R18

Code No: 155DD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, July/August - 2023

STRUCTURAL ENGINEERING – I (RCC)

(Civil Engineering)

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

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 15 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 12 marks and may have a, b as sub questions.
iv) Use of IS 456 - 2000 code and only interaction diagram for columns from SP-16 is permitted.

PART – A

(15 Marks)

1.a)	State the assumption made for design of RC members using limit state method.	[2]
b)	Define modular ratio. Estimate modular ratio for M20 and M25 grade concrete.	[2]
c)	Write the various types of slabs.	[2]
d)	State the behavior of slender column.	[2]
e)	What is the main advantage of combined footing?	[2]
f)	Write the partial safety factor for steel and concrete.	[1]
g)	Enumerate the advantage of flanged beam.	[1]
h)	Define two way slab.	[1]
i)	Write the expression for eccentricity of column.	[1]
j)	List the different types of footings.	[1]

PART – B

(60 Marks)

2. Elaborate on the philosophy and principles of Limit State Method of RCC design. [12]

OR

3. An RCC simply supported beam having over all cross section of 250 × 500 mm is reinforced with 4 of 25mm diameter bars as tension reinforcement and shear reinforcement of 2 legged vertical stirrups of 8mm diameter at 300mm c/c. Determine the safe load carrying capacity of the beam, if the effective span of the beam is 6.3m subjected to mild exposure condition. Assume M25 grade of concrete and Fe 500 grade of steel. [12]

4. A reinforced concrete beam has a support section with a width of 250mm and effective depth of 500mm. The support section is reinforced with 3 bars of 20mm diameter on the tension side. 8mm diameter 2 legged stirrups are provided at a spacing of 200mm centers. Using M-20 grade concrete and Fe-415 HYSD bars, calculate the shear strength of the support section. [12]

OR

5. Design shear reinforcement for the following data: size of beam = 300mm × 500mm; clear cover = 25mm; steel reinforcement = 5 - #25; design shear force = 350kN; Use M20 grade of concrete and Fe415 grade of steel. Sketch the reinforcement details. [12]

6. Design a slab for a hall of internal dimensions 12 × 4m carrying a live load of 4kN/m^2. The slab is supported on the wall of thickness 230 mm. Adopt mild exposures with M20 grade concrete and Fe415 steel. Sketch the reinforcement details. [12]

OR

7. Design a continuous RC slab for a class room 7m wide and 14m long. The roof is to be supported on RCC beams spaced at 3.5m intervals. The width of beam should be kept 230mm. The super imposed load is 3kN/m^2 and floor finish is 1kN/m^2. Use M20 grade of concrete and Fe415 grade of steel. Sketch the reinforcement details. [12]

8. Design a column subjected to an axial working load of 2000kN. The column has unsupported length of 3m and it is braced against side sway in both directions. Adopt M20 grade of concrete and Fe415 grade of steel. Sketch the reinforcement details. [12]

OR

9. Design the reinforcements in the short column 400mm × 600mm subjected to an ultimate axial load of 1600kN together with ultimate moments of 120kNm and 90kNm about the major and minor axis respectively. Adopt M20 grade of concrete and Fe415 grade of steel. Sketch the reinforcement details. [12]

10. A rectangular RC Column 300mm × 300mm carrying axial load 1200kN. The SBC of soil is 160 kN/m^2. Use M25 grade concrete and Fe 500 steel. Design the suitable footing. Sketch the reinforcement details. [12]

OR

11. Design a reinforced concrete footing for a rectangular column of section 300mm by 500mm supporting an axial factored load of 1600kN. The SBC of the soil at site is 180kN/m^2. Adopt M30 grade concrete and Fe500 grade steel. Sketch the reinforcement details. [12]

---ooOoo---