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C14–C–501

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2018

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) Assume M20 grade mix for concrete and Fe415 for steel for design unless specified.

(4) Candidates are allowed to use IS 456-2000 and SP-16 code book.

1. State the loads to be considered in the design of beams as per IS : 875 and IS : 1893.

2. What is partial safety factor? Give partial safety factor for material strength for concrete and steel.

3. Define effective depth and effective span for beams.

4. A singly reinforced rectangular beam 230 mm × 450 mm (effective depth) is subjected to a shear force of 40 kN. Calculate the nominal shear stress in concrete.

5. Distinguish between one-way and two-way slabs as per IS code.

6. State the IS provisions for limiting vertical deflections in slabs and beams.

7. Find the effective flange width of simply supported T-beam with the following data :

Effective span—530 m, breadth of web—300 mm, C/C of adjacent panels—4·0 m, Thickness of slab—100 mm.

8. Draw the line diagram of a continuous beam and indicate salient points with BM equations as per code at those locations.

9. Calculate the BM at the support for a continuous beam with following data :

Rectangular beam size—250 mm × 400 mm (overall), Effective span—4·75 m, Imposed load—15 kN/m (not fixed), Imposed load—24 kN/m (fixed).

10. Define long column, short column and slenderness ratio.

PART—B

10×5=50

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

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

(3) Assume M20 grade mix for concrete and Fe415 for steel for design unless specified.

(4) Candidates are allowed to use IS 456-2000 code book.

(5) Answer all questions using limit state method unless specified.

11. Design an RC rectangular beam simply supported over an effective span of 5 m to support a live load of 20 kN/m including self weight. Adopt M20 grade and Fe415 for materials. Take effective depth *d* 1 5b. Use working stress method.

12. Design a rectangular simply supported beam over a clear span of 6·0 m to carry a superimposed load of 30 kN/m, the support width is 230 mm. Check for deflection.

13. Calculate moment of resistance of an RC beam of rectangular section 300 mm × 400 mm deep. Area of steel consists of 6 nos. 18 in tension side and 3 nos.–18 in compression side. Assume effective cover of 35 mm on both sides.

14. Design a one-way slab to carry a live load of 3 kN/m^2 over an effective span of 3·5 m. sketch the reinforcement details.

15. A continuous RCC rectangular beam 250 mm × 400 mm (overall) is supported by 250 mm × 250 mm size masonry column at clear intervals of 4·5 m. The beam carries a dead load of 24 kN/m including its self weight. Live load is 15 kN/m. Design the reinforcement for the support next to the end support.

16. A T-beam of effective flange width—1200 mm, Thickness of slab—100 mm, width of rib—300 mm, effective depth—460 mm, Reinforcement—4 nos. 16 mm bars. Calculate ultimate moment of resistance.

17. Design the reinforcement for an axially loaded short square column to carry an axial load of 1200 kN.

18. Design a footing of uniform thickness to carry an axial load of 1000 kN from a column of size 500 mm × 500 mm. The safe bearing capacity of soil is 125 kN/m^2. Check for shear (one-way shear).

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