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Question Paper Code : 51258

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

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 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 are the assumptions made in the elastic theory of reinforced concrete structures ?
2. List down the types of shear failures observed in reinforced concrete member.
3. List the advantages of limit state design.
4. Distinguish between under reinforced and over reinforced sections.
5. Differentiate shear failure and bending failure.
6. What do you understand by the term Anchorage ?
7. What is pedestal ?
8. Write down the expression for minimum eccentricity.
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) (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/m^2 inclusive of its own weight. Determine (1) effective depth of the slab (2) steel reinforcement. Use M20 concrete and Fe415 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) Design a one way reinforced concrete slab – Simply Supported at the edges for a public building with a clear span of 4 m supported on 200 mm solid concrete masonry walls. Live load on slab is 5 kN/m^2. Adopt M.-20 grade concrete and Fe-415 HYSD bars. **(16)**

OR

(b) A tee beam slab 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/m^2. Design one of the intermediate beam using M-20 grade concrete and Fe-415 HYSD bars. **(16)**

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

OR

(b) An overhanging beam has 6 m 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) Determine the ultimate load carrying capacity of a circular column section of 500 mm diameter reinforced with 8 numbers of 25 mm diameter bars adequately tied with lateral ties. Use M 25 concrete and Fe 415 steel. **(16)**

OR

(b) A rectangular column of effective height 4 m is subjected to a load of 1800 kN and bending moment of 100 kN-m about major axis of the column. Design a suitable suction for the column so that the width should not exceed 400 mm. Use M25 concrete and Fe45 steel. **(16)**

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/m^2. 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/m^2. Adopt M-20 grade concrete and Fe-415 HYSD bars. **(16)**
