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C09–C–**402**

3423

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2013

DCE–FOURTH SEMESTER EXAMINATION

RC STRUCTURES

Time : 3 hours] [*Total Marks* : 80

PART—A

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

(3) Answer should be brief and straight to the point and shall not exceed *five* simple sentences.

(4) Candidates are allowed to use IS 456-2000 Code Book.

1. List various limit states to be considered in limit state method. 1½+1½

2. Define characteristic strength of material and characteristic load. 1½+1½

3. The dimensions of a singly reinforced, simply supported rectangular beam are 300 mm wide and 450 mm deep effective, provided with Fe 415 grade steel and M 20 grade concrete. Determine the limiting moment of resistance of the beam.

4. Calculate the spacing of two-legged 8 mm diameter vertical stirrups as per minimum shear reinforcement for a beam 350 mm wide and 500 mm overall depth if Fe 415 bars are used. Effective cover is 35 mm.

5. State the IS Code Provisions for limiting vertical deflections for different types of beam/slab.

6. Write the code provisions for maximum spacing of bars in slabs.

7. Find the effective flange width of the following simply supported T-beam :

Effective span = 5·4 m
c/c distance of adjacent panels = 3·0 m
Breadth of the web = 230 mm
Thickness of slab = 120 mm

8. Calculate the maximum bending moment at other interior support for a continuous beam as per IS 456–2000. Size of beam is 300 mm × 500 mm overall, effective span = 4 m, imposed load (not fixed) = 10 kN/m, imposed load (fixed) = 15 kN/m excluding self-weight, effective cover = 40 mm.

9. What are the conditions to be satisfied to adopt the moment and shear coefficients given in IS 456-2000 for continuous beams/slabs?

10. A short axially loaded column of size 300 mm × 350 mm is reinforced with 8 bars of 20 mm diameter Fe 415 grade steel. Concrete is M 30 grade. Calculate the load carrying capacity of column.

PART—B

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

(4) Assume suitable data wherever necessary.

11. *(a)* Define underreinforced, balanced and overreinforced sections in working stress method. 2×3=6

(b) Explain *(i)* neutral axis factor and *(ii)* lever arm factor. 2×2=4

12. Design a simply supported singly reinforced rectangular RC beam for flexure over a clear span of 5 m. The superimposed load is 20 kN/m and width of supports is 300 mm each. Use M 20 grade concrete and Fe 415 steel. Check the design for deflection.

13. Design a RC lintel for flexure over a door of 2·4 m wide. The height of brickwork above the opening is 3·5 m. Masonry weighs 19 kN/Cum. The brick walls are 230 mm wide. Use M 20 grade concrete and Fe 415 steel.

14. Design a simply-supported RC slab for a room of clear size 4 m 3 5 m. Superimposed load is 2 kN/sq. m and weight of finishes is 1·0 kN/sq. m. The corners of slab are not held down. Width of supports is 230 mm. Use M 25 grade concrete and Fe 415 steel.

15. Calculate the moment of resistance of the T-beam with the following data :

Width of flange = 750 mm

Thickness of slab = 110 mm

Width of rib = 250 mm

Effective depth = 600 mm

Area of tension steel = 2400 sq. mm

Grade of steel Fe 415 and grade of concrete M 20.

16. Design a singly-reinforced continuous RC rectangular beam for flexure at middle of interior span with the following details :

Number of spans = 3, clear distance between supports = 3600 mm, width of support = 300 mm, imposed load fixed = 7·5 kN/m excluding self-weight, imposed load not fixed = 5 kN/m

Use M 20 concrete and Fe 415 steel.

17. Design a short reinforced concrete column of square section to carry an axial load of 800 kN. Use M 20 concrete and Fe 415 steel.

18. A square isolated uniform RC footing 2500 mm 2500 mm is 550 mm thick, supports a RC column 300 mm × 300 mm. Net upward soil pressure on footing is 288 kN/m^2, 16 mm diameter bars at 220 mm c/c is provided in footing in both the directions. Effective cover for bars in footing is 50 mm. Using M 20 concrete and Fe 415 steel, check the footing for one-way shear, punching shear, development length and bearing pressure. 2½+2½+2½+2½

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