

**BACHELOR OF ARCHITECTURE (B. Arch.)****Term-End Examination**

00135

December, 2014

**BAR-044 : THEORY OF STRUCTURES – V***Time : 3 hours**Maximum Marks : 70*

**Note :** Answer any **four** questions. All questions carry equal marks. Use of scientific calculator and IS : 456 code is permitted.

1. (a) Draw the stress-strain curve for mild steel and concrete. Briefly discuss their important features.  $8\frac{1}{2}$
- (b) Determine the depth of neutral axis from the top of a beam cross-section for the following data :
- Width of beam = 300 mm  
Effective depth = 600 mm
- The beam is reinforced with 4 bars of 20 mm diameter in tensile zone. Use M 20 concrete and Fe 415 steel. 9
2. Determine the moment of resistance of a beam of rectangular section of size = 350 mm × 500 mm (effective depth) reinforced with 4 bars of 22 mm diameter in tensile zone. Use M 20 concrete and Fe 415 steel. Assume nominal cover of 50 mm.  $17\frac{1}{2}$

3. Determine the moment of resistance of a reinforced concrete T-section shown in Figure 1. Use M 20 concrete and Fe 415 steel. Assume nominal cover of 25 mm and diameter of links as 8 mm.

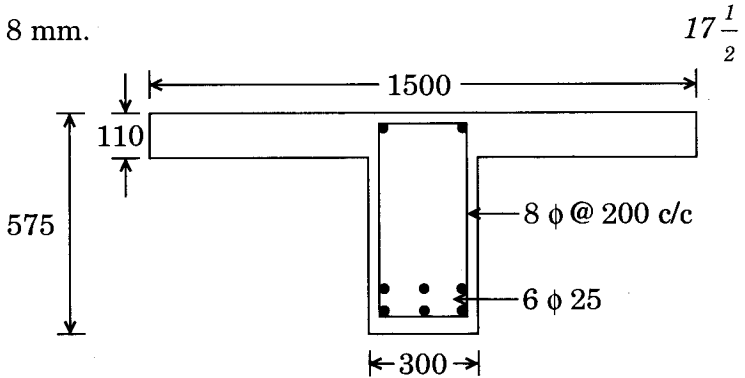


Figure 1

(All dimensions are in mm)

4. Design a two way slab for a room having clear dimensions of  $4000 \times 5000$  mm. Take live load as  $2000 \text{ N/m}^2$  and finishes as  $500 \text{ N/m}^2$ . Use M 20 concrete and Fe 415 steel.

5. (a) What do you understand by slenderness of a compression member? How does it affect the load carrying capacity of the member?

- (b) A column of unsupported length 4.5 m and cross-section  $250 \times 250$  mm is reinforced with 4 bars of 16 mm diameter. Determine the permissible load if both ends are effectively held in position but not restrained against rotation.

6. Determine the shear reinforcement for a beam of rectangular cross-section of  $b \times d = 250 \times 500$  mm, reinforced with 4 bars of 20 mm diameter. The factored shear force is 130 kN. Use M 20 concrete, Fe 415 grade main reinforcement and Fe 250 grade transverse reinforcement. Provide only vertical stirrups as shear reinforcement.  $17 \frac{1}{2}$
7. (a) Describe the criteria and steps for determining the area and depth of footing for a concrete wall.  $4 \frac{1}{2}$
- (b) What is diagonal tension ? Discuss the methods to resist it. 4
- (c) What do you understand by earthquake resistant structures ? How do they differ from earthquake proof structures ? 4
- (d) Discuss the function and design of a shear wall. 5
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