

**BACHELOR OF ARCHITECTURE (BARCH)**

**Term-End Examination**

**December, 2012**

**BAR-044 : THEORY OF STRUCTURES-V**

*Time : 3 hours*

*Maximum Marks : 70*

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

1. Determine area of tensile reinforcement in a RC 17½ beam of rectangular cross section of 300 mm width and 500 mm depth. The section is subjected to a bending moment of 150 kN m. Use Fe 250 grade steel and M 25 concrete in design. Nominal cover of 30 mm is provided in the section. Use 20 mm diameter bars and provide a neat sketch showing detailing of reinforcement, 8 mm diameter double legged shear reinforcement is provided in the beam.
2. Determine moment of resistance of a rectangular 17½ section of 350 mm width and 500 mm depth. It is provided with 4 bars, of 20 mm diameter, of Fe 415 grade steel. Use M 20 grade of concrete and a nominal cover of 20 mm for the reinforcement. Use limit state method.

3. Design a cantilever beam of a clear span 3m,  $17\frac{1}{2}$  loaded with a informally distributed load of 28 kN/m over its full length. The UDL intensity includes the self weight of the beam. Cross sectional dimensions of the beam are 300 mm (width)  $\times$  500 mm (depth). Use M 25 grade concrete and Fe 415 grade steel.
  
4. Design a rectangular roof slab supported on all  $17\frac{1}{2}$  its four edges. The effective spans are  $3\text{m} \times 7\text{m}$ . The top of the slab is covered with 100 mm thick lime terracing. Take imposed load on the slab as  $1.5 \text{ kN/m}^2$ . Use M20 concrete, Fe 415 grade steel and provide 20mm nominal cover to reinforcement. Draw a neat sketch showing detailing of reinforcement in the slab. Take total depth of slab section as 190 mm.
  
5. Determine required thickness of an RC  $17\frac{1}{2}$  rectangular footing slab for a super imposed load of 1000 kN. The size of column supported on the footing is  $600 \times 400$  mm. The size of footing has been taken as  $2.5\text{m} \times 1.8\text{m}$  with the safe bearing capacity of soil being as  $250 \text{ kN/m}^2$ . Use M25 grade concrete and Fe 415 grade steel.
  
6. (a) What is a two way shear ? How would you  $7\frac{1}{2}$  check shear in such a case ?

(b) What is the difference between the terms, 10  
'Earthquake proof structures' and  
'Earthquake resistant structures' ?

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

- (a) Effects of diagonal tension
- (b) Theory of composite sections
- (c) Doubly reinforced sections.

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