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C14–C–501

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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—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) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define characteristic strength of concrete.

2. What are the loads to be considered in design of reinforced concrete members?

3. Define effective depth and neutral axis.

4. A singly reinforced rectangular beam 300 mm × 550 mm is reinforced with 5no–16mm bars with an effective cover of 50 mm. The beam is simply supported over a span of 5m. Find whether it is underreinforced or overreinforced if M20 and Fe 415 grades are used.

5. Distinguish between one-way and two-way slabs.

6. State the IS 456-2000 provisions for minimum percentage of main and distribution reinforcement for slabs.

7. Write the formula for—
   (a) calculating the effective width of flange of T-beam;
   (b) moment of resistance for T-beam when neutral axis falls in the flange.

8. What are three advantages of continuous slabs or beams?

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

   Factored dead load=8.4kN/m, factored live load=3.75kN/m. effective span=3.39m.

10. Write the equation to calculate ultimate load on short column with lateral ties. Explain the terms.

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 in limit state method unless specified.

11. Design an RC rectangular beam simply supported over an effective depth of 5.3m to support an imposed load of 18kN/m including self weight. Adopt M20 grade and Fe 415 for materials. Take effective depth d = 1.5 times breadth. Use working stress method.

12. Find the ultimate moment of resistance of singly reinforced rectangular beam 230mm × 500mm reinforced with 5 bars of 20 mm and an effective cover of 50 mm.

13. Design a lintel over a door of 2.4m wide. The height of the brick wall above the opening is 3m. Masonry weight is 19 kN/m^3. The brick walls are 230 mm thick.

14. Design a cantilever balcony slab projecting 1.5 m from a beam using M20 grade and Fe 415. Adopt a live load of $2kN/m^2$ and floor finish of 1 kN/m^2.

15. Design a singly reinforced continuous RC rectangular beam for flexure at the middle of interior span with the following data:

No of spans–03, clear distance between supports–3600 mm, width of the support–300 mm, imposed load (not fixed)–5kN/m, imposed load (fixed)—7.5kN/m (exluding self weight). Partial fixity may be expected to discontinuous edge. Check for deflection, shear not required. USE M20 and Fe 415 grade steel.

16. Calculate the maximum UDL at limit state, the T-beam can carry including its self weight on a simply supported beam of 5.0 m, width of the flange as 1500 mm, thickness of the beam as 100 mm. Depth of tensile steel from the top of the flange is 500mm, width of web is 250 mm. Effective cover = 40 mm, area of steel = $804mm^2$.

17. Design a square column 400 mm × 400 mm. 3.3m long subjected to axial working load of 1000 kN. The column is effectively held in position and direction at both ends.

18. Design an RCC footing of uniform thickness to carry an axial load of 1000 kN from a column of size 350 mm×350 mm. The safe bearing capacity of soil is 180 kN/m^2.

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