

April 2019

Time – Three hours
(Maximum Marks: 75)

- [N.B: (1) Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory.
Answer any FOUR questions from the remaining in each PART – A
and PART – B
(2) Answer division (a) or division (b) of each question in PART – C.
(3) Each question carries 2 marks in PART – A, 3 marks in Part – B
and 10 marks in PART – C.
(4) IS456-2000, IS800-2007, Steel table and structural engg. Hand
book approved by the board are permitted.
(5) Suitable data may be assumed wherever necessary.]

PART – A

1. What is the purpose of providing reinforcement?
2. What is meant by lever arm?
3. Write down the effective flange width of T-Beam.
4. Specify the code provisions regarding the minimum shear reinforcement for beams.
5. What is torsional reinforcement in slab?
6. Define slenderness ratio for columns.
7. Mention any two rolled steel channel sections.
8. What is the limiting deflection of steel beam as per IS code?

PART – B

9. What is meant by under and over reinforced sections?
10. When and why doubly reinforced beams are provided?
11. Mention the various forms of shear reinforcement with sketches.
12. Differentiate between one-way slab and two-way slab.
13. What is meant by middle strip and edge strip?
14. State the IS code provisions regarding the longitudinal reinforcements and lateral reinforcements in RC. columns.
15. Define gross area and net area of tension member.

[Turn over.....

16. Write down the bending moment coefficients for continuous beam at supports for dead load and live load.

PART - C

17. (a) A doubly reinforced rectangular beam is 300mm wide and 550mm deep effective is reinforced with 4 bars of 20mm dia. in tensile zone and 4 bars of 12mm dia. in compression zone. Effective cover in both cases is 50mm. Determine the moment of resistance of the section, if concrete grade M20 and steel grade Fe415 are used.
(Or)
- (b) Design a singly reinforced simply supported beam to carry a total load of 90kN/m. The clear span of the beam is 6m. The beam has 300mm bearing at the ends. Use concrete grade M20 and steel grade Fe415.
18. (a) A hall of 12m×6m in size is to be covered by RC slab and beams. The beam rests upon 600mm walls. The live load on the slab is 3kN/m². Assuming 120mm thick slab, design the central T beam. The spacing of T beam is 3m C/C. M20 and Fe415 are used.
(Or)
- (b) A simply supported rectangular beam has an effective depth of 600mm and breadth of 400mm. The beam is reinforced with 3 bars of 22mm dia. as tension reinforcement at support. The beam is subjected to a factored shear force of 200kN at support. Check the shear stress and design the shear reinforcement. M20 grade concrete and steel grade Fe415 are used.
19. (a) Design a simply supported one-way slab for a clear span of 3.8m with 300mm walls. Use M20 and Fe415 Steel. Adopt live load 5000N/m² and a floor finish load of 500N/m².
(Or)

- (b) The main stair of the office building has to be located in a staircase room measuring 2.5m×5.6m. The vertical distance between the floors is 3.75m. Live load on stair is 5kN/m². Design the flight slab of a dog legged staircase using M20 and Fe415. If flight slab and landing slab spanning in the same direction.
20. (a) Design a rectangular column to carry on axial load of 1500kN using M20 and Fe415. Effective length of the column is 3.1m.
(Or)
- (b) A square column 400mm × 400mm carries a load of 1000kN. Safe bearing capacity of soil is 150kN/m². Use M20 and Fe250 and design the footing with uniform thickness.
21. (a) Design a suitable section for a compression member of effective length 5m to carry an axial load of 2500kN using a single rolled heavy I section and 16mm thick plates of yield stress of 340MPa.
(Or)
- (b) A laterally restrained simple beam has to resist a maximum bending moment of 185kNm. The yield strength of steel is 250N/mm². Choose a suitable I section for the beam.