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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Civil Engineering **Duration: 3 hrs.**

Course Code: 23CV5PCDRC / 22CV5PCDRC **Max Marks: 100**

Course: Design of RC Structural Elements

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.
3. Use of IS 456-2000 and charts 31 to 38, 43 to 50, 63 to 65 of SP16 & IS875-2(1987) permitted.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Explain briefly i) Partial safety factor ii) Limiting depth of neutral axis iii) Moment of resistance	*CO1*	*PO1*	**06**
	b)	An RC of size 300 x 500 mm is reinforced with 3 bars of 20mm diameter in the tension zone and 2 bars of 16 mm diameter in the compression zone. Calculate the allowable point load that can be applied at the midspan of a simply supported beam of effective span 6 m. Assume M25 grade concrete mix, Fe-415 grade steel. Assume exposure level as moderate.	*CO1*	*PO2*	**14**
		OR			
2	a)	Explain the development length with the help of a neat sketch. Also mention the reasons for providing development length.	*CO1*	*PO1*	**6**
	b)	An isolated simply supported T-beam has a flange width of 2400mm and flange thickness of 120mm. The effective span of beam is 3.6m. The effective depth of beam is 580mm and web width is 300mm. If A_{st} = balanced steel, determine the maximum safe UDL the beam can carry. Use M20 concrete and Fe415 steel.	*CO1*	*PO2*	**14**
		UNIT - II			
3		Design a rectangular beam for flexure and shear to carry an UDL of 12 kN/m all-inclusive over a clear span of 4 m. Beam is supported on a 230 mm thick wall. Adopt M20-grade concrete and Fe-415-grade steel.	*CO2*	*PO2,3*	**20**
		OR			
4	a)	Explain with sketches, the various modes of shear failure of an RC beam	*CO1*	*PO1*	**6**
	b)	A R.C beam has cross section 300mm X 600 mm and is subjected to the following design forces: bending moment=115	*CO2*	*PO1,2,*	**14**

			kN-m, shear force=95 kN and torsional moment =45 kN-m. Design longitudinal and shear reinforcement for the section. Assume M25 concrete and Fe 415 steel.		*3*	
			UNIT - III			
	5	a)	Distinguish between one way slab and two-way slab	*CO1*	*PO2,3*	**04**
		b)	Design a simply supported one-way slab over a clear span of 3.5m. It carries a live load of 4 kN/m^2 and a floor finish of 1.5 kN/m^2. The width of the supporting wall is 230 mm. Adopt M25-grade concrete and Fe-500-grade steel. Apply the necessary checks and sketch the reinforcement details.	*CO2*	*PO1,2, 3*	**16**
			OR			
	6		Design a unrestrained slab for a hall measuring 4mx6m (clear) simply supported on all sides on 230 mm thick walls to carry a live load of 3kN/m$^{2.}$ Adopt M20-grade concrete and Fe-415grade steel. Sketch the reinforcement details.	*CO2*	*PO1,2, 3*	**20**
			UNIT - IV			
	7	a)	Explain the difference between short column and long column?	*CO1*	*PO2,3*	**04**
		b)	Design a rectangular column of 3.5 m unsupported length, restrained in position and direction at both ends, to carry an axial load of 1500 kN. Use M25-grade concrete and Fe500 grade steel. Apply the necessary checks and show the reinforcement details of the column.	*CO2*	*1,2,3*	**16**
			OR			
	8	a)	What is the role of transverse reinforcement in columns? State the provisions of IS 456 with regard to design of transverse reinforcement.	*CO1*	*1*	**6**
		b)	Design a rectangular column of size 300x400 mm to carry an axial load of 1000 kN with a uniaxial bending of 50 kN-m about the major axis. Use M20 grade concrete and Fe 415 steel. Provide reinforcement equally on all faces. Sketch the details of reinforcement.	*CO2*	*PO1,2, 3*	**14**
			UNIT - V			
	9		Design a dog legged stair for a building in which the vertical distance between floors is 3.4 m. The stair hall measures 2.5 m x 5 m (clear). The live load may be taken as 1.75kN/m^2. Use M25 grade concrete and Fe 500 steel. The landing slab rests on 230 mm thick wall. Show the reinforcement details.	*CO2*	*PO1,2, 3*	**20**
			OR			
	10		Design a rectangular isolated footing of uniform thickness for an RC column bearing a vertical load of 600 kN and having a size of 400 mm x 600 mm. The safe bearing capacity of the soil may be taken as 120 kN/m^2. Use M25 concrete and Fe 500 steel. Sketch the reinforcement details.	*CO2*	*PO1,2, 3*	**20**

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