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Question Paper Code : 31210

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

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 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. Draw yield line pattern for a one way slab with simply supported edge conditions.

4. How do you check the deflection for various end conditions of the beams?

5. Differentiate shear failure and bending failure.

6. What do you understand by the term Anchorage?

7. What is the formula used in the Bresler's Load contour method of approach for short columns subjected to axial load and biaxial bending?

8. How do you calculate the base area in the case of axially loaded footings?

9. Give the general steps involved in the design of combined footing.

10. Name any four loads you would consider in the design of masonry walls.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What are the advantages of Limit state method. (5)

(ii) A reinforced concrete slab has an effective span of 5 m, and carries a uniformly distributed load of 6 kN/m² inclusive of its own weight. Determine (1) effective depth of the slab (2) steel reinforcement. Use M 20 concrete and Fe 415 steel. (11)

Or

(b) A rectangular beam of breadth 300 mm and effective depth 800 mm with cover of 40 mm to centre of steel is to be designed for M 20 concrete and Fe 415 grade steel. Use working stress method. Determine the area of steel required if the moment due to characteristic load is 160 kNm.

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/mm². 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 M20 concrete and Fe 415 grade steel.

13. (a) A rectangular beam with b = 350 mm and d = 550 mm has a factored shear of 400 kN at the critical section near the support. The steel at the tension side of the section consists of four 32mm dia bars which are Continued to support. Assuming f_{ck} = 25 N/mm² and f_y = 415 N/mm², design the vertical stirrups for the section. Use Limit state method.

Or

(b) Check for the development length at support of a doubly reinforced beam 400 mm × 750 mm (effective) the clear span of the beam is 5.25 m. The beam carries UDL of 46 kN/m (Including self-weight). The beam is reinforced with 8 bars of 20 mm diameter (4 are bent up near support) on tension side and 4 bars of 16mm diameter on compression side. Adopt M 20 grade concrete and Fe 415 HYSD bars.

14. (a) Determine the reinforcement for a short column for the following data ; column size; 300 mm × 500 mm, P_u = 2200 kN, M_{ux} = 140 kNm, M_{uy} = 90 kNm, Use M20 concrete and Fe 415 grade steel. Use Limit state method.

Or

(b) Design a reinforced concrete column, 400 mm square, to carry an ultimate load of 1200 kN at an eccentricity of 170 mm. Use M 20 concrete and Fe 415 grade steel.

15. (a) Design a rectangular footing of uniform thickness for a R.C.C column bearing a vertical load of 600kN, and having a base size of 400 mm × 600 mm. The SBC of the soil may be taken as 120 kN/m². Use M 20 concrete and Fe 415 steel bars.

Or

(b) Design a combined rectangular footing for two columns A and B, carrying loads of 500 kN and 700 kN respectively. Column A is 300 mm × 300 mm in size and column B is 400 mm × 400 mm in size. The center to centre spacing of the Column is 3.4 m.The SBC of soil is 150 N/m². Use M20 concrete and Fe 415 steel.