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Question Paper Code : 62009

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Sixth Semester

Civil Engineering

080100035 — DESIGN OF RC ELEMENTS

(Regulations 2008)

Time : Three hours Maximum : 100 marks

(Use of IS 456-2000 and SP 16 is permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by modular ratio?

2. Write down the advantages of limit state method over other methods.

3. Draw the stress diagram across the cross section of a rectangular beam and indicate the values for ultimate method.

4. Explain the need for corner reinforcements in two way rectangular slab whose corners are prevented from lifting up.

5. Define modes of cracking under shear.

6. Enumerate behaviour of concrete with torsional reinforcement.

7. What are the classification of columns based on type of reinforcement?

8. Define compression failure.

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) State the assumptions made in the case of limit state method of design of R.C. beams. (8)

(ii) Discuss the salient Properties of various grades of concrete as per IS 456-2000. What are the corresponding nominal mixes? (8)

Or

(b) (i) What is the characteristic strength and how it is different from the mean strength? (6)

(ii) What is the value of limit state moment of a balanced rectangular section in terms of '*b*' and '*d*', when Fe415 steel is used? (4)

(iii) Explain the term 'characteristic load' and 'partial safety factor'. (6)

12. (a) Design a R.C. beam of rectangular section using the following data.

Effective span = 8 m, Working live load = 30 kN/m, overall depth = 650 mm M_{20} grade concrete and Fe_{415} grade steel are used width of beam = 300 mm. Effective cover = 50 mm. Draw the reinforcement details and mark the salient points. (16)

Or

(b) Design a simply Supported R.C.C. slab for an office floor having clear dimensions 4 m × 10 m with 230 mm walls all round. Adopt M_{20} grade concrete and Fe_{415} grade HYSD bars. Draw the reinforcement details with salient features. (16)

13. (a) A rectangular R.C.C. beam 300 mm × 600 mm is reinforced with 0.3% steel as main reinforcement. The factored shear force at the section is 165 kN. Design the shear reinforcement by the limit state method. Use M20 concrete and Fe415 steel. (16)

Or

(b) Design a rectangular beam section of 300 mm wide and 500 mm effective depth subjected to ultimate moment of 185 kNm. Ultimate shear force of 28 kN and ultimate torsional moment of 11 kNm. Use M25 concrete and Fe415 steel. (16)

14. (a) (i) Design the reinforcement in a column of size 450 mm × 600 mm, subject to an axial load of 2000 kN under service dead and live loads. The column has an unsupported length of 3 m and is braced against sideway in both directions. Use M20 concrete and Fe 415 steel. (12)

(ii) Write a short note on behaviour of axially loaded tied and spiral columns. (4)

Or

(b) A corner column 400 mm × 400 mm, located in the lower most storey of a system of braced frames, is subjected to factored loads :

P_u = 1300 kN, M_{ux} = 190 kNm and M_{uy} = 110 kN. The unsupported length of the column is 3.50 m. Design the reinforcement in the column, assuming M25 concrete and Fe 415 steel. (16)

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 3 m 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 100 kN/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 M20 concrete and Fe 415 steel. (16)

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