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C16-C–401

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BOARD DIPLOMA EXAMINATION, (C-16)

JUNE/JULY—2022

DCE - FOURTH SEMESTER EXAMINATION

REINFORCED CONCRETE STRUCTURES

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

PART—A

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 any three types of admixtures used in concrete with one example for each type. 3×1

2. Define *(a)* design strength of material and *(b)* design load in limit state design method. 3×1

3. Find the depth of neutral axis of a singly reinforced rectangular beam 230 mm × 370 mm effective depth, reinforced with 4 bars of 16 mm diameter. Use M20 concrete and Fe415 steel. 3

4. Mention the various forms of shear reinforcement provided in a beam. 3

5. Write a short note on the detailing of reinforcement in a cantilever slab. 3

6. Draw the sketch of a standard bend. What is its anchorage value? 1½+1½

7. What is the minimum and maximum values of reinforcement based on width of web of a T-beam? 3

8. State the advantages of continuous beams/slabs. 3

9. Calculate the maximum factored moment at middle of interior span of a 3 span continuous floor slab with the following data : 3

(a) Factored dead load (w_{ud}) = 8 kN/m

(b) Factored live load (w_{ul}) = 3·5 kN/m

(c) Effective span (l) = 3·3 m

10. State the IS : 456-2000 code provisions for lateral ties regarding diameter and pitch. 3

PART—B

10×5=50

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

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

(3) Answer should be brief and straight to the point.

11. Design a reinforced concrete beam simply supported over an effective span of 5·6 m to support an imposed load of 22 kN/m inclusive of its self-weight. Use M25 grade concrete and Fe415 grade steel. Provide width of the beam equal to half of the depth. Use working stress method.

12. Calculate the ultimate moment of resistance of an RC beam of rectangular section 300 mm × 400 mm deep. 6 numbers 18 mm diameter bars are provided in tension zone and 3 numbers 18 mm diameter bars are provided in compression zone. Use M20 concrete and Fe415 steel. An effective cover of 35 mm is provided both on top and bottom of the beam. Take stress in compression steel (f_{sc}) as 353·4 N/mm^2.

13. An RCC beam 230 mm wide and 460 mm effective depth is reinforced with 5-bars of 16 mm diameter on tension side of which two-bars are cranked up near the support. If the design shear force is 110 kN, design the vertical shear reinforcement considering bentup bars. Use M20 concrete and Fe415 steel.

14. Design a doglegged staircase for a building in which the height of floor is 3·3 m. The stair hall size is 2·5 m × 4·5 m. Take a live load of 3 kN/ m^2. Provide a rise of 150 mm and tread of 225 mm. Use M20 concrete and Fe415 steel. Assume the stairs are supported on 230 mm walls at the ends of outer edges of landing slabs.

15. A T-beam floor consists of 150 mm thick RCC slab monolithic with 300 mm wide beams. The beams are spaced at 3·3 m centre to centre and their effective span is 6 m. If the super imposed load on the slab is 5 kN/m^2, design an intermediate tee-beam. Use M20 concrete and Fe415 steel.

16. Design a continuous one-way slab for an office floor. The slab is continuous over beams spaced at 3·3 m (c/c) intervals. The width of the beam is 230 mm. The super imposed load is 3 kN/m^2 and floor finish is 0·8 kN/m^2. Use M20 concrete and Fe415 steel.

17. Design the reinforcement for a short axially loaded square column of size 300 mm × 300 mm to support a load of 725 kN. Use M20 concrete and Fe415 steel.

18. A reinforced concrete column of size 410 mm × 410 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. Check for two-way shear only. Use M30 concrete and Fe415 steel.

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