

**Total No. of Pages : 02**

**Total No. of Questions : 10**

**B. Arch. (2012 & Onwards) (Sem.-4)**

## STRUCTURE DESIGN – III

**Subject Code : BACH-409**

**M.Code : 71024**

**Time : 3 Hrs.**

**Max. Marks : 60**

**INSTRUCTIONS TO CANDIDATES :**

1. Attempt SIX questions in ALL taking atleast ONE question from EACH UNIT.
2. Missing data, if any may be assumed suitably.
3. Use of IS 456-2000 is allowed.

## UNIT-I

1.
  - a) What is the necessity of providing shear reinforcement? 3
  - b) A simply supported beam  $250 \times 400$  mm effective depth is loaded with a u.d.l. of 15 kN/m. The effective span of beam is 4.00 m. Design the shear reinforcement if the tension reinforcement is 4-22mm diameter bars and concrete used is M-20 grade. Use plain mild steel bars for stirrups. 7
2.
  - a) What are the conditions to design a section as doubly reinforced sections? 3
  - b) Determine the ultimate M.O.R of a beam  $300 \times 550$  mm. The tension and compression reinforcement provided at an effective cover of 50mm are  $2500 \text{ mm}^2$  and  $400 \text{ mm}^2$  respectively. Use M-25 concrete and Fe-500 steel. Take  $f_{sc} = 412 \text{ N/mm}^2$  7

## UNIT-II

3. Design a reinforced concrete slab for a corridor of 3m width. The slab is supported on walls of 230 mm width. Design the slab, if the slab is to carry a u.d.l of  $5 \text{ kN/m}^2$  as imposed load. Use M-20 concrete and HYSD Fe-415 steel. Apply all checks. 10
4. Design a reinforced concrete slab (with corners held down) for a room of  $4\text{m} \times 5\text{m}$ . The slab is supported on walls of 300 mm width. Design the slab, if the slab is to carry a u.d.l of  $5 \text{ kN/m}^2$  as imposed load. Use M-20 concrete and HYSD Fe-415 steel. 10

**UNIT-III**

5. Describe various types of staircases according to their geometrical classification. 10
6. Describe various components of staircase, viz. Risers, Treads, Width etc and the values usually adopted for the design of staircase. 10

**UNIT-IV**

7. a) Differentiate between long and short columns. 2
- b) Give IS 456 specifications regarding transverse reinforcement in columns. 8
8. Design a circular column of 400 mm diameter to carry an axial load of 1500 kN (factored) using helical reinforcement. The column is 3m long and is effectively held in position at both ends. Use M-25 concrete and Fe-415 steel. 10

**UNIT-V**

9. Design a square footing of uniform thickness for an axially loaded Column of 400 mm x 400 mm size. The safe bearing capacity of soil is  $200 \text{ kN/m}^2$ . Load on column is 800 kN. Use M-20 concrete and Fe-415 steel. 10
10. a) Name various types of column footings used in case of RCC columns. 3
- b) Design a square base with uniform thickness for an axially loaded column  $300\text{mm} \times 300 \text{ mm}$  to carry a load of 500 kN. The safe bearing capacity of soil is  $190 \text{ kN/m}^2$ . Use M-25 grade concrete and Fe-415 steel. (Calculate thickness only). 7

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**