 grade steel are used. Predict the moment of resistance.	L2	CO1	14 M

UNIT-II					
3	a)	Show the different 'limit states' to be considered in reinforced concrete design.	L3	CO2	7 M
	b)	Demonstrate expression for depth of neutral axis in limit state method.	L3	CO2	7 M
OR					
4		Calculate the moment of resistance of the beam having dimension as 300 x 550 mm (effective). The beam is reinforced with 1963mm ² of steel in the tension zone. Use M20 concrete and Fe415 steel.	L3	CO2	14 M
UNIT-III					
5	a)	Discuss the types of shear reinforcements in the beams with neat sketches.	L2	CO3	7 M
	b)	A simply supported R.C beam 230mm wide and 450mm overall depth is reinforced with four number of 16mm diameter bars. Design the shear reinforcement, if the shear force at service state is 180kN Use M20 grade concrete and Fe415 grade steel.	L6	CO3	7 M
OR					
6		Estimate the equivalent shear and equivalent bending moment in a rectangular beam section, 350 mm wide and 750 mm deep, subjected to an ultimate twisting moment of 140 kNm combined with an ultimate bending moment of 200 kN m and an ultimate shear force of 110 kN. Assume M25 grade concrete, Fe415 grade steel and mild exposure conditions.	L5	CO3	14 M

UNIT-IV				
7	Analyze moment and shear of a reinforced concrete slab for a room of clear dimensions 4m x 5m. The slab is supported on walls of width 300 mm. The slab is carrying live load of 4kN/m^2 and floor finish 1kN/m^2 . Use M20 concrete and Fe415 steel. The corners of slab are held down.	L4	CO4	14 M
OR				
8	Design a simply supported slab to cover a room with internal dimensions 4m x 6m and 230mm thick brick walls all around. Assume live load of 3kN/m^2 and a finish load of 1kN/m^2 . Assume that the slab corners are free to lift up. Use M20 grade concrete and Fe415 grade steel.	L6	CO4	14 M
UNIT-V				
9	A corner column 400 mm x 400mm located in the lowermost storey of a system, is subjected to factored loads: $P_u = 1300\text{ kN}$. The unsupported length of the column is 3.5 m. Design the reinforcement in the column, assuming M25 concrete and Fe415 steel.	L6	CO5	14 M
OR				
10	Design an isolated footing for square column 450 mm x 450 mm reinforced with 8-25 mm dia bars carrying a service load of 2300 kN. Assume soil with safe bearing capacity of 300 kN/m^2 at a depth of 1.5 m below ground. Assume M25 grade concrete and Fe415 steel for both column and footing.	L6	CO5	14 M