R18

Code No: 155DD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, January - 2025

STRUCTURAL ENGINEERING – I (RCC)

(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B. i) **Part-A** for 15 marks, ii) **Part-B** for 60 marks.

- Part – A is a compulsory question consisting of ten sub-questions.
- Part – B consists of 5 questions (numbered 2 to 11) carrying **12 marks each.**
- **Use of IS 456-2000 code and only interaction diagram for columns from SP-16 is permitted.**

PART – A

(15 Marks)

1.a)	Distinguish between Working Stress Method and Limit State Method.	[2]
b)	What are the parameters influencing the bond resistance in RCC flexural members?	[2]
c)	Differentiate between short-term and long-term deflections.	[2]
d)	What are the various functions of the lateral ties in an RCC column?	[2]
e)	What are the functions of a column footing?	[2]
f)	Define the term Design.	[1]
g)	What is an equilibrium torsion?	[1]
h)	What is a two-way slab?	[1]
i)	Define the slenderness ratio of an RCC column.	[1]
j)	Define punching shear.	[1]

PART – B

(60 Marks)

2. An RCC beam of rectangular section is 300 mm wide and 450 mm overall depth. It is reinforced with 2 bars of 16 mm diameter in compression zone and 3 bars of 20 mm diameter in tension zone. Determine the moment of resistance of the section. Use M30 grade concrete and Fe500 steel. [12]

OR

3. A reinforced concrete slab of 125 mm thick is supported by reinforced concrete beams of width 300 mm and spaced at 3.6 m c/c. The beams have a clear span of 5 m and supported on 300 mm wide supports. The beams are cast monolithic with the slab. The live load acting on the slab is 2 kN/m^2 and the floor finish is 1 kN/m^2. Design a T-beam section for one of the intermediate beams. Use M20 grade concrete and Fe500 steel. Sketch the reinforcement details. [12]

4. Design the shear reinforcement of a simply supported beam of span 4.8 m, section 230 mm × 450 mm (overall depth) and subjected to an imposed load of 50 kN/m. The beam is reinforced with 4 bars of 20 mm diameter. Use M25 concrete and Fe500 steel. Sketch the reinforcement details. [12]

OR

5. Design a reinforcement concrete beam of rectangular section subjected to an ultimate twisting moment of 120 kNm and an ultimate shear force of 150 kN. Use M30 concrete and Fe500 steel. Sketch the reinforcement details. Sketch the reinforcement details. [12]

6. Design an interior slab panel of a room with dimensions 4 m × 5 m. The slab is subjected to live load of 4 kN/m^2 and floor finish of 1 kN/m^2. Assume the width of supports is 300 mm. Use M 25 concrete and Fe 415 steel. Sketch the reinforcement details. [12]

OR

7. Design a stair case in a room with clear dimensions 2.4 m × 4.5 m and the storey height is 3.6 m. Assume the live load is 3 kN/m^2. Adopt M 20 Concrete and Fe 500 steel. Sketch the reinforcement details. [12]

8. Design an RCC column of effective length 4.5 m subjected to an axial load of 1500 kN. Use M 25 concrete and Fe 500 steel. Sketch the reinforcement details. [12]

OR

9. Design the reinforcement of a column, section 400 mm × 400 mm and effective length 4.2 m, subjected to a factored axial load of 1000 kN and a factored moment of 90 kNm and 60 kNm about the two centroidal axes, respectively. Use M30 grade concrete and Fe500 steel. Sketch the reinforcement details. [12]

10. Design the footing for a square column of side 450 mm and subjected to an axial load of 1600 kN. Assume the bearing capacity of soil is 200 kN/m^2. Use M25 concrete and Fe 500 steel. Sketch the reinforcement details. [12]

OR

11. Design a combined footing for two columns located 3.5 m apart. The sizes of the columns are 400 mm × 400 mm and 500 mm × 500 mm and transferring axial loads 900 kN and 1200 kN respectively. The centers of the two columns lies at a distance of 0.6 m from the property line. The safe bearing capacity of the soil is 250 kN/m^2. Use M30 grade concrete and Fe500 steel. Sketch the reinforcement details. [12]

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