

BACHELOR OF ARCHITECTURE (B.Arch.)

Term-End Examination

00231

June, 2015

BAR-044 : THEORY OF STRUCTURES – V

Time : 3 hours

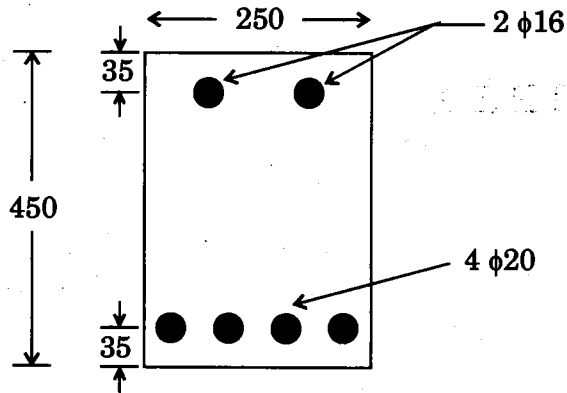
Maximum Marks : 70

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

1. (a) Discuss the simplifying assumptions taken for design of flexural RC members. $8\frac{1}{2}$

(b) A beam of rectangular cross-section $b \times d = 250 \text{ mm} \times 415 \text{ mm}$ resists an applied moment of 70 kN-m. Determine the required area of the tensile reinforcement. Use M 20 concrete and Fe 415 steel. 9

2. Determine the moment of resistance of a doubly reinforced section of an RC beam shown in Figure 1. Use M 20 concrete and Fe 415 steel. $17\frac{1}{2}$



(All dimensions are in mm)

Figure 1

3. Design an RC roof slab simply supported on all its four edges with effective spans as 3 m × 7 m. The top of the slab is covered with 100 mm lime terrace. The slab carries a superimposed live load of 2500 N/m². Use M 20 concrete and Fe 415 steel. Take nominal cover as 20 mm. $17\frac{1}{2}$
4. (a) Discuss why lateral reinforcement is essential in a column. What are the different ways of providing it? Discuss the merits of each way of provision. $8\frac{1}{2}$

- (b) Determine the permissible load for an RC circular column of 400 mm diameter reinforced with 6 nos. 25 mm diameter main reinforcement. The lateral reinforcement is in the form of a helical spiral of 8 mm diameter bar with a pitch of 55 mm c/c. Use M 20 concrete and Fe 415 steel.

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5. Provide the shear reinforcement in the form of vertical stirrups of 8 mm diameter for a rectangular cross-section of a beam of size $b \times D = 300 \times 500$ mm. The beam is reinforced with 4 – 25 mm diameter bars in the tensile zone and resists a factored shear force of 125 kN. Use M 20 concrete and Fe 415 steel for main reinforcement and Fe 250 grade steel for transverse reinforcement. Use nominal cover of 25 mm.

$17\frac{1}{2}$

6. Determine the size and depth of a square footing for a superimposed load of 1000 kN under a column of size 600 mm \times 600 mm. The safe bearing capacity of soil is 250 kN/m². Use M 20 concrete and Fe 415 steel. Provide a neat sketch showing detailing of reinforcement.

$17\frac{1}{2}$

7. (a) Discuss the purpose and method of the pull out test. $4\frac{1}{2}$
- (b) Discuss the different forms in which shear reinforcement may be provided in beams. Draw neat sketches showing these forms. 4
- (c) Discuss the importance of proper bond between concrete and steel. Explain how bond is affected by surface characteristics of HYSD bars. 4
- (d) Discuss the base isolation concept in earthquake resistant design of structures. 5
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