Register No.: .... Name: ....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FIRST SEMESTER M.TECH DEGREE EXAMINATION (Regular), DECEMBER 2022

STRUCTURAL ENGINEERING AND CONSTRUCTION MANAGEMENT

(2021 Scheme)

Course Code: **21SC102**

Course Name: **Advanced Design of Concrete Structures**

Max. Marks: **60** **Duration: 3 Hours**

Use of IS 456:2000, SP 16, IS 875, IS 13920, IS 2911 Part 1 are permitted

(Answer one full question from each module)

MODULE I

1. Design a short column to carry an ultimate load of 1200 kN and an ultimate moment of 60 kNm about the major axis. Use M 20 concrete and Fe415 steel bars at an effective cover of 50 mm. (9)

OR

2. a) Write down design procedure for slender column. (6)
   b) Draw the ductile detailing of column. (3)

MODULE II

3. A beam of width 450 mm, depth 650 mm and clear cover of reinforcement 40 mm is reinforced with 3 bars of 20 mm diameter. Grade of concrete and steel are M25 and Fe 415 respectively. Determine the crack width when the section subjected to a bending moment of 190 kNm at the following points. (9)
   i) a point midway between bars at tension face
   ii) at bottom left corner
   iii) at tension face directly under the bar
   iv) a point on the side face of the beam 250 mm below neutral axis.

OR

4. Design a rectangular beam, continuous over four column supports of effective span 5.5 m. The beam is subjected to an imposed load of 11 kN/m and live load of 15 kN/m. Use M 25 concrete and Fe 415 steel. (9)

MODULE III

5. Design a deep beam 300 mm wide and 4 m deep, simply supported over a clear span of 6 m. The beam carries a live load of 160 kN/m at service state and is supported on walls of 600 mm thick on each end. Use M 20 concrete Fe 415 steel. (9)

OR

6. a) Define shear wall. Classify different types of shear walls with sketches. (4)
   b) Explain the design principles flanged shear walls (5)

MODULE IV

7. Design an interior panel of a flat slab with panel size 6m × 5m supported by columns of size 500mm × 500mm. Provide suitable drop. Take live load as 4 kN/m^2. Use M 20 Concrete and Fe 415steel. (9)

OR

8. a) Explain different terms used in flat slab design with help of sketch (4)
      i) Drop
      ii) Column head
      iii) Column strip
      iv) Middle strip
   b) A walkway consists of a slab 5.4m between edges supported on a spandrel beams 200mm × 600mm in size, which in turn is carried on 300mm × 200mm columns spaced at 7m centers. Assuming that the total factored load on the walkway is 6kN/m^2 and the slab thickness is 150mm, determine the torsional moment in the spandrel beam and the walkway slab. (5)

MODULE V

9. Design a pile cap for a system of 3 piles of diameter 400 mm supporting a column 500 mm which is carrying a axial load of 600 KN, piles are placed at the vertex of a equilateral triangle of sides 1200 mm, adopt M 20 concrete and Fe 415 steel. (12)

OR

10. Design a pile under a column transmitting an axial load of 800kN. The pile is to be driven to a hard stratum available at a depth of 8m. Use M20 Concrete and Fe 415 Steel. (12)

MODULE VI

11. Design a portal frame hinged at base to suit the following data (12)
    Spacing of portal frame= 4m
    height of column = 4m
    distance between column centers= 10m

live load on roof = 1.5kN/m^2
RCC slab Continues over portal frame
safe bearing Capacity of soil= 200kN/m^2
adopt M20 concrete and Fe 415 steel.

OR

12. a) Draw the ductile detailing of beam-Column joint. (4)

    b) Explain the concept behind the fixing of beam-column layout, column position and column orientation in multistory RC building. (8)

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