Register No.:

934

April 2018

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) Use of IS456-2000 Structural Engineer's Handbook, IS800-2007 Steel tables are permitted.]

PART – A

1. Define characteristic load and design load.

2. What is the IS code provision regarding minimum reinforcement in slab?

3. What do you mean by middle strip and edge strip?

4. Define tread and rise of a stair.

5. Name the various forms of providing transverse reinforcement in column.

6. Define column footing and mention any two types.

7. Define effective length and slenderness ratio of steel compression members.

8. What are the purpose of providing reinforcement in RCC?

PART – B

9. Define limit state. Write the different types of limit state.

10. Quote the minimum and maximum permitted area of reinforcement for a beam.

11. Define slab. What are the classifications of slab?

12. Define: (i)BM co-efficients (ii)Effective span.

13. Sketch the various forms of shear reinforcement and mention the purpose.

14. State the code provision regarding column footing. (i)Minimum reinforcement (ii)Development length (iii)Minimum edge thickness of sloped footing.

15. What are the assumptions made in the theory of simple bending?

16. Differentiate between long column and short column in RCC.

PART – C

17. (a) (i) What do you mean by singly reinforced and doubly reinforced beam? (2 marks)
(ii) A beam of rectangular section is 250mm wide and 500mm effective and is provided with 4 bars of 16mm diameter as tensile steel. Find the ultimate moment of resistance. Use M20 concrete and Fe415 steel. (8 marks)

(Or)

(b) A simply supported rectangular beam of 6m span carries a characteristic load of 25kN/m inclusive of its self weight. The beam section is 230mm x 600mm overall. Design the beam. The materials to the used are M20 grade concrete and Fe415 grade steel. The beam is resting on RCC columns of size 300mm x 300mm.

18. (a) Design a roof slab for a conference hall of clear dimension 3.5m X 10m using M20 grade concrete and Fe415 grade steel by limit state method. No access is provided to the roof. Adopt width of support as 250mm weathering course of weight 2.1kN/m² is provided over the slab. Check the slab for shear and stiffness.

(Or)

(b) Design a simply supported roof slab for a room of clear size 2.5m x 3m. The thickness of wall all round is 200mm. Access is not provided to the roof. The corners of slab are not held down. Weight of weathering course is 1.5kN/m². Use M20 and Fe415.

19. (a) (i) Specify the code provisions regarding the minimum shear reinforcement for beams. (2 marks)
(ii) A RC beam has an effecting size of 250 X 550mm. It is subjected to a total load including self weight of 35kN/m on a span of 5.2m. It is provided with 4 bars of 22mm dia. RTS bars in tension at the support. Suggest suitable shear reinforcement. Use M20 grade concrete. (8 marks)

(Or)

(b) The flight slab of a dog legged staircase is supported by landing slabs width 1.5m each with span in the direction perpendicular to the flight. The flight consists of 8 steps of 300mm tread and 175mm rise each of brick masonry floor finish weight may be taken as 0.50kN/m² of plan area. Design the flight slab using M20 concrete and Fe415 steel.

20. (a) Design a circular column with circular ties to carry an axial load of 1500kN. Assume 2% steel. Use M20 concrete and Fe415 steel.

(Or)

(b) Design a square footing of uniform thickness to carry an axial load of 1350kN. Size of column is 400 X 400mm. Safe bearing capacity of soil is 150kN/m². Use M20 grade concrete and Fe415 grade steel (check not necessary).

21. (a) Design a simple beam to easy a load of 45kN/m over a span of 5.5m. Use $f_y = 300MPa$. Check the beam against bending, shear and deflection.

(Or)

(b) Design a steel column to carry an axial compressive load of 1200kN using a single rolled I-section of yield stress 300MPa. The height of the column is 6.2m. It has both the ends restrained against rotation and held in position.
