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Question Paper Code : 98015

B.E/B.Tech. DEGREE EXAMINATION, APRIL/ MAY 2017.

Sixth Semester

Civil Engineering

080100035 — DESIGN OF RC.ELEMENTS

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the permissible tensile stress of high strength deformed bar?

2. State the conditions for a slab to be designed as a continuous slab?

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. Differentiate primary and secondary torsion.

6. What do you mean by punching shear?

7. Write any two code requirements on slenderness limits.

8. Define member stability effect in braced columns.

9. Write a short note on overturning and sliding.

10. What is the importance of plain concrete footings?

PART B — (5 × 16 = 80 marks)

11. (a) Explain in detail about the following methods of design of reinforced concrete structures along with IS code specifications.

(i) Elastic method. (5)

(ii) Ultimate load method. (5)

(iii) Limit state method. (6)

Or

(b) Design a reinforced rectangular beam of breadth 300 mm to carry a characteristic live load of 12 kN/m over an effective span 8m using M20 grade concrete and Fe415 steel by the working stress method. (16)

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. 20mm dia. and

(ii) 4nos. 25mm dia. (16)

Or

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

(i) 95 kNm and

(ii) 195 kNm. (Consider the concrete of grade M25 and steel of grade Fe 415). (16)

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

(1) Fiexural 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) Design the reinforcements in short column 400 × 60 mm subjected to an ultimate axial load of 1600 kN together with ultimate moments of 120 kNm and 90 kNm about the major and minor axis respectively, Use M20 grade concrete and Fe415 grade steel.

Or

(b) Design the reinforcements required for a column which is restrained against sway using the following data. -

Size of column = 530 × 450 mm, l_{eff} = 6.6m unsupported length = 7.70m. Factored load = 1600 kN. Factored moment about major axis = 45 kNm at top and 30 kNm at bottom. Factored moment about minor axis = 35 kNm at top and 20 kNm at bottom. Use M_{25} grade concrete and Fe_{500} grade HYSD bars. Column is bent in double curvature and reinforcement is distributed equally on all the four sides of the section.

15. (a) Design a suitable footing for a R.C. column of size 300 x 500 mm. Supporting a factored axial load of 1500 kN. Assume safe bearing capacity of soil as 200 kN/m^2. Adopt M20 grade and Fe415 grades. Sketch the details at reinforcements in footings.

Or

(b) Design a combined footing for the two columns at a multistorey building. The columns of size 400 mm × 400 mm transmit a working load of 300 kN each and they are spaced at 5m centres. The safe bearing capacity of soil at site is 200k N/m^2. Adopt M20 grade concrete and Fe415 grade steel. Sketch the details of reinforcements in the combined footing.
