Total No. of Questions : 8]

SEAT No. : ____

PA-1660

[Total No. of Pages : 3

[5927]-340

B.E. (Civil)

DESIGN OF PRESTRESSED CONCRETE STRUCTURES

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

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.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to Right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***IS1343:2012 and IS456:2000 code of practice are allowed.***
6) ***Assume suitable data if necessary.***

Q1) a) A post-tensioned prestressed beam of rectangular section 250mm wide is to be designed for an imposed load of 12 kN/m, uniformly distributed on a span of 12m. The stress in the concrete must not exceed 17 N/mm^2 in compression or 1.4 N/mm^2 in tension at any time and the loss of prestress may be assumed to be 15%. Calculate **[10]**

i) The minimum possible depth of the beam

ii) For the section provided, the minimum prestressing force and the corresponding eccentricity.

b) An end block of a post tensioned beam is 350 mm×500 mm. The prestressing force 900 kN with the tendon placed centrally at the ends. A bearing plate of 200 mm×200 mm is provided. Check the bearing stresses developed in concrete having strength, at transfer equal to 40 MPa.**[7]**

OR

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

b) A c/s of a prestressed concrete beam is an unsymmetrical T section with the following dimensions. **[9]**

Overall depth=l200 mm

Web = 200mm

Flange = 1000×200 mm

P.T.O.

At a particular section the beam is subjected to ultimate moment & shear force of 2000 kNm & 250 kN resp. Estimate the flexural shear resistance of 'the cracked section as per IS code.

Grade of concrete=M40 Effective depth = l100mm

Ap = 2310mm^2 fp = l500Mpa

η = 0.6

Effective prestress at extreme tensile face of the beam=l9.3 Mpa

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/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 6m×8m 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 8m 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 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]**

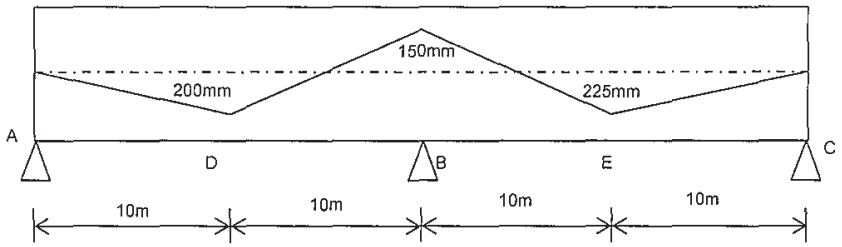
b) Design a post tension two way slab of effective span 5m×7m with continuity on all sides, subjected to superimposed load 4 kN/m^2. Take F.F. load = 1.5 kN/m^2.Use cable S_3 or S_4 f_{ck} = 45 N/mm^2, f_y of S_3 or S_4= 1900 N/mm^2. Design the spacing of cable in both directions. Don't apply checks. **[10]**

Q5) Design a post tensioned flat slab for the following data **[18]**
Centre to centre distance between columns=8m in both directions
Column size-800mm square
Floor is to be used for a shopping mall.
Live load-5 kN/m^2
Floor finish- 1kN/m^2
Materials- M40, multistrand cables
Slab with drop

OR

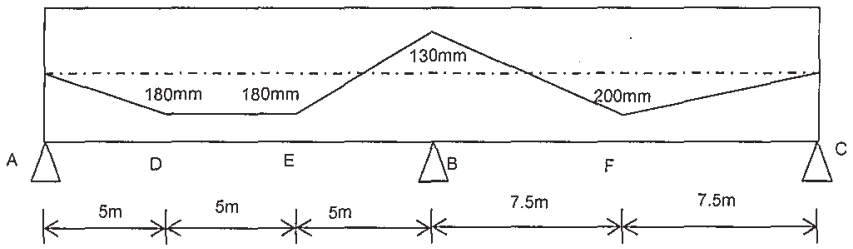
Q6) Design a post tensioned fiat slab for the following data **[18]**
Centre to centre distance between columns=9m in both directions
Column size-900mm diameter
Floor is to be used for an pharmaceutical company
Live load-4 kN/m^2
Floor finish- 1kN/m^2
Materials- M40 , multistrand cables
Slab with drop

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 1250kN. **[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 l200kN. **[17]**



✪ ✪ ✪