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Total No. of Pages : 02

Total No. of Questions : 10

**B. Architecture (Sem.-3)**  
**STRUCTURE DESIGN-III**  
**Subject Code : AR-231**  
**Paper ID : [A0919]**

Time : 3 Hrs.

Max. Marks : 50

**INSTRUCTION TO CANDIDATES :**

1. Attempt five questions taking any one question from each unit. All questions are of equal marks.
2. Use of IS-456, Scientific Calculator is allowed. Assume missing data if any. Draw neat diagrams.

**UNIT-I**

1. A concrete beam section 700 overall depth and 300mm width, is simply supported having 6.0 meter span. Beam is loaded with 40Kn/m of UDL. Find area of reinforcement required, draw neat sketches. Assume M25 concrete, steel primary or secondary - Fe - 500.

End support conditions- Base is fixed and top is free. (10)

2. a) What do you understand by T beam explain its behavior in terms of stress? (5)  
b) What is difference between under reinforced section, over reinforced section and balanced section, draw sketches? (5)

**UNIT-II**

3. Design two way concrete slab of 400mm×4000mm clear span, considering all sides continuous. Assume live load on floor 4Kn/m<sup>2</sup>, Density of concrete 25 kN /cubic meter Use M25 concrete strength and steel of min yield stress of 500n/mm<sup>2</sup>. (10)
4. a) What is maximum deflection in slab is allowed as per code? How will you check the defection in beams? (5)  
b) What is difference between one way slab and two way slab? (5)

**UNIT-III**

5. Design a dog legged concrete stair case with 150mm riser and 300mm tread, total steps are 20 and landing is 1200mm. Take width of stair 1200mm. Assume live load as  $4.0 \text{ Kn/m}^2$  & desity of concrete 24 kN/cubic meter. Assume steps of concrete of weight calculations. Draw sketch. (10)
6. a) Describe various types of stairs. What is effective span of stair? (5)
- b) Draw a general section showing the reinforcement of stair case. (5)

**UNIT-IV**

7. a) What is interaction diagram in column design ? (5)
- b) Explain slender and short columns. (5)
8. Design a circular concrete column, which can withstand a load of 1200 Kn(working load) along with moment of 150 Kn-m( working moment) in one direction . Height of column is 4 m and column is in frame of building. Assume concrete strength M20 and steel reinforcement fe- 415. Assume 40mm clear reinforcement cover. (10)

**UNIT-V**

9. a) What is one way and two way shear check in footings? (4)
- b) At what distance from column face, the two way shear is checked? (2)
- c) What is the difference between isolated and strap footing? Describe situations where these could use? (4)
10. Design independent square footing for 1000 Kn load , The column size is 500mm  $\times$  300mm. Assume net soil bearing capacity -  $120 \text{ Kn /m}^2$  at 2.0 meter depth form natural ground level. Find spread area, depth of concrete in footing and reinforcement required. Assume concrete strength M25, Steel Fe-500, clear cover to reinforcement 50 mm. (10)