KUMARAGURU
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M.E DEGREE EXAMINATIONS: DEC 2022

(Regulation 2018)

First Semester

STRUCTURAL ENGINEERING

P18SEI1202: Design of Advanced Concrete Structures

Use of IS:456-2000 is allowed

COURSE OUTCOMES

CO1: Calculate short term and long-term deflections for structural elements

CO2: Analyze the structure after redistribution of moments

CO3: Design and detail deep beams, grid floor and flat slabs in accordance with relevant IS code and standards

CO4: Design bunkers and silos.

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Find the odd one in changes made in IS 456:2000   CO1 [K1]

   a) Recognition of 3 grades of OPC with other cement
   b) Method of testing water for concrete is removed
   c) Enumeration of allowable mineral admixture
   d) Characteristic strength of steel has been defined

2. Deflection of members should not exceed   CO1 [K1]

   a) Span/250
   b) Span/350
   c) Span/300
   d) Span/200

3. Formula for deflection of a simply supported beam due to uniformly distributed load is _____   CO1 [K2]

   a) $(5/384)* wl^3/EI$
   b) $(5/384)* wl^4/EI$
   c) $(5/384)* wl^4/AI$
   d) $(5/384)* wl^5/AI$

4. Pick the formula to find out bending moment at centre in a fixed beam is   CO2 [K2]

   a) $Wl^2/24$
   b) $Wl^2/12$
   c) $Wl^3/24$
   d) $Wl^3/12$

5. The empirical requirement to prevent bulking of deep beam is   CO3 [K2]

    a)   D/t <25   b)   D/t <20

    c)   D/t <15   d)   D/t <35

6. Minimum steel to control tension cracks in beam is should not be less than   CO3 [K2]

    a)   0.2 or 0.3% of area of concrete   b)   0.1 or 0.3% of area of concrete

    c)   0.3 or 0.3% of area of concrete   d)   0.4 or 0.3% of area of concrete

7. Under _____ clause in IS 456 discussed about ribbed slabs and voided slabs   CO3 [K1]

    a)   30   b)   29

    c)   31   d)   32

8. Formula to find out the shear stress is   CO3 [K1]

    a)   V/bd (V = shear force)   b)   V/EI

    c)   VEI/bd   d)   v/bd (v = shear stress)

9. Direct tension in short wall in square bunker is   CO4 [K1]

    a)   pL/2   b)   pL/3

    c)   pL/4   d) pL^2

10. Hoop tension in circular bunker is   CO4 [K1]

    a)   0.5 pD   b)   pD

    c) P^2D d) pD^2

PART B (10 x 2 = 20 Marks)

11. Pen down the basic deflection equation of beam.   CO1 [K2]

12. Write the allowable crack width of buildings as per IS 456:2000.   CO1 [K2]

13. List the advantage of the of the moment redistribution.   CO2 [K1]

14. As per BS 8110:1985, write the expression for clear spacing of steel.   CO2 [K2]

15. What are the steps to be followed to design the deep beams?   CO3 [K3]

16. Write the steps to be followed for the detailing of deep beams.   CO3 [K2]

17. Write the advantage of ribbed slab compared to other slabs.   CO3 [K2]

18. Mention the methods adopted to analysis the flat grid floors.   CO3 [K2]

19. Distinguish between bunkers and silos.   CO4 [K2]

20. Write any two theories that are used to determine the pressure intensity in silos.   CO4 [K2]

PART C (10 x 5 = 50 Marks)

21. What do you understand in long term deflection and write a short note on long term deflection due to creep by IS 456. CO1 [K2]

22. Write a short note on factors affecting crack width in beams. CO1 [K2]

23. A rectangular section of 250 x 350 mm with effective cover of 50mm is reinforced with 3#16mm dia in tension zone using M20 and Fe415 steel. Calculate the depth of neutral axis CO1 [K3]

24. Describe theatrical method of redistribution moment for two span continuous beam CO2 [K3]

25. Identify the suitable condition of that to be satisfied for moment redistribution in RCC structures. CO2 [K3]

26. Outline the Moment – Curvature (M -Φ) Relation of Reinforced Concrete Section. CO2 [K2]

27. Explain the step by step procedure for designing deep beams as per IS 456 CO3 [K3]

28. Elaborate the plate theory for flat grid floors. CO3 [K3]

29. List the various types of shear wall that can build in the structure. CO4 [K2]

30. Discuss about the methods that to be fallowed for design of slender column. CO4 [K3]

Answer any TWO Questions
PART D (2 x 10 = 20 Marks)

31. A rectangular beam of 300x600 mm is reinforced with 4#20 mm dia bars over an effective span of 6.5 m. It carries a live load of 17.5kN/m. Use M20 concrete. Calculate the crack width directly below the 1st rod in the tension zone. CO1 [K3]

32. Design a ribbed slab 3 m x 4 m continuous over two adjacent sides and simply supported on other side. The ribs are spaced at 1mx1m. Assume factored load of 15 kN/m². Assume necessary data. CO3 [K3]

33. Use a limit state method and design a circular cylinder bunker to store 15 tonnes of coal. Density of coal is 9kN/m². Angle of repose is 30 degrees. Take M20 and Fe415 grade of steel. CO4 [K3]

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