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Question Paper Code : 40307

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fifth Semester

Civil Engineering

CE 8501 — DESIGN OF REINFORCED CEMENT CONCRETE ELEMENTS

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Write any two assumptions are made in elastic theory method.

2. What is partial safety factor?

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3. Write any two guidelines to select the cross sectional dimensions of reinforced concrete beams.

4. Define balanced section.

5. What is the importance of anchorage value of bends?

6. What are the functions of longitudinal reinforcement with respect to torsion?

7. Write any two salient assumptions are made in the limit state design of columns.

8. How the compression failures occur in columns?

9. Why the dowel bars are provided in footing?

10. On which circumstances combined rectangular footings are suitable?

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PART B — (5 × 13 = 65 marks)

11. (a) A reinforced concrete rectangular beam is supported on two walls 750 mm thick, spaced at a clear distance of 6m. The beam carries a super imposed load of 30 kN/m. design the beam in working stress method. M20 Grade Concrete and Fe250 bars. Draw reinforcement details. (13)

Or

(b) Explain the codal recommendations for limit state design. (13)

12. (a) Design a T- beam section with a flange width of 1250 mm, a flange depth of 100mm, a web width of 250 mm and an effective depth of 500 mm. which is subjected to a factored moment of 560 kNm. The concrete mix is to be used grade of M20 and steel is grade of Fe415. Use limit state method. (13)

Or

(b) Design shear reinforcement for a rectangular reinforced concrete beam section to carry a factored bending moment of 200 kNm. Factored shear force of 120 kN, and a factored torsional moment of 75 kNm. Use M20 grade concrete and Fe 415 grade steel. (13)

13. (a) Design a one way simply supported slab of a clear span of 4 m, the width of the supports being 300 mm, the dead load on the slab may be taken as 1000 N/m² excluding self-weight. The live load on the slab is 2000 N/m². Use M20 grade concrete and Fe 415 grade steel. (13)

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Or

(b) Design a two way slab for an office floor size 3.5m × 4.5m with discontinuous and simply supported edges on all the sides with the corners prevented from lifting and supporting a live load of 4.4kN/m². Adopt M20 grade concrete and Fe 415 HYSD bars. (13)

14. (a) Design the reinforcements in a circular column of dia 300 mm to support a service axial load of 800 kN. The column has an unsupported length of 3m and is braced against side sway. The column is reinforced with helical ties. The materials to be used are M25 grade of concrete and Fe 415 HYSD bars. (13)

Or

(b) Design the reinforcements in a short column 400 mm × 400mm at the corner of a multi storeyed building to support an axial factored load 1500kN, together with a biaxial moment of 50kNm acting in a perpendicular planes. Adopt M20 grade concrete and Fe415 HYSD bars. (13)

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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, 17.5 kN/m³ and 30 degree respectively. Use M20 grade of concrete and HYSD steel bars of grade Fe415. Design the footing when the wall supports at service state, a load of 50 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 SBC of the soil is 200 kN/m². Use M20 grade concrete and Fe 415 HYSD bars. (13)

PART C — (1 × 15 = 15 marks)

16. (a) A braced reinforced concrete column of circular cross section of 500 mm diameter is to support a factored axial load of 2250 kN along with the factored moment of 160 kN.m. The unsupported length of the column is 6.3m with effective length of 5.5m. design the column when it is to be provided with:

(i) Lateral ties and

(ii) Spiral reinforcement

The M25 grade of concrete and HYSD steel bars of Fe415. (15)

Or

(b) A beam of rectangular section is reinforced with 6 No's of 18mm dia bars in tension and is supported an effective span of 5m, the beam being 300mm wide and 700mm deep. The beam carries a UDL of 42 kN/m, design the shear reinforcement considering no bars are bent up for shear. Assume $\sigma_{sv} = 230$ N/mm², $\tau_c = 0.30$ N/mm² and $f_y = 415$ N/mm². (15)

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