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Question Paper Code : 31009

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Sixth Semester

Civil Engineering

080100035 — DESIGN OF R.C. ELEMENTS

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define ultimate load method.

2. Enumerate serviceability limit states.

3. What is the importance of doubly reinforced beam sections?

4. Write any two various boundary conditions in the two way slab acting UDL.

5. Define limit state of collapse in shear.

6. What do you mean by diagonal tension'?

7. Give the classification of columns based on slenderness ratio.

8. Differentiate between a braced columns and an unbraced column.

9. When can a foundation be considered as rigid?

10. What are one way and two way shears in footing?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the advantages of limit state method over other methods. (10)

(ii) What are the assumptions in working stress method? (6)

Or

(b) (i) A rectangular R.C. Section having a width of 350 mm is reinforced with 2nos of 28 mmdia and 2nos of 25 mmdia at an effective depth of 700 nim. Adopting M_{20} grade concrete and Fe_{415} HYSD bars. Determine the ultimate moment of resistance of the section. (10)

(ii) What are the assumptions on limit state method. (6)

12. (a) Analyze the T-beam section of 250 mm width of web, 1200 mm of flange, 100 mm thickness of flange and 450 mm effective depth to determine the factored moment of resistance for two cases of tension reinforcements

(i) 4nos. 20 mm dia. and (8)

(ii) 4nos. 25 mm dia. (8)

Or

(b) Design a rectangular beam section 250 mm wide and 450 mm effective depth subjected to factored moments

(i) 95 KNm and (8)

(ii) 195 KNm, (Consider the concrete of grade M25 and steel of grade Fe 415). (8)

13. (a) (i) Under what situations do the following modes of cracking occur in reinforced concrete beams

(1) Flexural cracks

(2) Diagonal tension cracks

(3) Flexural-shear cracks

(4) Splitting cracks. (12)

(ii) Stirrups may be open or closed. When does it become mandatory to use closed stirrups. (4)

Or

(b) Design the torsional reinforcement in a rectangular beam section, 350 mm wide and 750 mm deep, subjected to an ultimate twisting moment of 140 kN/m combined with an ultimate (hogging) bending moment of 200 kN/m and an ultimate shear force of 110 kN. Assume M25 concrete, Fe 415 steel and mild exposure conditions. (16)

14. (a) Determine the Longitudinal reinforcement and lateral ties to be provided in a rectangular column of size 300 mm × 400 mm subjected to a factored axial load of 1100 kN and a factored moment of 150 kN–m about the major axis. The effective length of the column is 3.6 m. Materials used are M 25 grade of concrete and Fe 415 steel bars. Assume cover of 60 mm. The steel is provided on four sides.

Or

(b) A corner column 400 mm x 400 mm is subjected to the factored loads P_u = 1300 kM, M_{ux} = 190 kN – m and M_{uy} = 110 kN – m. Design the reinforcement in the column, assuming M 25 grade of concrete and Fe 415 steel. The column may be treated as a short column and effective cover may be taken as 60 mm.

15. (a) A brick wall 300 mm thick is used for a double storey building 4 m high from the foundation to the ground floor and 3m high from the first floor to the roof. Assuming rooms to be 4 m square, Design a suitable reinforced concrete continuous footing for the above wall. Sketch the details of steel. Use M15 Concrete and Fe 415 steel. Safe bearing capacity is 100kN/m^2. (16)

Or

(b) Design a footing for a rectangular column 300 × 450 mm carrying an axial factored, load of 1500 kN. The safe bearing capacity of the soil is 120 kN/m^2. Use M_{20} concrete and Fe 415 steel. (16)

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