Total No. of Questions : 4]

SEAT No. :

PF283

[Total No. of Pages : 2

APR-26/TE/Insem-362

T.E. (Civil Engineering) (Insem)

DESIGN OF REINFORCED CONCRETE STRUCTURES

(2019 Pattern) (Semester - VI) (301013)

Time : 1 Hour 15 minutes] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Solve Q.1 or Q.2 and Q.3 or Q.4.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***IS 456 is permitted in the examination.***
5) ***Non-programmable calculator is allowed in the examination.***

Q1) a) A T-beam has the following details:

flange width = 1000 mm, web width = 250 mm, flange thickness = 100 mm, effective depth = 500 mm, area of reinforcement = 2200 mm^2. Use M20 concrete and Fe 500 steel. Determine moment of resistance assuming the flange in compression. **[8]**

b) Define the following terms used in Limit State Method: **[7]**

i) Characteristic strength

ii) Characteristic load

iii) Partial safety factors for materials

iv) Partial safety factors for loads.
Also explain why partial safety factors for loads are different for dead load, live load and wind/earthquake load.

OR

Q2) a) A doubly reinforced L-beam has the following details:

b_f = 800 mm, b_w = 250 mm, t_f = 100 mm, d = 600 mm, d′ = 50 mm, A_{st} = 2000 mm^2 and A_{sc} = 400 mm^2. Calculate the moment of resistance using M30 grade concrete and Fe 500 grade steel. **[8]**

P.T.O.

b) Explain the following limit states and their importance in design: **[7]**

i) limit state of collapse

ii) limit state of serviceability

iii) limit state of durability.

Q3) Design the slabs S-1, S-2, S-3 and S-4 shown in Fig. 1. Consider the width of the beam as 300 mm. The imposed load on the slabs S-1 to S-6 is 4 kN/m^2 and 2 kN/m^2 on S-7. Use M30 grade of concrete and Fe 500 grade steel.
The design should include all assumptions, design steps, checks for deflection and strength and details of reinforcement in the slabs. **[15]**

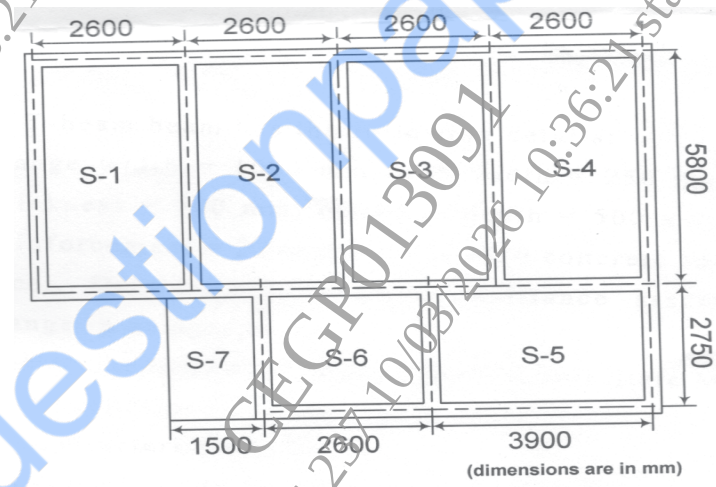

Fig. 1

OR

Q4) For the data given in Q.3, design the slabs S-7 and S-6. The design should include all assumptions, design steps, checks for deflection and strength and details of reinforcement in the slabs. **[15]**

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