

Time: 3-hour

Max. Marks: 80

Please Note:

1. All questions carry equal marks
2. Question one is compulsory. Attempt any three out of remaining questions.
3. Use of IS 456:2000 is permitted
4. Assume suitable data if required and state it clearly.

- Q1** Attempt any four **20**
- a) Obtain stress block parameters in limit state method.
 - b) Write a short note on interaction curves used for design of columns.
 - c) Explain how safety of RCC structures is ensured using probability and reliability approach during design.
 - d) Write a short note on raft foundation and draw sketch showing reinforcement.
 - e) State different types of loads acting on structures. How they are calculated.
- Q2** a) A simply supported beam of size 230 mm x 530 mm overall depth is reinforced with 4 no of bars of 16 mm diameter. Find the safe uniformly distributed load on the beam over a span of 5.5 m. Use M20 grade concrete and Fe415 steel. **Adopt Working Stress Method.** **10**
- b) A T Beam of effective flange width 1000 mm, thickness of the slab is 100 mm, width of the rib is 250 mm and effective depth is 500 mm. beam is reinforced with 4 bars of 22 mm diameter. Calculate the factored moment of resistance. The Materials are M20 concrete and Fe250 steel. **10**
- Q3** a) Design a shear reinforcement for a beam of 250 mm x 500 mm effective depth carrying a factored shear force of 140 kN. It is reinforced with 5 no of bars of 16 mm diameter. Use M20 grade concrete and Fe415 steel. Adopt Limit State Method. **10**
- b) Design a simply supported R.C.C slab for an office floor having clear dimensions of 3 m by 9 m with 230 mm walls all- round. Adopt M20 grade concrete and Fe415 steel. Assume suitable data. **10**
- Q4** a) A simply supported beam of size 230 mm x 450 mm overall depth is reinforced with 3 no of bars of 12 mm diameter. Find the safe uniformly distributed load on the beam over a span of 5.0 m. Use M20 grade concrete and Fe415 steel. **Use Limit State Method.** **08**

- b) Determine the safe axial load for a short circular column 425 in diameter, reinforced with 6 bars of 22 mm diameter. It is provided with 8 mm diameter helical reinforcement at a pitch of 40 mm. Use M20 grade concrete and Fe 250 steel. **12**
- Q5**
- a) An RCC column of Size 350 x 350 mm carries a characteristic load of 800 kN. The allowable bearing pressure on soil is 200 kN/m². Design an Isolated Square footing. The materials are M20 concrete and Fe415 steel. **12**
- b) What is T beam. Compare rectangular beam and T beam. **04**
- c) What is doubly reinforced beam. Under what situations doubly reinforced beam is provided. **04**
- Q6**
- a) Compare working stress method and limit state method. **05**
- b) Sketch reinforcement details of slab beam type footing and two-way slab with torsion reinforcement. **05**
- c) Design RC short column 400 mm x 600 mm to carry an axial load of 1500 kN. Use M20 grade concrete and Fe415 steel. Sketch the reinforcement details. **10**
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