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M.E. DEGREE EXAMINATIONS: JANUARY 2009

First Semester

STRUCTURAL ENGINEERING

P07SE103 Advanced Reinforced Concrete Structures

Time: Three Hours   **Maximum Marks: 100**

Answer ALL Questions:-

Instructions:

1. Use M25 grade of concrete and Fe 415 steel wherever required
2. Use of relevant IS codes is permitted
3. Assume data, if necessary.

PART A (20 x 1 = 20 Marks)

1. The Short term deflection is due to

    A. Dead Load   B. Imposed load   C. Wind Load   D. Earthquake Load

2. The Modulus of rupture of concrete is

    A. $0.7\sqrt{fck}$ B. $0.67\sqrt{fck}$ C. $0.45\sqrt{fck}$ D. $0.4\sqrt{fck}$

    where fck = Cube Compressive Strength

3. Cracking due to stress concentration is caused by

    A. Curtailment of bars   B. Settlement of support

    C. Shrinkage   D. Chemical effect

4. The permissible crack width of beams in aggressive environment is

    A. 0.1mm   B. 0.01mm   C. 0.3mm   D. 0.03mm

5. The idealized Moment – Curvature relationship of a RC beam is

    A. Linear   B. Bi-Linear   C. Curve linear   D. Non-Linear

6. The design moment obtained after redistribution should not be less than ------- of elastic moment at ultimate load.

    A. 30%   B. 70%   C. 40%   D. 60%

7. Rotational Capacity is larger in

    A. Under reinforced Section   B. Balanced Section

    C. Over Reinforced Section   D. Singly Reinforced Section

8. Redistribution of moments not allowed when the moments have been obtained by

    A Moment Co-efficient Method   B. Moment distribution Method

    C. Slope deflection Method   D. Substitute Frame method

9. The minimum Thickness of deep beam should be greater than

    A. D/10   B. D/15   C. D/20   D. D/25

10. A simply supported beam is considered as deep beam if ratio of effective span to overall depth is

    A. less than 2   B. greater than 2   C. less than 2.5   D. greater than 2.5

11. Maximum Rib height in voided slab slabs is

    A. 3 bw   B. 4 bw   C. 5 bw   D. 6 bw

12. The moments and shears in a simply supported anisotropic plate depend on

    A. Deflection surface   B. Cracking surface

    C. Shrinkage   D. Creep

13. The reduction in floor live load on second floor column as per IS code is

    A. 5%   B. 10%   C. 15%   D. 20%

14. The fundamental time period T for a moment resisting frames without bracings

    A. 0.1N   B.0.01N   C. 0.6N   D. 0.9N
    Where N = Number of storeys

15. Gust factor G is

    A. Peak Load/ Mean Load   B. Mean Load/ Peak load
    C. Static Load/ Dynamic Load   D. Dynamic Load/Static Load

16. The wind effect for very stiff structures can be analyzed

    A. Static effect   B. Dynamic effect
    C. Quasi static effect   D. Quasi dynamic effect

17. The method of proportional column axial stresses is also known as

    A. Portal Method   B. Cantilever Method
    C. Factor method   D. Gust Factor Method.

18. The method of proportional shear is also known as

    A. Portal Method   B. Cantilever Method
    C. Factor method   D. Gust Factor Method.

19. The wind pressure due to cyclonic wind speed v is

    A. $0.3 \, v^2$ B. $0.4 \, v^2$ C. $0.5 \, v^2$ D. $0.6 \, v^2$

20. The wind drift limit of a tall building

    A. 0.002H   B. 0.003H   C. 0.004H   D. 0.005H
    Where H = Height of building

PART B (5 x 16 = 80 Marks)

21 a. A simply supported beam of span 8m is 350mm x 600mm cross section and is reinforced with 4 bars of 25mm diameter at tension side placed at an effective cover of 50mm. It is subjected to a maximum bending moment of 120 kNm, out of which 50% load is permanent loads. Calculate the total deflection of the beam.

(OR)

21. b. A cantilever beam 3.5m span is 300mm x 600mm in cross section. It is subjected to a load of 20kN/m. It is reinforced with 4 bars of 25mm diameter at tension side placed at an effective cover of 50mm. Calculate the crack width directly above the bar and top corner of the beam.

22. a. i). what are the merits and demerits of moment redistribution?

    ii). Draw bending moment diagram for the fixed beam carrying uniformly distributed load of Wu kN/m, after 20% redistribution.

(OR)

22. b. Discuss about the Moment – Curvature relationship of under reinforced and over reinforced members.

23. a. Design a deep beam having overall depth 4m and an effective span of 6m. The width of beam is 400mm. It has to carry a load of 250kN/m. Sketch the reinforcement detailing.

(OR)

23. b. i). Write the design procedure of voided slab.

   ii). Briefly explain the methods of grid floor analysis.

24. a. i). What are the various loads acting on the structures? Briefly explain.

   ii). Discuss about the loads due to imposed deformation.

(OR)

24. b. Write the step by step procedure of calculation of wind load on a structure using IS 875?.

25. a. Analyse two bay three storey RC frame, having bay width 3m each and storey height 3m each subjected to lateral loads at second storey , first storey and ground storey 10kN , 15 kN and 20kN respectively. Assume uniform cross section for all the members. Use Portal method.

(OR)

25.b. Analyze the frame given in Question No. 25 a. by Cantilever Method.

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