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**BAR-044**

00190

# BACHELOR OF ARCHITECTURE (BARCH)

## Term-End Examination

## June, 2013

## BAR-044 : THEORY OF STRUCTURES-V

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Attempt **any four** questions. Use of scientific calculator and IS 456 code is **permitted**.*

1. Determine moment of resistance of a reinforced 17½ concrete T-section shown in Fig-1.

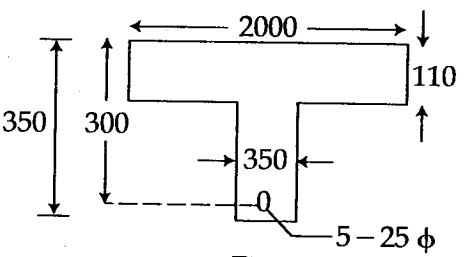


Fig. 1

Use the following data.

$f_{ck}$= 20 N/mm$^2$, $f_y$ = 415 N/mm$^2$. All dimensions shown in fig-1 are in mm.

2. Calculate the tensile reinforcement required in a simply supported beam of clear span 5m, loaded with a UDL of 15 kN/m intensity which includes self weight of the beam. Take the size of cross section as 250 mm × 470 mm. Take the grade of concrete and steel as M20 and Fe 415 respectively. Draw a neat sketch showing the detailing of reinforcement. 17½

3. Design a column of unsupported length of 2.75m which is effectively held in position but not restrained against rotation. The column has a rectangular cross section of size 350 × 400 mm and carries a factored load of 2000 kN. Determine the area of longitudinal reinforcement for the column. Take $f_{ck}$= 25 N/mm$^2$ and $f_y$= 250N/mm$^2$. Draw a neat sketch to show detailing of reinforcement, 25mm diameter bars are available. 17½

4. Design a square footing for a superimposed load of 800 kN transferred by a column of size 500 × 500 mm. Bearing capacity ( safe ) for the soil is 200 kN/m. Use M20 concrete and Fe250 steel. 17½

5. Design a rectangular slab which is cast monolithically with beams. Short and long spans are of 3.5m and 5.5m length respectively. On one short edge only the slab is continuous. The slab has a topping of 120mm thick lime terrace and imposed load for the slab is 1.5 kN/m$^2$. Use M20 concrete and Fe415 grade steel. Use 20mm nominal cover on the reinforcement in the slab. Provide detailing of reinforcement. 17½

6. (a) Describe the philosophy behind the design of earthquake resistant structures. 7½

(b) Discuss why shear reinforcement is normally not needed in slabs. 10

7. Write short notes on *any two* of the following : 17½

(a) Disadvantages of over - reinforced concrete beam sections.

(b) Types of foundation

(c) Comparison of working stress and limit state philosophies.