

Total No. of Questions : 6]

SEAT No. :

PD81

[Total No. of Pages : 2

[6410]-402

T.E. (Civil) (Insem)

**DESIGN OF REINFORCED CONCRETE STRUCTURES
(2019 Pattern) (Semester - II) (301013)**

Time : 1¼ Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Attempt 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) Explain balanced and under reinforced section with suitable sketch. [4]
- b) A beam of size 230mm × 550mm effective depth is simply supported over a span of 5m. The reinforcement consists of 5 bars of 20mm diameter at tension face. Find intensity of uniformly distributed load (including self-weight) that can be carried by beam. Use M25 & Fe415. [6]

OR

- Q2) a) Explain the terms bond stress and development length. Calculate development length for 16mm diameter bar of grade Fe500 and M30 grade of concrete in tension and compression using LSM. [4]
- b) Calculate maximum safe superimposed load carried by beam of effective span 8m. The beam is detailed as below- [6]
- i) Width of rib = 300mm
 - ii) Effective flange width = 1200mm
 - iii) Thickness of flange = 130mm
 - iv) Effective depth = 565mm
 - v) Tension steel = 5 nos. of 25mm diameter
 - vi) M25 grade of concrete and Fe500 grade of steel
 - vii) Effective cover = 40mm

P.T.O.

- Q3) a)** Explain four reason where doubly reinforced section is required. [2]
- b) Design cantilever slab using LSM approach for an effective span of 1.8m carrying live load of 2.5kN/m^2 and floor finish of 1.5kN/m^2 . Use M20 & Fe 415. Draw the details of the reinforcement. [8]

OR

- Q4) a)** What is the purpose of partial safety factors used in LSM? Give the partial safety factors for stresses in steel and concrete. [2]
- b) A RC slab is to be provided for a passage measuring $8.5\text{m} \times 2.5\text{m}$ with 230mm wide beams around all edges. Design the suitable slab assuming LL 4kN/m^2 and FF 1.0kN/m^2 . Use M30 and Fe500. Assume moderate exposure condition. Show details of the reinforcement. [8]
- Q5)** Design a simply supported two way slab of effective spans $5.5\text{m} \times 4.5\text{m}$ effective carrying L.L. of 3kN/m^2 and F.F. of 1.5kN/m^2 . Use M25 and Fe415 for mild exposure condition. Draw the details of the reinforcement. (Neglect design of distribution steel and check for shear) [10]

OR

- Q6)** Design a two way slab of effective spans $4.5\text{m} \times 3.5\text{m}$ with two adjacent edges discontinuous. The slab is supported on beams of 300mm width around all edges. Provide L.L. of 3kN/m^2 and F.F. of 1kN/m^2 . Use M20 and Fe415. Show the details of the reinforcement with neat and clean sketch. (Neglect design of distribution steel, torsion reinforcement and check for shear) [10]

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