

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**B.Arch.- SEMESTER- IV EXAMINATION -- 2020**

Subject Code: 2X45003

Date: / / 2020

Subject Name: Structure III

Time:

Total Marks: 50

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. IS:456(2000) design code is allowed.
4. Figures to the right indicate full marks.

- Q.1** (a) Discuss the suitability of steel as reinforcement material. **03**  
 (b) State and explain in brief types of limit states and assumptions made in theory of limit state of collapse. **07**
- Q.2** (a) Explain the term with example: Distribution factor & Carry over factor. **05**  
 (b) Discuss different kinds of loads to be taken into account for the the design. **05**
- OR**
- Q.2** Find the moment of resistance of a singly reinforced concrete beam 230 mm width and 410mm effective depth, reinforced with 4 bars of 16mm diameters of Fe415 and M20 concrete. **10**
- Q.3** Design doubly reinforced beam section 300 × 500 mm to carry factored bending moment 300 kNm. Consider M25 and Fe415. Furnish reinforcement details. **10**
- OR**
- Q.3** Design and detail a one-way simply supported slab of 3.5m clear span supported on 300 mm thick walls. Take 3 kN/m<sup>2</sup> live load and 1 kN/m<sup>2</sup> floor finish. **10**
- Q.4** (a) What is the function of transverse & longitudinal reinforcement in a column? **04**  
 (b) Find the ultimate load carrying capacity & allowable load for a short column of size 500 mm × 500 mm. the column is reinforced with 4-25 mm diameter bars. Using M-20 concrete & HYSD grade Fe 415 steel. Assume  $e_{min} < 0.05 D$ . **06**
- OR**
- Q.4** Design a square isolated sloped footing for a column of size 450 mm x 450mm. carrying a service axial load of 2500KN. Safe bearing capacity of soil is 200 KN/m<sup>2</sup>. Use M-20 & Fe-415 steel. Also check for shear. **10**
- Q.5** Design a straight staircase supported on one side on a wall on the otherside on a stringer beam. The horizontal span of the stairs is 1.5 m. The rise is 150 mm and the tread of stair is 280 mm. The live load acting on the stairs is 3 KN/m<sup>2</sup>. Use M20 concrete and Fe 415 steel. **10**
- OR**
- Q.5** (a) Explain four virtues of earthquake resistant structures. **04**  
 (b) Give the guidelines for efficient earthquake resistant design of structures. **06**

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