PRN:		Course Code:	P68PC103

First Year M. **Tech** End Semester Examination Winter 2024 000413

Advanced Design of Concrete Structures

Day and Date: Wed - 4 Dec 2024 Max Marks: **50**

Time: 10:30AM To 12:30PM Duration: **03** hrs

Instructions: 1) All questions are compulsory.
2) assume suitable data wherever necessary.
3) Figures to the right indicate full marks.
4) Use of IS:456, IS:1343 IS: 1893 and Sp:16 allowed

		Marks	Bloom's Level	CO
Q.1	**Attempt any one from the following**			
a)	A braced Column of M20 grade Concrete has 300mm dia. & has 7.5m. Unsupported length & 5.8m effective length the Column is Subjected to an axial load Pu = 700kN. Find the area of reinforcement required Using Fe415 Steel Provide Effective Cover Of 60mm.	10	L4	CO1
b)	Design the reinforcement for a R.C. column 250mm X 400mm in Section for the following data- Pu = 1000 kN, L= 6m, Leffx =4.8m, Leffy = 4.0m, Mux2 = 30 kN.m at top & Mux1=20kN·m at bottom, fy = 415N/mm², Muy = 10kN.M at top of bottom. Column is braced & bends into Single Curvature Assume, mild environment.	10	L4	CO1
Q.2	**Attempt any one from the following**			
a)	An orthotropic reinforced concrete and grid 16m x 20m is required for the roof of an auditorium. The ribs are spaced at 2m intervals. Live load on roof 1.5 kN/ m². Adopt M 20 grade concrete and Fe 415 HYSD bars. Design suitable reinforcements in the grid beams and sketch the details of reinforcements.	10	L5	CO2
b)	R.C. grid floor is to be designed to cover a floor area of 12 m x18 m. The spacing of the ribs in mutually perpendicular directions is 1.5 m c/c. Live load on floor is 3 kN/m². Adopt M20 grade concrete and Fe-415 grade HYSD bars. Assume ends are simply supported. Analyze the grid floor by IS 456: 2000 method and design suitable reinforcements in the grid floor.	10	L5	CO2
Q.3	**Attempt any one from the following**			
a)	Design a flat bottom circular elevated water tank of diameter 10 m and total height 4 m which is to be supported by ring beam of 7.5 m diameter. The ring beam is to be supported by six columns equally placed. Use M25 concrete and Fe 415 steel. Design the following components of the water tank. a) Top Dome b) Top ring beam.	10	L6	CO4

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	b)	Design a flat bottom circular elevated water tank of diameter 8 m and total height 3 m which is to be supported by ring beam of 6 m diameter. The ring beam is to be supported by six columns equally placed. Use M25 concrete and Fe 415 steel. Design the following components of the water tank. a) Top Dome b) Top ring beam.	10	L6	CO4
Q.4		**Attempt the following (Any One)**			
	a)	Design the typical interior panel of a flat slab floor of size 5 m x 5m with suitable drop to support a live load of 4 kN/m. The floor is supported by columns of size 450 mm x 450 mm. Use M20 concrete and Fe 415 steel. Sketch the reinforcement details by showing cross sections (i) at column strip (ii) at middle strip.	10	L5	CO3
	b)	A flat plate panel of dimensions 6 m × 6 m supported by columns of size 450 mm × 450 mm has a slab thickness of 150 mm and is designed for a working (total) load of 10 kN/m². Check the safety of the slab in punching shear and provide shear reinforcement, if required. Assume M20 Concrete and Fe 415 steel.	10	L5	CO3
Q.5		**Attempt the following (Any One)**			
	a)	Design a single span deep beam using the following data: - Effective span of beam = 6m Overall depth = 6m Width of support =0.6m Width of beam = 0.4m UDL including self-weight = 400kN/m Use fck = 20N/mm² & fy = 415 N/mm² steel. Sketch the detail of reinforcement at center of span & support sections.	10	L4	CO3
	b)	Design a typical interior span of continuous deep beam using the following data. Span of beam = 9m Overall depth = 4.5m Width of beam = 0.4m Width of support= 0.9m Uniformly distributed load including self-weight 200kN/m. Use M20 concrete and Fe415 steel. Sketch the details of reinforcement at center of span & support section	10	L4	CO3

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