

**III B. Tech I Semester Supplementary Examinations, October/November- 2019**  
**DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES**  
 (Civil Engineering)

Time: 3 hours

Max. Marks: 70

**Answer any ONE Question from Part – A and any THREE Questions from Part – B**

**Use of IS: 456-2000 and design charts from SP-16 is allowed.**

**For all designs adopt Limit State Method**

**PART –A**

- 1 Design an R/C simply supported T-beam for the following data. Effective span 8 m, center to center spacing of beams 3.3 m, thickness of slab 130 mm, width of web 250 mm and total depth of beam 450 mm. Assume live load  $10 \text{ kN/m}^2$  and floor finish  $1.5 \text{ kN/m}^2$ . Use concrete grade M20 and Steel reinforcement Fe415. Proceed the design with Limit State Method. Apply relevant design checks for strength and serviceability conditions. Neatly sketch the T-beam section and detail the reinforcement. The clear cover of reinforcement 25mm (assume relevant any suitable data if required). [28M]
- 2 Design an isolated square footing to carry column load 600 kN and moment 30 kN-m respectively. Assume safe bearing capacity of soil  $120 \text{ kN/m}^2$  and use concrete grade M25 and Steel reinforcement Fe415. Apply relevant design checks for strength and serviceability conditions. (Use Limit State Method). Neatly sketch the footing section and detail the reinforcement and connection between the column and footing. [28M]

**PART -B**

- 3 a) Write the basic assumptions in Limit State Design. [6M]  
 b) Neatly sketch and define the stress block parameters of reinforced concrete element. Also mention the limiting values of neutral axis ( $X_u$ ) of rectangular R/C section if Fe415 and Fe500 grade steel used. [8M]
- 4 A simply supported rectangular beam 300 mm x 500 mm effective depth carries UDL load  $50 \text{ kN/m}$  include self weight over a effective span of 6 m. Design the shear reinforcement of beam and detail under the following conditions: [14M]  
 ii) Use Two legged vertical stirrups  
 ii) Use combination of Two bent up bars (16mm diameter) and stirrups  
 Assume the beam reinforced with 4nos -12mm diameter at top and 6nos-16mm diameter bar at bottom and width of supports on which beam rests is 300mm. (use concrete M25 grade and Steel reinforcement Fe415).
- 5 Find the maximum moment carried about major and minor axis of a column 250 mm x 400 mm size fixed at bottom and carry axial load 250 kN. Assume the column provided with reinforcement 4nos 20 mm dia bars in tension side and 2nos 20 mm dia bars in compression side. Use clear cover 40 mm and steel Fe415, M20 grade concrete. [14M]
- 6 a) Define the terms in design of R/C members (i) Balanced section (ii) Biaxial bending moment in columns. Write its importance and give examples. [6M]  
 b) Design a continuous slab 8 m x 16 m resting on 250 mm wide monolithic casted beams that are spacing at 4 m center to center and arranged in short span direction. Assume the super imposed load  $10 \text{ kN/m}^2$  and use concrete M25, steel Fe415. [8M]
- 7 Design an R/C slab of clear room dimension 4 m x 5m supported on four walls 300 mm each width and carry live load  $4 \text{ kN/m}^2$ . Assume corners of slab held down, Neatly sketch detail the slab reinforcement. (Concrete grade M25 and Steel grade Fe415). [14M]