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C09–C–402

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2015

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

2. Define design strength of material and design load.

3. Find the depth of neutral axis of singly reinforced rectangular beam 230 mm 400 mm effective depth, reinforced with 4 bars of 16 mm diameter. Grade of concrete is M-20 and grade of steel is Fe-415. Use limit state method.

4. A singly reinforced concrete beam of size 230 mm 500 mm overall is subjected to a factored shear force of 60 kN. Calculate the nominal shear stress in concrete. Take effective cover as 50 mm.

5. State the functions of distribution bars in slabs.

6. State the IS code provisions for limiting vertical deflections for different types of beams/slabs.

7. Draw the cross-section and stress diagrams for three cases of a T-beam.

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

9. Draw the line diagram of a continuous beam and indicate salient points with shear force equations at inner and outer side of support next to end support.

10. Calculate the load carrying capacity of a short axially loaded column of size 230 mm×350 mm, reinforced with 6 bars of 16 mm diameter, Fe-415 grade steel. Concrete is M-25 grade.

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 seel, calculate the moment of resistance of the beam in working stress method.

12. An RCC beam 250 mm wide and 450 mm deep effective is reinforced with 6 bars of 16 mm diameter on tension side of which two bars are cranked up near the support. If the design shear force is 150 kN, design the shear reinforcement considering bent-up bars. Concrete is M-20 grade and steel is Fe-415.

13. Design a simply supported singly reinforced rectangular RC beam for flexure over a clear span of 4 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 for deflection.

14. Design an RCC one-way slab over a room of size 3 m × 8 m supported on 230 mm thick walls to carry line load of 3 kN/m^2 and fringher 0·8 kN/m^2. Use M-20 grade concrete and Fe-415 steel.

15. A T-beam of effective flange width 800 mm, thickness of slab 90 mm, width of rib 230 mm and effective depth 400 mm is reinforced with 5 numbers of 20 mm diameter bars. Calculate the moment of resistance of the section. M-20 grade concrete and Fe-415 bars are used.

16. Design a continuous one-way slab for an office floor. The slab is continuous over beams spaced at 3·5 m intervals. Width of beam is 230 mm. The superimposed load is 3 kN/sq.m and floor finish is 1 kN/sq.m. Use M-20 concrete and Fe-415 steel.

17. Design a short reinforced concrete circular column to carry an axial load of 1200 kN. Use M-30 concrete and Fe-415 steel.

18. Design a square reinforced concrete footing of uniform thickness for an RC column of 400 mm × 400 mm carrying an axial load of 1200 kN using M-20 grade concrete and Fe-415 steel. The safe bearing capacity of soil is 220 kN/m^2. Check for development length and check for bearing pressure are not required.

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