

III B. Tech I Semester Supplementary Examinations, May-2018
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

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**PART –A**

- 1 Design the reinforcements in a circular column of diameter 350mm with helical ties to support a factored load of 1600kN. The column has an unsupported length of 3.5m and is braced against side sway. Adopt M-25 grade concrete and Fe-500 grade reinforcement. [28M]
- 2 Design a combined footing for the two columns of a multistory building. The columns of size 400mm×400mm transmit a working load of 800kN each and they are spaced at 5m centers. The safe bearing capacity of soil at site is  $200\text{kN/m}^2$ . Adopt M-20 grade concrete and Fe-415 grade reinforcement. Sketch the details of reinforcements in the combined footing. [28M]

**PART –B**

- 3 a) Explain the terms: neutral axis depth factor, modular ratio, lever arm coefficient and moment of resistance with respect to reinforced concrete sections. [7M]  
 b) What are the various serviceability states and why they should be considered in design? [7M]
- 4 Determine the moment of resistance of a tee-beam having the following section properties: [14M]  
 Effective width of flange=2500mm  
 Depth of flange=150mm  
 Width of rib=300mm  
 Effective depth=800mm  
 Area of steel:6 bars of 25mm diameter  
 Materials:M-20grade concrete  
 Fe-415 HYSD bars.
- 5 A simply supported reinforced concrete beam of rectangular section 250mm wide by 450mm overall depth is used over an effective span of 4m. The beam is reinforced with 3 bars of 20mm diameter Fe-415 HYSD grade steel at an effective depth of 400mm. Two hanger bars of 10mm diameter are provided. The self weight together with the dead load on the beam is 10kN/m. Using M-20 grade concrete, compute: [14M]  
 i) The short term deflection  
 ii)The long term deflection according to the provisions of the IS:456-2000 code.

- 6 Design a two-way slab  $4\text{m} \times 6\text{m}$  continuous on all edges and supported on 300mm wide beams to serve as an office floor. Adopt M-25 grade concrete and Fe-500 HYSD bars. [14M]
- 7 Design a waist slab type dog legged staircase for an office building using the following data: [14M]  
Height between floors=3.2m  
Tread=270mm and riser=160mm  
Width of flight = landing width=1.25m  
The stairs are supported on 300mm load bearing masonry walls at the outer edges of the landing, parallel to the risers.  
Materials: M-20 grade concrete and Fe-415 HYSD bars.

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