

Seat No. : \_\_\_\_\_

**18I-112**

May-2015

**B.Arch./ID/BCT, Sem.-IV (New)**

**AR-403 : Structures – IV**

**Time : 2 Hours]**

**[Max. Marks : 50**

**Instruction :** Permit only IS : 456-2000 & SP-16.

1. (a) Calculate main reinforcement required for a rectangular doubly beam having effective section  $300 \times 600$  mm to resist factored moment of 500 kNm. Effective cover on both side is 50 mm. Use M20 grade of concrete and Fe415 grade of steel. **7**  
(b) A RC beam having effective section  $250 \times 500$  mm is reinforced with 4-20 mm of Fe415. Beam carries factored shear force of 200 kN. Find shear reinforcement and use Fe250 for stirrups. M20 grade of concrete. **3**
2. Design a simply supported one-way slab for effective span of 3 m to carry factored load of  $10.50 \text{ kN/m}^2$ . Use M20 grade of concrete and Fe250 grade of steel. Draft the cross section and plan of slab. **10**
3. Design a RC square column to resist 1600 kN factored load. Take longitudinal reinforcement 1% of gross area. Use M20 grade of concrete and Fe 415 grade of steel. Also calculate pitch distance between lateral ties. Draft the figure. **10**
4. (a) Define the following terms : **5**
  - (1) Short column & Long column
  - (2) Cover
  - (3) Permissible Deflection
  - (4) Shear Reinforcement
  - (5) Control of Deflection
  - (6) Effective Depth  
(b) Answer any **two** of the following : **5**
  - (1) Explain failure pattern of over reinforced beams.
  - (2) Mention the criterias to be satisfied in limit state design.
  - (3) What is the slenderness criteria for column ?
5. (a) Explain limit state method in detail. **3**  
(b) Design a simply supported two-way slab having clear dimensions  $3 \text{ m} \times 3 \text{ m}$ . Take wall thickness 250 mm and super imposed load of  $4 \text{ kN/m}^2$ . **7**

**OR**

Design an isolated pad footing for a square column  $230 \times 320$  mm for axial load of 700 kN. Use M 20 grade of concrete and Fe 250 grade of steel. Take SBC of soil  $140 \text{ kN/m}^2$ .

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