



MARRI LAXMAN REDDY INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(AN AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)

Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section 2(f) & 12(B) of the UGC act, 1956

III B.Tech I Sem Supply End Examination, August 2022 Structural Engineering - I (RCC) (CIVIL)

Time: 3 Hours.

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.

2. In Part - A, answer all questions which carries 20 marks.

3. In Part - B, answer any one question from each unit.

Each question carries 10 marks and may have a, b as sub questions.

PART- A**(10*2 Marks = 20 Marks)**

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|-------|---|----|-----|-----|
| 1. a) | What is the formula used to find the critical neutral axis in Limit State method? | 2M | C01 | BL1 |
| b) | What is a doubly reinforced section | 2M | C01 | BL1 |
| c) | What are the types of reinforcement used to resist shear | 2M | C02 | BL1 |
| d) | How to overcome torsion on beams? | 2M | C02 | BL1 |
| e) | Why corner reinforcement are provided in a two way slab? | 2M | C03 | BL1 |
| f) | What is stair case? | 2M | C03 | BL1 |
| g) | Write the expression for eccentricity of columns | 2M | C04 | BL1 |
| h) | Differentiate between uniaxial and biaxial column | 2M | C04 | BL2 |
| i) | Why punching shear is not encouraged in design of footing? | 2M | C05 | BL1 |
| j) | Why dowel bars are provided in footing? | 2M | C05 | BL1 |

PART- B**(10*5 Marks = 50 Marks)**

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|-------|---|----|-----|-----|
| 2. a) | Compare and explain detailed notes on under reinforced section and over reinforced section for LS method. | 5M | C01 | BL2 |
| b) | Determine the position of neutral axis and the moment of resistance of a beam 300mm wide and 550mm effective depth. It is reinforced with 3 bars of 16mm diameter. Use M20 grade of concrete and Fe415 grade of steel. Adopt Limit State method | 5M | C01 | BL2 |

OR

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|----|--|-----|-----|-----|
| 3. | A rectangular RC section having a width of 350 mm is reinforced with 2 numbers of 28 mm diameters at an effective depth of 700mm. adopting M20 grade concrete and Fe415 HYSD bars. Determine the ultimate moment of resistance of the section. | 10M | C01 | BL3 |
|----|--|-----|-----|-----|

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|-------|---|----|-----|-----|
| 4. a) | Define limit state of collapse in shear and briefly explain procedure for design of beam for shear according to IS456:2000. | 5M | C02 | BL4 |
| b) | A simply supported RC beam of size 300x500mm effective is reinforced with 4 bars of 16mm diameter HYSD steel of grade Fe415. Determine the anchorage length of the bars at the simply supported end if it is subjected to a factored fore of 350 KN at the Centre of 300mm wide masonry supports. The concrete mix of grade M 20 is to be used. Draw the reinforcement details. | 5M | C02 | BL3 |

OR

- 5 Design torsional reinforcement in a rectangular beam section, 350mm wide 750mm deep, subject to an ultimate twisting moment of 140 KNm combined ultimate shear force of 110KN. Assume M-25 grade concrete, Fe415 grade steel and mild exposure condition. 10M C02 BL6
- 6 Design a R.C. slab for a room measuring 5m x 6m size. The slab is simply supported on all the four edges, with corners held down and carries a superimposed load of 30 N/m². Inclusive of floor finishes etc. use M20 mix, Fe415 steel and IS code method. Draw the reinforcement details. 10M C03 BL6
- OR**
- 7 A rectangular beam of span 7m (C/C of supports), 250mm wide by 550mm deep is to carry a uniformly distributed load (excluding self weight) of 15 KN/m and LL of 20KN/m. using M20 grade concrete and Fe415 HYSD bars, Design the beam section at mid span, check the adequacy of the section for shear and perform a check for deflection control. 10M C03 BL3
- 8 a) Discuss various assumptions used in the limit state methods of design of compression members. 5M C04 BL2
 b) Design an axially loaded tied column 400 mm x 400 mm pinned at both ends with unsupported length of 3m to carry a factored load of 2300KN. Use M 20 & Fe 415 5M C04 BL6
- OR**
- 9 Design the reinforcement required for a column which is restrained against sway using the following data. Size of column=530x450mm, $l_{eff}=6.6m$, unsupported length=7.70m. Factored load = 1600kN. Factored moment about major axis =45kNm at top and 30kNm at bottom. Factored moment about minor axis=35kNm at top and 20kNm at bottom. Use M25 grade concrete and Fe 500 grade HYSD bars. Column is bent in double curvature and reinforcement is distributed equally on all the four sides of the section 10M C04 BL6
- 10 Design a suitable footing for a 500 mm x 500 mm square column transferring 100kN axial load and a moment of 35kN-m. The safe bearing capacity of soil is 190 kN/m² .Use M20 concrete and Fe415 steel. Adopt limit state design method. 10M C05 BL6
- OR**
- 11 Design a combined footing for the two columns at a multi-storey building. The columns of size 400mmx400mm transmit a working load of 500kN each and they are spaced at 6m c/c .The safe bearing capacity of soil at site is1500kN/m² . Adopt M20 grade concrete and Fe500 grade steel. Sketch the details of reinforcements in the combined footing 10M C05 BL6