Total No. of Questions : 8]

SEAT No. :

P-6535

[Total No. of Pages : 3

[6181]-84

B.E. (Civil)

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

(2019 Pattern) (Semester - VII) (401004E) (Elective -IV)

Time : 3 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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicates full marks.***
4) ***Use of electronic pocket calculators is allowed.***
5) ***IS1343 : 2012 and IS456:2000 codes of practice are allowed.***
6) ***Assume suitable data, if necessary.***

Q1) a) A pre-tensioned prestressed concrete beam having a rectangular. section, 150 mm wide and 300 mm deep has an effective cover of 50 mm. If f_{ck} = 40 N/mm^2 f_{pu} = l600N/mm^2, and the area of prestressing steel Aps = 461 mm^2, Calculate the ultimate flexural strength of the section using IS 1343 code provisions. **[9]**

b) A prestressed concrete beam 250 mm wide & 375 mm deep is subjected to two symmetrical cables each with a prestressing force of 800 kN. An anchor plate 150 mm × 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 1200mm wide and 150 mm deep. The rib is 300 mm wide and 1500mm deep. The effective depth of the cross section is 1600mm. If f_{ck} = 40 N/mm^2, f_{pu} = l600N/mm^2 and the area of prestressing steel Aps = 4700 mm^2, Calculate the ultimate flexural strength of the section using IS1343 code provisions. **[8]**

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 130 kN. The uniform prestress across the section is 5 N/mm^2. The characteristic cube strength of the concrete is 40 N/mm^2 and steel is Fe 415 with bar dia. 8 mm. Design suitable spacing for the stirrups conforming to IS1343 recommendations for uncracked section. Assume cover to the reinf. as 50 mm. **[9]**

P.T.O.

Q3) a) A slab spanning 10 m is to be designed as a one way prestressed concrete slab with parallel post tensioned cables carrying an effective force of 600kN. The deck slab is required to support a udl of 25kN/m^2. The permissible stresses in concrete should not exceed 15 N/mm^2 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 6 m × 7 m with continuity on all side, subjected to superimposed load 4 kN/m^2. Take F.F. load = 1.5 kN/m^2. Use cable S_3 or S_4, f_{ck} = 45 N/mm^2, f_y of S_3 or S_4 = 1900 N/mm^2. Design the spacing of cable in both direction. Don't apply checks. **[10]**

OR

Q4) a) A slab spanning 7 m 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/m^2. The permissible stresses in doncrete should not exceed 15 N/mm^2 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 5 m × 6 m with continuity on all sides, subjected to superimposed load 4 kN/m^2. Take F.F. load = 1.5 kN/m^2. Use cable S_3 or S_4 f_{ck} = 45 N/mm^2, f_y of S_3 or S_4 = 1900 N/mm^2. 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 = 7.5m in both directions

Column size-750mm square

Floor is to be used for a shopping mall.

Live load-5 kN/m^2

Floor finish-1 kN/m^2

Materials- M40 , multistrand cables

Slab with drop

OR

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

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

Column size-900mm diameter

Floor is to be used for an pharmaceutical company

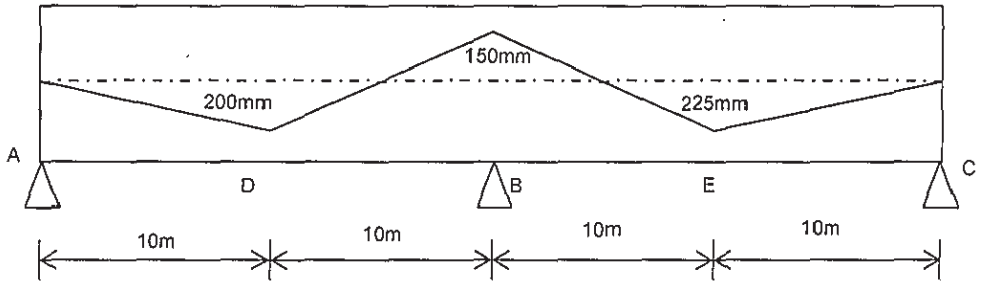
Live load-4 kN/m^2

Floor finish-1 kN/m^2

Materials- M40 , multistrand cables

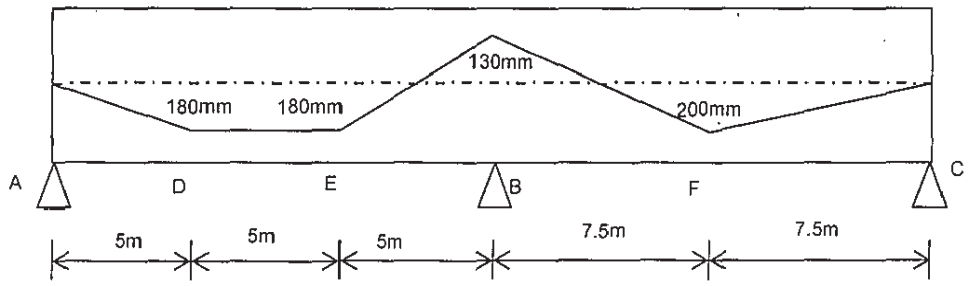
Slab with drop

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 1200kN. **[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 1000kN. **[17]**



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