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C09–C–402

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

DCE—FOURTH SEMESTER EXAMINATION

RC STRUCTURES

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

PART—A 3×10=30

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. State any three advantages of limit state method over working stress method.

2. State the limiting values of depth of neutral axis for different grades of steel from assumptions made in limit state method.

3. A singly reinforced rectangular section of size 230 mm 450 mm effective is reinforced with 4 numbers of 16 mm diameter bars in tension. Factored shear force at the section is 120 kN. State whether shear reinforcement is required or not. Concrete is of M-20 grade.

4. Draw the sketch of a standard 90° bend. What is its anchorage value?

5. Explain where and how you provide torsion reinforcement in slabs.

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

7. State the formulae for calculating effective flange width of T-beams and isolated T-beams.

8. Calculate the shear force at outer side of support next to end support for a continuous beam as per IS 456-2000. Size of beam is 300 mm 450 mm overall. Effective span = 3·5 m, imposed load (not fixed) = 10 kN/m, imposed load (fixed) = 12 kN/m excluding self-weight. Effective cover = 40 mm.

9. Draw the line diagram of a continuous beam and indicate salient points with bending moment equations at inner and outer sides of support next to end support.

10. Differentiate between short and long columns.

PART—B 10×5=50

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 singly reinforced rectangular concrete beam of 300 mm wide and 550 mm effective depth is reinforced with 5 bars of 20 mm diameter. Using M-20 grade concrete and Fe-415 grade steel, calculate the moment of resistance of the beam in working stress method.

12. A doubly reinforced beam of width 250 mm and 500 mm effective depth is reinforced with 2 bars of 20 mm diameter bars in compression and 6 bars of 20 mm diameter bars in tension zones. Find the ultimate moment of resistance of the section. Effective cover is 40 mm for both the steels. Concrete grade is M-25 and steel is Fe–415.

13. Design a simply supported singly reinforced rectangular RC beam for flexure over a clear span of 6 m. The superimposed load is 30 kN/m and width of supports is 230 mm each. Use M-20 grade concrete and Fe-415 steel. Check the design for deflection.

14. Design a simply supported RC slab for a room of clear size 3 5 m 4 5 m. Superimposed load is 2·5 kN/sq. m and weight of finishes is 1·0 kN/sq. m. The corners of the slab are not held down (unrestrained). Use M-20 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. A continuous RCC rectangular beam of size 250 mm 500 mm overall is supported on 300 mm 300 mm masonry pillars at clear intervals of 4 m. The beam carries a dead load of 20 kN/m including its self weight and imposed load of 12 kN/m. Concrete is M-20 grade and steel is Fe-415 grade. Design the reinforcement at *(a)* middle of end span and *(b)* middle of interior span.

17. Design a short-reinforced concrete circular column with lateral ties to carry an axial load of 1500 kN. Use M-25 concrete and Fe-415 steel.

18. An RC column of size 400 mm 400 mm carries a load of 1500 kN. The safe bearing capacity of soil is 200 kN / m^2. Design an isolated square column footing of uniform thickness. Use M-30 grade concrete and Fe-415 steel. Check for development length and bearing pressure are not required.

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