**MODEL QUESTION**
**SIXTH SEMESTER B.Arch**
**STRUCTURAL DESIGN V**

***Time 3 hours***
***Maximum marks 100***
***Use of IS 456 and column design charts permitted***

## *Part A*
***(Answer all questions)***

1. When do you require a doubly reinforced beam.

2. Why is an over reinforced section not designed in practice.

3. What are flanged beams.

4. Why should we check the deflection of beams

5. Explain different types of slabs

6. Briefly explain how deflection is checked in slabs

7. Find the longitudinal reinforcement required for a short axially loaded column to carry an axial load of 1000 kN. The column is 400 mm square. Use M20 concrete, Fe 415 steel.

8. Briefly explain the design procedure of columns with axial load and biaxial moments.

(8 x 5 marks = 40 marks)

## *Part B*
## *(Answer one question from each module)*

## Module 1

9. Find the moment of resistance of a singly reinforced beam of width 200 mm and 400 mm effective depth. It is reinforced with 3 – 16 mm dia bars. Use M20 concrete and Fe 415 steel.

OR

10. Design a rectangular beam for an effective span of 6 m. The superimposed load is 80 kN/m and the size of the beam is limited to 300 mm x 700 mm overall. Take effective cover for reinforcements as 70 mm. Use M 20 concrete and Fe 415 steel.

(15 marks)

## Module 2

11. A reinforced concrete T – beam has the following data: width of flange = 1600 mm, effective depth = 350 mm, thickness of flange = 105 mm, width of web = 250 mm. Find the limiting moment of resistance and the limiting area of steel. Use M 20 concrete and Fe 500 steel.

OR

12. Explain in detail how the moment of resistance of a T beam is found for all cases.

(15 marks)

## Module 3

13. Design a one way slab for a room of inside dimensions 10 m x 4 m. Live load is 2 kN/m2. Use M20 concrete and Fe 415 steel.

OR

14. Design a slab for a room of inside dimensions 3 x 4 m. Live load is 2 kN/m2. Corners are not held down. Use M20 concrete and Fe 415 steel.

(15 marks)

## Module 4

15. Design a square column of size 400 mm to carry an axial load of 700 kN and a uniaxial moment of 50 kNm. Design also the lateral ties. Use M20 concrete and Fe 415 steel.

OR

16. Design a square spread footing to carry a column load of 1000 kN from a 400 mm square column containing 20 mm bars as longitudinal steel. The bearing capacity of the soil is 100 kN/$m^2$. Consider the base of the footing at 1m below the ground level. The unit weight of earth is 20 kN/$m^3$. Use M20 concrete and Fe 415 steel.

(15 marks)