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Question Paper Code : 21258

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

Fifth Semester

Civil Engineering

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

(Regulations 2008/2010)

Time : Three hours Maximum : 100 marks

(IS 456 – 2000 and SP 16 – 1980, 459 – 1978 Design Charts Tables are Permitted).

Use of relevant BIS standards and Handbook is permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the basic concept of Ultimate load method?

2. 'The working stress method is unrealistic in many ways'. Justify with any two points.

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

4. Enumerate doubly reinforced section.

5. Define torsional shear.

6. What is development length?

7. Define overturning on columns.

8. On what condition intermediate column is more suitable?

9. State the Rankine's equation to determine the minimum depth of foundation.

10. When is the combined footing provided?

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 bars is 4 m. If the self weight of slab and finishes is 4.2 kN/m^2. 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 kNm. Estimate the stresses in concrete and steel. Adopt working stress method.

12. (a) Using Limit state method, design a R.C slab for a room measuring 5 m × 6 m size. The slab is simply supported on all the four edges, with corners held down and carries a superimposed load of 3100 N/mm^2. inclusive of floor finishes etc. Adopt M-25 concrete and Fe-415 HYSD bars.

Or

(b) A T-beam has the following data : width of the flange = 750 mm; breadth of beam = 250 mm. Effective depth = 500 mm; thickness of flange = 90 mm; applied moment = 130 kNm. Design the beam using M-20 concrete and Fe-415 grade steel.

13. (a) Derive the expression to determine the shear strength of RC section. (16)

Or

(b) An overhanging beam has 6m span from support to support and 2 m overhanging. The cross section of the beam is 300 mm × 500 mm and the design load applied through was 40 kN/m. 4 bars of 20 mm diameter plain bars are provided with 50 mm effective cover. What is the maximum bond stress developed and find the anchorage length required for the overhanging portion. (16)

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 s reinforced with helical ties. Adopt M-20 grade concrete and Fe-415 HYSD bars.

Or

(b) Design the reinforcements in a short column 400 × 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 perpendicular planes. Adopt M-20 grade concrete and Fe 415 HYSD bars.

15. (a) Design a reinforced concrete footing for rectangular column of section 300 mm × 500 mm supporting an axial factored load of 1500 kN. The safe bearing capacity of soil at site is 185 kN/m². Adopt M-20 grade concrete and Fe-415 HYSD bars. (16)

Or

(b) Design a RCC footing for a wall to carry a load of 5 kN/m. The thickness of brick wall is 200 mm. The safe bearing capacity of soil at site is 200 kN/m². Adopt M-20 grade concrete and Fe-415 HYSD bars. (16)
