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C14-C-501

4618

BOARD DIPLOMA EXAMINATION, (C-14)

SEPTEMBER/OCTOBER - 2020

DCE—FIFTH SEMESTER EXAMINATION

DESIGN AND DETAILING OF RC ELEMENTS

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.

(4) Assume suitable data, if necessary.

(5) IS 456-2000 code and SP-16 are allowed.

1. Write any three differences between nominal mix concrete and design mix concrete.

2. What is limit state? State limit state of serviceability.

3. Sketch the strain diagram and stress block for a singly reinforced rectangular beam indicating salient values in compression zone and tension zone.

4. Define development length and write the formula.

5. State the provisions for limiting spacing of main reinforcement and distribution steel in slabs as per IS 456-2000.

- * 6. State the IS provisions for limiting vertical deflections in slabs and beams.
7. Write the equations for calculating the effective flange width of the following :
 (a) T-beam
 (b) Isolated T-beam
8. Write any three advantages of continuous slabs/beams.
9. Sketch a three-span continuous slab and mark the points, where the tension reinforcement is to be provided.
10. Define the terms (a) short column and (b) long 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 criterion for valuation is the content but not the length of the answer.

(4) Assume suitable data, if necessary.

11. A reinforced concrete beam 300 mm wide by 600 mm overall depth is reinforced with 4 bars of 16 mm diameter at an effective cover 40 mm. Using M20 grade concrete and Fe415 steel, estimate the moment of resistance of the section using working stress method.
- * 12. Design a rectangular beam for an effective span of 6 m. The superimposed load is 80 kN/m and size of rectangular section is limited to 300 mm wide and 700 mm deep with an effective cover of 70 mm for both tension and compression. Assume M20 and Fe415.
13. Design a lintel over a door of 2 m wide. The height of the brick work above the opening is 2.3 m. Masonry weighs 19 kN/m³. The brick wall is 230 mm thick. Use M20 grade concrete and Fe415.

- * 14. Design a simple supported RC slab for a room of clear size 4 m × 5 m. Superimposed load is 3 kN/m^2 and weight of finishes is 1 kN/m^2 . The corners of slab are restrained. Width of support is 250 mm. Use M25 grade concrete and Fe415 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. M20 grade concrete and Fe415 bars are used.
16. Calculate the bending moment at four important points of a singly reinforced continuous beam with M20 concrete and Fe415 steel as per IS 456-2000, no. of spans = 3, clear distance between supports = 3.6 m, width of support = 300 mm, imposed load (not fixed) = 5 kN/m^2 , imposed load (fixed) = 7.5 kN/m^2 (excluding self-weight), partially fixing may be expected at the discontinuous edge.
17. Design the short, axially loaded rectangular column to support a load of 875 kN. One side of the column is restricted to 300 mm. Use M25 concrete and Fe415 steel.
18. List and explain the steps for design of isolated square footing of uniform thickness.
