

Seat No.	
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**B.E. (Civil Engineering) (Semester - VII) Examination, December - 2014**  
**DESIGN OF CONCRETE STRUCTURES - I (New)**  
**Sub. Code : 47901**

Day and Date : Friday, 5 - 12- 2014

Total Marks : 100

Time : 2.30 p.m. to 5.30 p.m.

- Instructions :
- 1) Attempt any three questions from each section.
  - 2) Figure to the right indicates full marks.
  - 3) Assume any suitable data whenever necessary.
  - 4) Use of non-programmable calculator and relevant. I.S. 456: 2000 are allowed.

**SECTION - I**

**Q1) a)** Explain

- i) Characteristic load
- ii) Characteristic strength
- iii) Load factor

[6]

- b) A singly RC beam has effective dimension of 230 mm × 450 mm. Design a if subjected to bending moment of 160 KN. Consider concrete of grade M20 and HYSD steel reinforcement of Fe 415 grade. [11]

**Q2)** A floor system consists of a slab 110mm thick, cast integrally on beams spaced at 3.5 m centre to centre and spanning over 7 m. The beam has a width of 300 mm and the total depth of the beam including the thickness of slab is 600mm. Assume mild exposure condition. The floor is to be designed for a service load of 4 kN/ m<sup>2</sup> and 0.8 kN/m<sup>2</sup> for finishes excluding the self weight of the floor system. Design flexural reinforcement for one intermediate T-beam using Limit State method. Use M25 concrete and Fe415 steel. [17]

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- Q3) a) Explain the concept of 'Shear' in RC beams, with a sketch. [4]
- b) A R.C. beam  $300 \text{ mm} \times 450 \text{ mm}$  is reinforced with 3 Nos - 20 mm bars. Assume moderate exposure condition. The ultimate shear at the section is 240 kN. Design the shear reinforcement. Use M 25 grade concrete and Fe 415 grade steel. Sketch the reinforcement details. [12]
- Q4) a) What are the various remedial measures for control of cracking? [4]
- b) A doubly reinforced beam of rectangular section  $300 \text{ mm wide} \times 550 \text{ mm}$  overall depth is reinforced with 4 bars of 25 mm diameter on the tension face and 2 bars of 16 mm diameter on the compression face. Assume mild exposure condition. The beam spans over 8 m. Check the deflection control if Fe 415 steel is used. Use M25 concrete. Calculate moment carrying capacity. [12]

## SECTION - II

- Q5) Design a R.C. slab for a room measuring  $4.5 \text{ m} \times 6 \text{ m}$ . The slab carries a live load of  $3 \text{ kN/m}^2$ . The slab is simply supported at all the 4 edges with corners free to lift. The width of the supporting walls is 300 mm. Use M 30 grade concrete and Fe 415 grade steel. Sketch the reinforcement details. Assume mild exposure condition. [17]
- Q6) The clear dimensions of a staircase hall are  $2.8 \text{ m} \times 5.00 \text{ m}$ . The floor to floor height is 3.5 m. The landing slabs span in the same direction as the stair and are supported by the walls at the ends. The stair is used in a residential building. design a dog - legged staircase. Use M 20 concrete and Fe 500 steel. Sketch the reinforcement details. Sketch the reinforcement details. Assume moderate exposure condition. [17]

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**Q7)** Design an axially loaded tied column with an unsupported length of 4.6 m. The column is fixed at one end and pinned at the other end. The column has to carry a factored load of 2000 kN. Use M 30 grade concrete and Fe 415 grade steel. Sketch the reinforcement details. [16]

**Q8)** Design a rectangular isolated box footing for a column of size 350 mm × 650 mm carrying an axial load of 2300kN. The S.B.C. of the soil is 280 kN / m<sup>2</sup>. Use M 25 grade concrete and Fe 415 grade. [16]

