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**Question Paper Code : 91243**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2014.

Fifth Semester

Civil Engineering

CE 2306/CE 55/CE 1302/10111 CE 506 — DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

(IS 456-2000 and SP 16 Design charts tables are permitted)

Use of relevant BIS standards and hand book is permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the advantage of Elastic method?

2. Write any two assumptions of limit state method.

3. What is the advantage of two way slabs over one way slab?

4. Enumerate doubly reinforced section.

5. Define flexural bond.

6. How to overcome torsion on beams?

7. Define overturning on columns.

8. On what condition intermediate column is more suitable?

9. What is the necessity to provide combined rectangular footing?

10. Define wall footing.

PART B — (5 × 16 = 80 marks)

11. (a) A simply supported RC slab having an overall thickness of 150 mm is reinforced with 12 mm diameter bars at an effective depth of 130 mm. The spacing of the bars is 100 mm. The effective span of the slab is 4 m. If the self weight of slab and finishes is 4.2 kN/m². Estimate the maximum permissible live load on the slab. Adopt M-15 grade concrete and MS grade-I steel. Use working stress method.

Or

(b) A RC beam having a rectangular cross section 300 mm wide is reinforced with 2 bars of 12 mm diameter at an effective depth of 550 mm. The section is subjected to a service load moment of 40 kN.m. Estimate the stresses in concrete and steel. Adopt working stress method.

12. (a) Design the Interior panel of flat slab with drops for an office floor to suit the following data:

Size of floor = 25 m × 25 m

Size of panels = 5 m × 5 m

Loading class 4 kN/ m²

Materials M 20 grade concrete and Fe 415 HYSD bars.

Or

(b) A T beam slab floor of an office comprises of a slab 150 mm thick spanning between ribs spaced at 3m centres. The effective span of the beam is 8 m. Live load on floor is 4 kN/ m². Using M 20 grade concrete and Fe 415 HYSD bars, design one of the intermediate T beams.

13. (a) Design torsional reinforcement in a rectangular beam section, 350 mm wide and 750 mm deep, subjected to an ultimate twisting moment of 140 kNm, combined with ultimate(hogging) bending moment of 200 kNm and an ultimate shear force of 110 kN. Assume M 25 grade concrete and Fe 415 grade steel and mild exposure condition.

Or

(b) (i) Explain bond failure mechanisms. (8)

(ii) What are the factors influencing bond strength? (8)

14. (a) Design the reinforcements in a circular column of diameter 300 mm to support a service axial load of 800 kN. The column has an unsupported length of 3 m and is braced against side sway. The column is reinforced with helical ties. Adopt M 20 grade concrete and Fe 415 HYSD bars.

Or

(b) Design the reinforcements in a short column 400 mm × 400 mm at the corner of a multistoreyed building to support an axial factored load of 1500 kN together with biaxial moments of 50 kNm acting in perendicular planes. Adopt M 20 grade concrete and Fe 415 HYSD bars.

15. (a) Design a reinforced concrete circular footing for a circular column of 300 mm diameter supporting a factored axial load of 750 kN. Adopt the safe bearing capacity of the soil as 200 kN/ $m^2$ and use M 20 grade concrete and Fe 415 HYSD bars.

Or

(b) Design a combined column footing with a strap beam for two reinforced concrete columns 300 × 300 mm size spaced 4 m apart and each supporting a factored axial load of 750 kN. Assume the ultimate bearing capacity of soil at site as 225 kN/ $m^2$. Adopt M 20 grade concrete and Fe 415 HYSD bars.

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