

**P.E.S. College of Engineering, Mandya - 571 401***(An Autonomous Institution affiliated to VTU, Belagavi)***Second Semester, M. Tech - Civil Engineering (MCAD)****Semester End Examination; October -2022****Structural Design - RCC Structures**

Time: 3 hrs

Max. Marks: 100

**Course Outcomes***The Students will be able to:**CO1: Apply the concept of redistribution of moments in design.**CO2: Design a flat slabs and waffle slabs subjected to various load combinations.**CO3: Analyze a complex civil engineering structure consisting of structural elements mentioned above.**CO4: Design RCC deep beam, bunkers and silos using Janssen's Airy is theory.***Note: I) Answer any FIVE full questions, selecting ONE full question from each unit.****II) Any THREE units will have internal choice and remaining TWO unit questions are compulsory.****III) Each unit carries 20 marks.****IV) Use of IS456-2000 is permitted. Assume any missing data.**

Q. No.	Questions	Marks	BLs	COs	POs
<b>UNIT - I</b>		<b>20</b>			
1 a.	Design a two span continuous beam of clear span 6 m supported stone masonry of 330 mm wide. Thickness of concrete slab is 150 mm, spacing of continuous beam is 3 m c/c, live load is 4 kN/m <sup>2</sup> and finishing load is 0.4 kN/m <sup>2</sup> . Allow 15% redistribution of moments. Sketch reinforcement details. Use M20 grade concrete and Fe 415 grade steel.	20	L4	CO1,2	PO1,2
<b>OR</b>					
1 d.	Design a two span continuous beam of span 8 m to carry a factored uniformly distributed load of 75 kN/m. Allow 30% redistribution of moments. Sketch reinforcement details. Use M25 grade concrete and Fe 500 grade steel.	20	L4	CO1,2	PO1,2
<b>UNIT - II</b>		<b>20</b>			
2 a.	Design an interior panel of a flat slab of size 5 m x 5 m supported by columns of size 500 mm x 500 mm without providing drop and column head. Consider live load and finishing load as 5 kN/m <sup>2</sup> . Sketch the reinforcement details. Use M20 grade concrete and Fe 415 grade steel.	20	L4	CO2,3	PO1,2
<b>OR</b>					
d.	Design an interior panel of a flat slab of size 6 m x 6 m supported by columns of size 500 mm diameter providing suitable drop and column head. Consider live load and finishing load as 5 kN/m <sup>2</sup> . Sketch reinforcement details. Use M20 grade	20	L4	CO2,3	PO1,2

**UNIT - III**

- 3 a. The roof of an 8 m wide hall is supported on a portal frame spaced at 4 m intervals. The height of the portal frame is 4 m. Continuous slab is 120 mm thick. Live load on roof is  $1.5 \text{ kN/m}^2$ , Bearing capacity of the soil is  $150 \text{ kN/m}^2$ . The base of the column is fixed. Design a portal frame (Beam and Columns only). Sketch reinforcement details. Adopt M20 grade concrete and Fe415 grade steel.
- 20    L4    CO3    PO1,2

**UNIT - IV****20**

- 4 a. Design the side wall and hopper bottom of a  $3 \text{ m} \times 3 \text{ m}$  square bunker to store 300 kN of coal. Design of coal is  $9 \text{ kN/m}^3$ . Angle of repose is  $30^\circ$ . Sketch reinforcement details. Adopt M20 grade concrete and Fe415 grade steel.
- 20    L4    CO3,4    PO1,2

**OR**

- d. Design a silo of internal diameter 6 m and 20 m deep (cylindrical portion) with a conical hopper bottom to store wheat. Density of wheat is  $8 \text{ kN/m}^3$ . Angle of repose is  $25^\circ$ . Sketch reinforcement details. Adopt M20 grade concrete and Fe415 grade steel.
- 20    L4    CO3,4    PO1,2

**UNIT - V****20**

- 5 a. Design an interior span of a continuous deep beam of span 9 m. Overall depth is 4.5 m, width of support is 0.9 m. Width of beam is 0.4 m, uniformly distributed load is  $200 \text{ kN/m}$ . Sketch reinforcement details. Adopt M20 grade concrete and Fe415 grade steel.
- 20    L4    CO3,4    PO1,2

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