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C14–C–501

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—2017

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) **IS 456-2000** and **SP-16** codes are permitted.

1. Define the term 'limit state'. Write the types of limit states.

2. State how the 'design strength of materials' and 'design loads' are calculated.

3. State the assumptions made in the design of flexural members in the limit state method of design.

4. State any four situations in which the doubly reinforced beams are used.

5. State the IS code provisions for limiting stiffness values for different types of slabs.

6. State any three uses of providing distribution steel in slabs.

7. Calculate the minimum and maximum areas of Fe 415 grade tension steel to be provided for a T-beam of web width 230 mm and overall depth 680 mm. Assume effective cover to the steel as 30 mm

8. Write any three advantages of continuous slabs/beams.

9. A continuous reinforced concrete rectangular beam of size 250 × 400 mm overall depth is supported by effective span of 3·75 m. The beam carries a dead load of 22 kN/m including its self weight and an imposed load of 12 kN/m. Find the bending moment at the support next to the end support. M 20 grade concrete and Fe 415 steel are used.

10. Distinguish between short and long columns.

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.

11. *(a)* Explain the principles of working stress method. 4

(b) Explain different types of singly reinforced concrete rectangular section as per working stress method. 6

12. Determine the moment of resistance of a singly reinforced rectangular beam 300 mm × 530 mm overall depth with effective cover 50 mm, reinforced with 4 bars of 16 mm diameter. Use M 20 grade concrete and Fe 415 grade steel.

13. Determine the tensile and compressive reinforcement required for a rectangular beam of overall size of 300 mm × 540 mm with an effective cover of 50 mm on both sides. The beam is subjected to a bending moment of 160 kN/m at working loads. The materials used are M 20 grade concrete and Fe 415 grade steel.

14. Design a simply supported RCC slab over a roof of a room of clear dimensions 3·5 m 7·7 m. The width of supporting wall is 300 mm. The slab carries a superimposed load of 2·5 kN/m^2 and floor finish of 1 kN/m^2. Use M 20 grade concrete and Fe 415 steel. Check the design for shear and stiffness.

15. Find the moment carrying capacity of a T-beam of effective flange width 1300 mm, thickness of slab 110 mm, rib width 300 mm and effective depth 520 mm, reinforced with 4-number of Fe 415 grade steel bars of 16 mm diameter. The concrete used is of grade M 20.

16. A three-span singly reinforced continuous RC rectangular beam carries an imposed load (fixed) of 8 kN/m^2 excluding self weight and imposed load (not fixed) of 6 kN/m^2. The clear distance between supports is 3·6 m and width of support is 300 mm. Design the beam for flexure assuming partial fixity at the discontinuous edges. Use M 20 concrete and Fe 415 steel. Design of shear reinforcement can omitted.

17. Design a short column of circular section to carry an axial load of 1200 kN using laterial ties. Use concrete of grade M 20 and reinforcement bars of grade Fe 415. The load factor may be taken as 1·5.

18. Design an isolated column footing with uniform thickness for a square reinforced concrete column of size 320 mm. The column carries an axial load of 900 kN. The safe bearing capacity of soil is 200 kN/m^2. Use M 20 grade concrete and Fe 415 steel.

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