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C09–C–402

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2016

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

1. State the various loads to consider in RCC design.

2. State any three differences between working stress and limit state methods of design.

3. A singly reinforced concrete beam of size 230 mm × 450 mm effective is subjected to a factored shear force of 40 kN. Calculate the nominal shear stress in concrete.

4. Calculate the minimum and maximum areas of tension reinforcement for beam 300 mm × 500 mm effective dimensions, effective cover is 40 mm and Fe 415 bars are used.

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

6. State the specifications for the spacing of main and distribution steel in slabs.

7. Find the effective flange width of 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. Explain the advantages of continuous beam with respect to stiffness as compared to single-span beam.

9. Calculate 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.

10. State the failure mechanism of 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.

11. Design a rectangular RCC beam to resist a bending moment of 60 kNm in working stress method. Use M20 grade concrete and Fe 415 grade steel. Take effective depth to breadth ratio as 1 : 2 (i.e., d $2b$).

12. Determine the tension and compression steels required for a doubly reinforced rectangular beam with the following data. Overall size of beam = 250 mm × 550 mm, Factored moment = 250 kNm, Effective cover = 50 mm. Use M20 concrete and Fe 415 steel.

13. Design a RC lintel for flexure over an opening of 1·5 m wide. The height of brickwork above the opening is 2·5 m. Masonry weighs 19 kN/cum. The brick walls are 230 mm wide and lintel has a bearing of 200 mm on wall on either side. Use M20 grade concrete and Fe 415 steel.

14. Design a simply supported RCC slab for a room of clear dimensions 2·5 m × 8 m width of supports is 250 mm. Superimposed load is 2 kN/sq. m and weight of finishes is 0·6 kN/sq. m. Use M20 concrete and HYSD bars of Fe 415 grade.

15. A *T*-beam of effective flange width 1200 mm, thickness of slab 100 mm, width of rib 300 mm, and effective depth 460 mm is reinforced with 4 numbers of 16 mm diameter bars. Calculate the moment of resistance of the section. M20 grade concrete and Fe 415 bars are used.

16. A continuous RCC rectangular beam of size 300 mm × 500 mm effective is supported on 300 mm × 300 mm RCC columns at 3 m intervals. The beam carries a dead load of 15 kN/m including its self-weight and imposed load of 10 kN/m. Design the reinforcement for the beam at the support next to end support.

17. Design a short reinforced concrete square column to carry an axial load of 2000 kN. Use M30 concrete and Fe 415 steel.

18. A RC column of size 300 mm × 300 mm carries a load of 750 kN. The safe bearing capacity of soil is 200 kN/m^2. Design an isolated square column footing of uniform thickness. Use M20 grade concrete and Fe 415 grade steel. Check for development length and check for bearing pressure are not required.

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