Total No. of Questions : 6]	SEAT No. :
P5814	[Total No. of Pages : 2

BE/Insem./Oct.-503 B.E. (Civil)

STRUCTURAL DESIGN & DRAWING - III

(2015 Pattern) (Semester - I)

Time: 1.30 Hours [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) Neat sketches must drawn wherever necessary.
- 3) Figures to right indicate full marks.
- 4) Assume suitable data if necessary.
- 5) IS 1343:2012, IS 456:2000 are allowed in examination.
- 6) Use of electronic pocket calculator is allowed.
- 7) Use of cell phone is prohibited during examination.
- Q1) A post tensioned prestressed concrete beam with top flange 750mm × 200mm, web 150mm × 500mm and bottom flange 400mm × 300mm. It is simply supported over a span of 30m and carries a superimposed load of 10kN/m exclusive of self-weight. It is prestressed with 10 numbers of 12/5 Freyssinet cables with their C.G. at 100mm from soffit at midspan section varying linearly with zero eccentricity at ends. Prestress at transfer is 1000 N/mm² and loss ratio 0.85. Calculate extreme fiber stresses at midspan under initial and final conditions. Unit weight of prestressed concrete 25 kN/m³. [10]

OR

Q2) a) Explain Freyssinet system of prestressing.

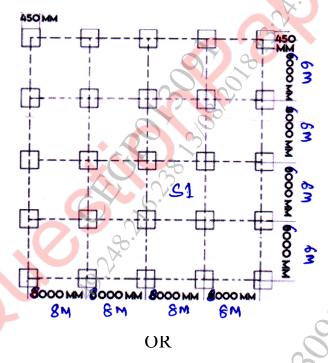
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- b) A pretension prestressed concrete beam, 200mm wide and 300mm deep, prestressed with wires (area = 320 mm^2) located at a constant eccentricity of 50mm and carrying an initial stress of 1000N/mm^2 . The span of the beam is 10 m. Calculate the percentage loss of stress in wires $E_s = 210 \text{kN/mm}^2$ and $E_c = 35 \text{ kN/mm}^2$. Relaxation of steel stress = 5% of initial stress. Shrinkage of concrete 300×10^{-6} for pretensioning. Creep coefficient = 1.6. Frictional coefficient for wave effect = 0.00×15 per m. [6]
- Q3) A post tensioned prestressed concrete one way slab is spanning over 8 m, to support an imposed load of 20kN/m. The stresses in concrete should not exceed 19.6 N/mm² in compression and 1.2 N/mm² in tension. Calculate the minimum possible depth and minimum prestressing force required. Also find corresponding eccentricity.
 [10]

Q4) The cross of prestress concrete beam is unsymmetrical T section with following dimension: Overall depth 1600 mm, web 300 mm and flange 1200mm × 300mm. At a particular section the beam is subjected to ultimate moment and shear force of 2400 kNm and 400 kN respectively. Design the beam with following data:

Grade of concrete-M40, effective depth 1200mm, $A_p = 2420 \text{ mm}^2$, $F_p = 1600 \text{ Mpa}$ effective prestress at extreme tensile in the beam is 20.5 Mpa.

Q5) Continuous Flat slab with drop for a shopping mall is as shown in figure.l below. The size of column is 450mm × 450 mm. Use M30 grade of concrete and Fe415 steel. Calculate total design moments for S1 as shown in below figure. Take LL= 4 kN/m² and FFL = 1.0kN/m². [10]



- **Q6)** a) Briefly outline the salient design features of continuous prestressed concrete flat slab. [6]
 - b) What is the necessary two way shear in flat slab [4]