

Total No. of Questions : 8]

SEAT No. :

P542

[Total No. of Pages : 4

[6004]-464

B.E. (Civil)

**DESIGN OF PRESTRESSED CONCRETE STRUCTURES
(2019 Pattern) (Semester - VII) (Elective - IV) (401004 E)**

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8 ,Q9 or Q10*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to right indicate full marks.*
- 4) Use of electronic pocket calculator is allowed.*

Q1) a) A post - tensioned prestressed beam of rectangular section 250 mm wide is to be designed for an imposed load of 12kN/m, uniformly distributed on a span of 12m. The stress in the concrete must not exceed 17 N/mm² in compression or 1.4N/mm² in tension at any time and the loss of prestress may be assumed to be 15% Calculate.

i) The minimum possible depth of the beam

ii) For the section provided the minimum prestressing force and the corresponding eccentricity. **[9]**

b) A prestressed concrete beam 250 mm wide & 375mm deep is subjected to two symmetrical cables each with a prestressing force of 800 kN/. An anchor plate 150mm × 275 mm is provided for each cable. Calculate the reinforcement required to resist bursting forces in the transmission zone. Assume a jacking force equal to 960 kN for each cable. **[8]**

OR

Q2) a) A pre - tensioned T- section has a flange which is 300 mm wide and 200 mm deep. The rib is 150 mm wide and 350 mm deep. The effective depth of the cross section is 500 mm. If $f_{ck} = 50 \text{ N/mm}^2$, $f_{pu} = 1600 \text{ N/mm}^2$, and the area of prestressing steel $A_{ps} = 200 \text{ mm}^2$, Calculate the ultimate flexural strength of the section using IS1343 code provisions. **[8]**

P.T.O.

- b) A prestressed concrete beam of rectangular section 150 mm wide by 300 mm deep is to be designed to support an ultimate shear force of 130kN. The uniform prestress across the section is 5 N/mm². The characteristic cube strength of the concrete is 40N/mm² and steel is Fe415 with bar dia.8 mm. Design suitable spacing for the stirrups conforming to IS1343 recommendations for uncracked section. Assume cover to the reinf. as 50mm. [9]

Q3) a) A slab spanning 10m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 620kN. The deck slab is required to support a udl of 25kN/m². The permissible stresses in concrete should not exceed 15N/mm² in compression and no tension is permitted at any stage. Design the spacing of the cables and their position at mid span section. Assume loss ratio 0.8. [8]

- b) Design a post tension two way slab of effective span 6m × 7m with continuity on all side, subjected to superimposed load 4 kN/m². Take F.F. load = 1.5 kN/m² Use cable S₃ or S₄, $f_{ck} = 45$ N/mm², f_y of S₃ or S₄ = 1900 N/mm². Design the spacing of cable in both direction. Don't apply checks. [10]

OR

Q4) a) A slab spanning 8m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 620 kN. The deck slab is required to support a udl of 25kN/m². The permissible stresses in concrete should not exceed 15 N/mm² in compression and no tension is permitted at any stage. Design the spacing of the cables and their position at mid span section. Assume loss ratio 0.8. [8]

- b) Design a post tension two way slab of effective span 5m × 6m with continuity on all sides, subjected to superimposed load 4 kN/m². Take F.F. load = 1.5 kN/m². Use cable S₃ or S₄, $f_{ck} = 45$ N/mm², f_y of S₃ or S₄ = 1900 N/mm². Design the spacing of cable in both directions. Don't apply checks. [10]

Q5) Design a post tensioned flat slab for the following data **[18]**

Centre to centre distance between columns = 7m in both directions

column size - 800 mm square

Floor is to be used for a shopping mall.

Live load - 5 kN/m^2

Floor finish - 1 kN/m^2

Materials - M35, multistrand cables

Slab with drop

OR

Q6) Design a post tensioned flat slab for the following data **[18]**

Centre to centre distance between columns = 8m in both directions

Column size - 800 mm diameter

Floor is to be used for an pharmaceutical company

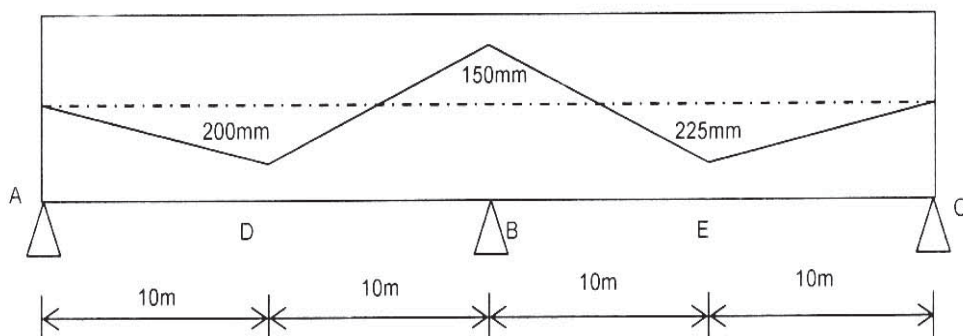
Live load - 4 kN/m^2

Floor finish - 1 kN/m^2

Materials - M40, multistrand cables

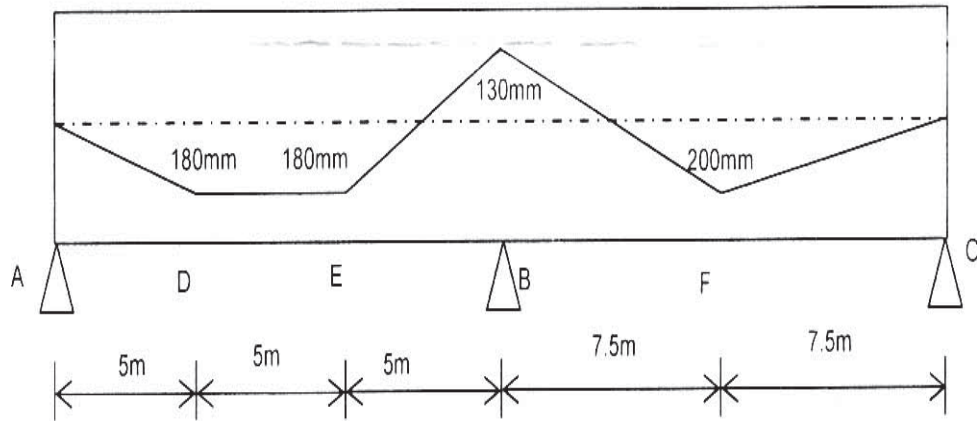
Slab with drop

Q7) Fig. shows a two span continuous beam. corresponding to the cable profile provided locate the pressure line due to prestress alone. The prestressing force is 1000 kN . **[17]**



OR

- Q8)** Fig. shows a two span continuous beam. Corresponding to the cable profile provided locate the pressure line due to prestress alone. The prestressing force is 1100kN. **[17]**



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