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BOARD DIPLOMA EXAMINATION, (C–16)

OCTOBER—2020

DCE—FOURTH SEMESTER EXAMINATION

REINFORCED CONCRETE 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. Determine the modular ratio of concrete for M 25 grade concrete.

2. Define characteristic strength and characteristic load of materials.

3. Find the depth of NA of singly reinforced rectangular beam 230 mm × 400 mm effective depth, reinforced with 4 bars of 16 mm diameter; concrete is M 20 grade and Fe 415 steel.

4. The dimensions of a singly reinforced simply supported rectangular beam are 400 mm wide and 550 mm deep effectively. Provide with Fe 415 steel and M 20 grade concrete. Determine the limiting moment of resistance of the beam.

5. Draw the cross-section of cantilever slab and show the reinforcement.

6. Distinguish between one-way slab and two-way slab.

7 What are the advantages of T-beam?

8. What are the conditions to be satisfied to adopt the moment and shear coefficients given is IS 456-2000 for continuous beams.

9. Sketch a 3 m span continuous beam and mark the location where the tension reinforcement is to be provided.

10. What are the specifications for lateral ties in a column?

PART—B

10×5=50

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

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

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

11. A reinforced concrete beam of rectangular section is simply supported over a span of 5 m carrying a uniformly distributed load of 20 kN/m over the entire span. Design suitable dimensions and reinforcement for the beam ($d=2b$) assuming M 20 grade concrete and Fe 415 steel.

12. A beam simply supported over an effective span 5·3 m carries a LL of 20 kN/m. Design the singly reinforced beam for flexure. M 20 concrete and Fe 415 steel are used. Breadth of the beam of 300 mm.

13. A cantilever beam of uniform depth is to support a span of 2·0 m. If the superimposed load is 18 kN/m and it is monolithic with RC column of 300 mm width and 400 mm deep, design the beam including shear reinforcement. Check for deflection is not necessary. Use M 20 concrete and Fe 415 steel.

14. The floor slab of a classroom of 3 m × 5 m is discontinuous on all its four sides. The corners of the slab are prevented from lifting; 50 mm thick floor finish of unit weight 20 kN/m^3 is to be provided over the slab. Live load on the slab is 3 kN/m^2, width of the support is 250 mm. Design the slab using M 20 grade concrete and Fe 415 steel. Design the torsion reinforcement also.

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

Width of the flange—750 mm

Thickness of slab—110 mm

Width of the rib—250 mm

Effective depth—600 mm

Area of tension steel—2400 mm^2

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 data :

No. of spans—3

Clear distance between supports—3600 mm

Width of the support—300 mm

Imposed load (not fixed)—5 kN/m^2

Imposed load (fixed)—7·5 kN/m^2 (excluding self weight)

Use M 20 grade concrete and Fe 415 steel.

17. Design a short column square in section to carry an axial load of 1600 kN using M 20 grade concrete and Fe 415 steel.

18. Design an RCC footing of uniform thickness for RCC column of 450 mm × 450 mm size carrying an axial load of 1400 kN using M 20 concrete and Fe 415 steel. Take safe bearing capacity of soil as 220 kN/m^2. Check for two-way shear only.

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