KUMARAGURU
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Register Number:……….……

M.E DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

First Semester

STRUCTURAL ENGINEERING

P18SEI1202 : Design of Advanced Concrete Structures

(Use IS456 -2000 ,IS875, SB16 are permitted)

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. **Assertion:** In the design of flat slabs, detailing of shear reinforcement is crucial to prevent brittle failure.   CO3   [K2]

    Reason: Flat slabs are prone to punching shear failure, and proper reinforcement detailing helps enhance their strength.

    a) Both the assertion and reason are true, and the reason is the correct explanation of the assertion.

    b) Both the assertion and reason are true, but the reason is not the correct explanation of the assertion.

    c) The assertion is true, but the reason is false.

    d) The assertion is false, but the reason is true.

2. Which of the following format is used in limit state method?   CO1   [K2]

    a) Single safety factor

    b) Multiple safety factor

    c) Load factor

    d) Wind factor

3. Which of the following relation is correct?   CO1   [K1]

    a) Design Load = Characteristic Load

    b) Design Load = Characteristic Load + Partial factor of safety

c) Design Load = Characteristic Load / Partial factor of safety
d) Design Load = Characteristic Load x Partial factor of safety

4. Thickened part of a flat slab over its supporting column, is technically known as   CO3 [K2]

a) drop panel
b) capital

c) column head
d) Beam head

5. Deep beams are designed for   CO3 [K2]

a) Shear force only
b) Bending moment only

c) Both shear force and bending moment
d) Bearing

6. Arrange the following in the correct sequence of considerations in the design of grid floors. A. Analysis B. Detailing C. Material Selection D. Load Calculation   CO3 [K2]

a) A, B, C, D
b) A, C, D, B

c) D, B, A, C
d) D, A, C, B

7. **Assertion (A):** The deflections of cracked structural concrete members may be estimated by Unilinear method.   CO2 [K2]

Reason (R): The load deflection curve is approximately linear up to stage of Invisible cracking

a) Both the assertion and reason are true, and the reason is the correct explanation of the assertion.
b) Both the assertion and reason are true, but the reason is not the correct explanation of the assertion.

c) The assertion is true, but the reason is false.
d) The assertion is false, but the reason is true.

8. In a cavity wall, the space between the leaves should be filled with a material which is not   CO4 [K2]

a) Waterproof
b) Load bearing

c) Non-load bearing
d) Insulating

9. Columns with what slenderness ratio are not designed with respect to buckling but are designed for compressive stresses.   CO4 [K2]

a) >1
b) <1

c) >30
d) <30

10. Maximum percentage of Redistribution of moments allowed in statically indeterminate beam as per IS 456:2000 for LSM is   CO2 [K2]

a) 20
b) 40

c) 30   d) 10

PART B (10 x 2 = 20 Marks)

11.	Write down the expression for crack width as per IS456-2000	CO1	[K_1]
12.	What is meant by Shrinkage and Thermal Cracking?	CO1	[K_2]
13.	State the moment curvature relation in a flexural member	CO2	[K_2]
14.	Write the concept of Plate theory.	CO2	[K_2]
15.	How does a deep beam differ from an ordinary RC beam? Under what circumstances deep beams are preferred?	CO3	[K_2]
16.	Design a neat sketch corbel and mention its importance.	CO3	[K_2]
17.	Write about action of flat slab and flat plate with diagram?	CO3	[K_1]
18.	Differentiate Bunker and Silos	CO4	[K_2]
19.	Give explanation about coupled shear wall with sketches	CO4	[K_2]
20.	Define Slender Column.	CO4	[K_2]

PART C (6 x 5 = 30 Marks)

21.	What are the major factors which influence crack-widths in flexural members?	CO1	[K_2]
22.	Write the advantage and disadvantages of moment redistribution.	CO2	[K_2]
23.	Explain about deep beam, its application, types, and behaviour at limit state.	CO3	[K_2]
24.	A simply supported one-way ribbed slab of 5 m span is to be used for 3 kN/m live loads. Design the slab using M$_{20}$ grade concrete and HYSD bars of grade Fe 415.	CO3	[K_3]
25.	Explain about the slenderness of the plain concrete wall as per IS 456-2000.	CO4	[K_2]
26.	Discuss the interaction between structural frame and shear wall.	CO4	[K_2]

Answer any FOUR Questions
PART D (4 x 10 = 40 Marks)

27.	Discuss the issues involved in designing for achieving control over thermal and shrinkage cracks in large R.C structures.	CO1	[K_2]

28. Write the step-by-step procedure for design of corbels using IS code.   CO3   [K2]

29. Design the interior panel of the flat slab floor system for a warehouse 24 m x 24   CO3   [K3]
    m divided into panels of 6 m x 6 m. Live load = 5kN/m², materials M20 and
    Fe415 HYSD bars, Column size = 400 mm diameter. Sketch the reinforcement
    details of the interior panel of the flat slab. Assume any data if required.

30. Calculate the design loads on a rectangular bunker 20 m length and 8 m width   CO4   [K3]
    supported on ten columns. It stores maize. Height of the vertical portion = 4.2 m.
    Height of hopper = 4.2 m. Assume any data if required.

31. Explain about design of concrete walls for flexure and rules for detailing of steel CO4   [K2]
    in concrete walls as per codal provisions.

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