

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BARCH – SEMESTER-IV– • EXAMINATION – SUMMER 2015

Subject Code: 1045003

Date: 13/05/2015

Subject Name: Structure IV

Time: 10:30 am-12:30 pm

Total Marks: 50

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of IS 456 (2000) and SP-16 is permitted

- Q.1 (a)** Explain briefly Limit State Method **04**
(b) Define: (i) Characteristic strength and (ii) Ductility **03**
(c) State different forms of limit state of serviceability **03**
- Q.2 (a)** State merits and demerits of working stress method **05**
(b) Differentiate between singly reinforced and doubly reinforced beams **05**
- OR**
- (b)** Explain (i) Balanced section (ii) Over reinforced and (iii) Under reinforced section **05**
- Q.3** Design a rectangular RC beam, having 300 mm width. The beam is simply supported on effective span of 5.0 m. It is loaded with service load of a u.d.l. of 20 kN/ m including self weight. Use M - 20 concrete and Fe - 415 steel. Take $\gamma_f = 1.5$. Also sketch the details of the designed beam. **10**
- OR**
- Q.3** Explain (i) Types of isolated column footings with sketches and (ii) Bearing capacity of soil **10**
- Q.4** Design a RCC square short column subjected to an axial working load of 800 kN. Concrete used is M - 20 and steel Fe - 415. Provide 1% steel. Take $\gamma_f = 1.5$. Sketch the reinforcement details showing longitudinal steel and lateral ties. **10**
- OR**
- Q.4** Design isolated square footing (Pad type) for a square column 300 mm x 300 mm for axial load of 750 kN. Use concrete grade M – 20 and Fe – 415 steel grade. Take safe bearing capacity of soil 150 kN/ m². Check for shear is not required. Draw neat sketch showing sectional elevation and plan of the designed footing. **10**
- Q.5** Design one-way slab for the office building 3.5 m x 9.0 m. The slab is resting on 300 mm thick wall and resisting live load of 3.0 kN/ m². Assume floor finish load 1.0 kN/ m². Adopt M – 20 concrete and Fe – 415 steel. Check the slab for control of cracking. Sketch the reinforcement details. **10**
- OR**
- Q.5** Explain with neat sketch following terms related to stair case (i) Flight (ii) Landing (iii) Rise (iv) Tread (v) Nosing (vi) Waist slab (vii) soffit. Draw detail of reinforcement in staircase from the following data for one flight. (i) Landing width = 1.2 m , Riser = 150 mm, Tread = 300 mm (ii) Waist slab overall thickness = 200 mm. (iii) Main steel = 12 mm dia. at 120 mm c/c. (iv) Distribution steel = 8 mm dia. bars at 175 mm c/c. (v) Effective cover = 25 mm. (vi) Assume landings on both the sides and no. of steps 10 **10**
