



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.

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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 $d = 15b$. 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/m² 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/m². Check for shear (one-way shear).

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