

Total No. of Questions : 6]

SEAT No. :

**PA-10032**

**[6009]- 314**

[Total No. of Pages : 2

**T.E. (Civil Engineering) (Insem)**

**DESIGN OF REINFORCED CONCRETE STRUCTURES**

**(2019 Pattern) (Semester - II) (301013)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.
- 2) Figures to the right indicate full marks.
- 3) Use of IS 456-2000 and non programmable calculator is allowed.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Mere reproduction from IS Code as answer, will not be given full credit.
- 6) Assume any other data, if necessary.

**Q1) a)** Calculate neutral axis, lever arm and moment of resistance factor for M25 and Fe 550. **[4]**

b) Calculate moment of resistance for a section 300mm × 450mm deep. 3 bars of 20mm diameter provided on tension side only. Effective cover is 40mm, use M30 and FE 415. **[6]**

OR

**Q2) a)** Explain the terms bond stress and development length. Calculate development length for 20mm diameter bar of grade Fe500 and M30 grade of concrete in tension and compression using LSM. **[4]**

b) Explain with neat sketch Balanced, Under reinforced and Over reinforced section as per LSM. **[6]**

**Q3) a)** Enlist essential conditions to design beam section as flanged beam in floor beam system. **[2]**

b) Design a cantilever RC slab for an effective span of 1.5 m carrying live load of 3 kN/m<sup>2</sup> and floor finish of 1 kN/m<sup>2</sup>. Use M20 grade of concrete and Fe 415 grade of steel. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain Characteristic strength and Partial factor of safety. [2]
- b) Design a simply supported one way slab for a room with clear inner size  $3.5\text{m} \times 7.8\text{m}$ . The slab is supported by beams of width 230mm along all the edges. The slab is subjected to floor finish of  $1.5\text{ kN/m}^2$  and live load  $3\text{ kN/m}^2$ . Use concrete of grade M20 and Fe500 reinforcement. Draw details of reinforcement. [8]

- Q5)** Design a simply supported two-way slab panel having effective dimensions as  $4.23\text{ m} \times 3.23\text{ m}$ . Take live load of  $3.50\text{ kN/m}^2$  and floor finish of  $1\text{ kN/m}^2$ . Use M20 grade of concrete and Fe 415 grade of steel. (Neglect design of distribution steel and check for shera) [10]

OR

- Q6)** Design of continuous two way slab of effective size  $3.5\text{ m} \times 5\text{ m}$  of a typing floor for an office building. The live load and floor finish are  $3.0\text{ kN/m}^2$  and  $1.5\text{ kN/m}^2$ , respectively. The slab is discontinuous at two adjacent edges. Use M25 grade of concrete and Fe 500. (Neglect design of distribution steel, torsion reinforcement and check for shear). [10]