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Question Paper Code : 52773

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fifth Semester

Civil Engineering

CE 6505 – DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulation 2013)

Time : Three hours Maximum : 100 marks

(Use Code Book IS 456 – 2000, Design Charts and Relevant Tables of SP 16)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any two assumptions of limit state method.
2. Distinguish between under reinforced and over reinforced sections.
3. On what circumstances doubly reinforced beams are to be adopted.
4. Write any two general features of two way slab.
5. Determine the anchorage length for 20 mm diameter bar.
6. What is torsional shear?
7. What is meant by braced column?
8. How the compression failures occur in columns?
9. Why the dowel bars are provided in footing?
10. What is the necessity of providing combined footings?

PART B — (5 × 13 = 65 marks)

11. (a) Design a simply supported reinforced concrete beam to carry a bending moment of 50 kNm as doubly reinforced section by working stress design. Keep the width is equal to half the effective depth. (13)

Or

(b) Design a simply supported rectangular slab for a hall of size 4 m × 5 m to carry a UDL of 5 kN/m². Use working stress method.

12. (a) A T-beam, slab floor of an office comprises of a slab 150 mm thick spanning between ribs spaced at 3 m centres. The effective span of the beam is 8 m. Live load on floor is 4 kN/m². Using M 20 grade and Fe 415 HYSD bars. Design one of the intermediate tee beams. Use limit state method. (13)

Or

(b) Design a two way slab for an office floor size 3.5 m × 4.5 m with discontinuous and simply supported edges on all the sides with the corners prevented from lifting and supporting a service live load of 4.4 kN/m². Adopt M 20 grade and Fe 415 HYSD bars. (13)

13. (a) Design a shear of rectangular reinforced concrete beam section to carry a factored bending Moment of 220 kNm, factored shear force of 140 kN, and a factored torsional moment of 80 kNm. Use M 20 grade concrete and Fe 415 steel. (13)

Or

(b) A simply supported RC beam of size 300 × 500 mm effective is reinforced with 4 bars of 16 mm diameter HYSD steel of grade Fe415, Determine the anchorage length of the bars at the simply supported end if it is subjected to a factored force of 350 kN at the centre of 300 mm wide masonry support. The concrete mix of grade M20 is to be used. Draw the reinforcement details. (13)

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 away. The column is reinforced with helical ties. Adopt M 20 grade concrete and Fe 415 HYSD bars. (13)

Or

(b) Design the reinforcement in a short column 400 mm × 400 mm at the corner of a multistorey 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. (13)

15. (a) A 230 mm thick masonry wall is to be provided with a reinforced concrete footing on a site having soil with SBC, unit weight and angle of repose of 125 kN/m², 17.5kN/m³ and 30° respectively. Use M 20 grade of concrete and HYSD steel bars of grade Fe 415. Design the footing when the wall supports at service state, a load of 150 kN/m length. (13)

Or

(b) A rectangular column 600 × 400 mm carries a load of 800 kN. Design a rectangular footing to support the column. The safe hearing capacity of the soil is 200 kN/m². Use M 20 grade concrete. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain in detail about the following methods of design.

(i) Elastic method

(ii) Ultimate load method

(iii) Unit State Method.

Also explain their merits and demerits. (15)

Or

(b) Design a footing to carry a strip load of 100 kN/m transferred by a wall of width 0.5 m. Safe bearing capacity of the soil is 150 kN/m². (15)

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