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C09–C–402

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2017

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. Find the modulus of elasticity of M-30 grade concrete as per IS 456.

2. Differentiate between nominal mix and design mix of concrete.

3. 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.

4. Calculate the limiting percentage of tension reinforcement if M-20 concrete and Fe 415 steel are used.

5. Differentiate between one-way and two-way slabs.

6. What are the functions of distribution steel in slabs?

7. Find the effective flange width of a T-beam with the following details :

Effective span = 5·5 m
Centre-to-centre distance of adjacent panels = 4 m
Breadth of web = 300 mm
Thickness of slab = 120 mm

8. Calculate the maximum bending moment at support next to end supports for a continuous beam as per IS 456-2000. Size of beam = 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 and effective cover = 40 mm.

9. Draw the line diagram of a continuous beam and indicate salient points with bending moment equations at the middle of end span and interior span.

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.

11. Find the moment of resistance of a singly reinforced beam of breadth 320 mm, effective depth 480 mm reinforced with 4 bars of 20 mm . Use M-20 grade concrete and Fe 415 grade steel. Use working stress method also.

12. A singly reinforced rectangular beam 300 mm × 550 mm effective depth carries a uniformly distributed load of 40 kN/m including its self-weight over simply supported span of 6 m and is reinforced with 4 bars of 20 mm diameter of which 2 bars are curtailed near the support. Design the shear reinforcement with only vertical stirrups. Use M-20 grade concrete and Fe 415 bars.

13. Determine the tension and compression steels required for a rectangular beam with the following data :

Overall size of beam = 250 mm × 550 mm
Factored moment = 200 kN/m
Effective cover = 50 mm

Use M-20 concrete and Fe 415 steel.

14. Design a simply supported RC slab for a room of clear size 4 m × 5 m. Superimposed load is 3 kN/sq.m and weight of finishes is 1·0 kN/sq.m. The corners of slab are restrained. Width of supports is 250 mm. Use M-25 grade concrete and Fe 415 steel.

15. A T-beam of effective flange width 750 mm, thickness of slab 120 mm, width of rib 250 mm and effective depth 450 mm is reinforced with 3500 sq.mm of tension steel. Calculate the moment of resistance of the section. M-20 grade concrete and Fe 415 bars are used.

16. A continuous RCC rectangular beam of size 250 mm × 500 mm overall is supported on 300 mm × 300 mm masonry columns 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 circular column to carry compressive load of 1000 kN. Use M-20 grade concrete and Fe 415 grade 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 M-20 grade concrete and Fe 415 grade steel. Check for development length and check for bearing pressure are not required.

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