Total No. of Questions : 8]

SEAT No. :

P1676

[Total No. of Pages : 4

[4859]-3
B.E. (CIVIL)
STRUCTURAL DESIGN-III
(2008 Course) (Semester - I)

Time : 4 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2,Q.3 or Q.4, from section-I.***
2) ***Answer Q.5 or Q.6,Q.7 or Q.8, from section-II.***
3) ***Answer to the two sections should be written in separate answer-books.***
4) ***Figures to the right indicates full marks.***
5) ***IS 1343, IS 456, IS 3370 are allowed.***
6) ***Assume suitable data wherever necessary and mentioned it clearly.***

SECTION - I

Q1) a) Enlist the various time dependant and instantaneous losses in prestress concrete. **[4]**

b) Define the term post tensioning. What are the various post tensioning methods. **[4]**

c) A post tensioned pre stressed concrete beam section has top flange 500x150 mm, web 150x700 mm and bottom flange 400x250 mm is simply supported over an effective span of 13 meter. The beam is pre stressed with 5 no's of 12/5 Freyssinet parabolic cables (Fy=1650 Mpa) with their C.G.100 mm from extreme bottom fiber, stressed one at a time from only one end, calculate total loss of prestress at the age of 120 days if k=0.0026/m length of cable, slip of anchorage =2mm, Cc=1.8, Es=$2x10^5$ Mpa, Concrete grade M40, Creep and relaxation = 2% of initial prestress. **[17]**

OR

Q2) a) Explain stress concept and load balancing concept used in design of prestress concrete member with neat sketches. **[10]**

b) An unsymmetrical prestressed concrete section has top flange 750x200 mm, bottom flange 400mm x 300mm, and web 150 mm x 500 mm, it is supported over a span of 20 m carries super imposed load of 10 kN/m, the effective prestressing force is 1200 KN located at 100mm form soffit of the section at mid span, cable profile is parabolic and concentric at support. Calculate extreme fiber stresses in concrete at mid span at initial and final stage. Take loss ratio as 0.85 and unit weight of concrete as 25 kN/m^3. **[15]**

P.T.O.

Q3) Design a post tensioned pre stressed concrete beam using I section for flexure to carry a live load of 15 kN/m over a simply supported span of 25 m with M 50 grade of concrete and freyssinet cables of 12/5 (f_y=1750 Mpa) or 12/7 (f_y=1500 Mpa), Design the End block also. Draw sketches showing details of cable profile, end block reinforcement check for fiber stresses in concrete and deflection is must. **[25]**

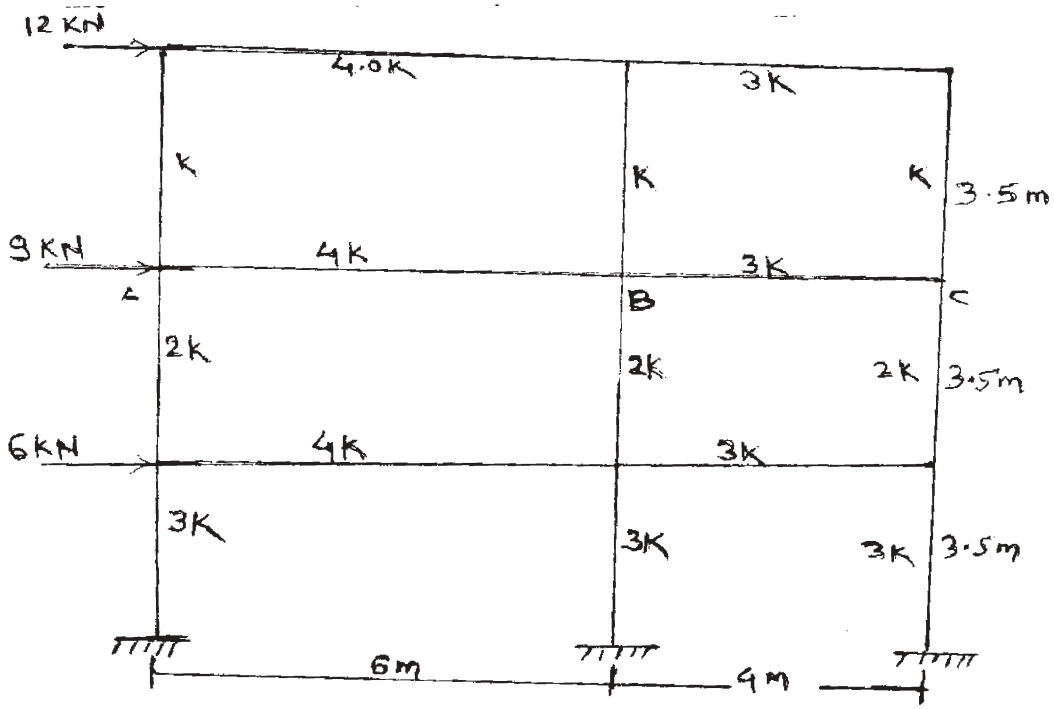
OR

Q4) a) State remedial measures to be taken to reduce losses in PSC beams.**[5]**

b) A post tensioned pre stressed concrete Two-way slab of 7 m x 8.5 m with discontinuous edge to support imposed load of 5 kN/m^2 using S3 strands each having cross sectional area 100 mm^2 and f_y=1900 Mpa check the safety of the slab at collapse and deflection at service load. Use M45 grade of concrete. **[20]**

SECTION - II

Q5) Fig (1) shows an intermediate frame of multistoried building the frames are spaced at 5m centre to centre analyze the rigid jointed frame taking live load as 3.0 kN/m^2 and dead load as 3.5kN/m^2 for panel AB and BC respectively. The self weight of beam AB is taken as 4 kN/m and for BC as 3.0 kN/m. The relative stiffness are as shown in fig.1 Use portal method for horizontal load and proper substitute frame for vertical loading. Design the beam ABC for combined effect of horizontal and vertical loading using 15% redistribution of moments for vertical load moments. Use M25 and Fe500. **[25]**

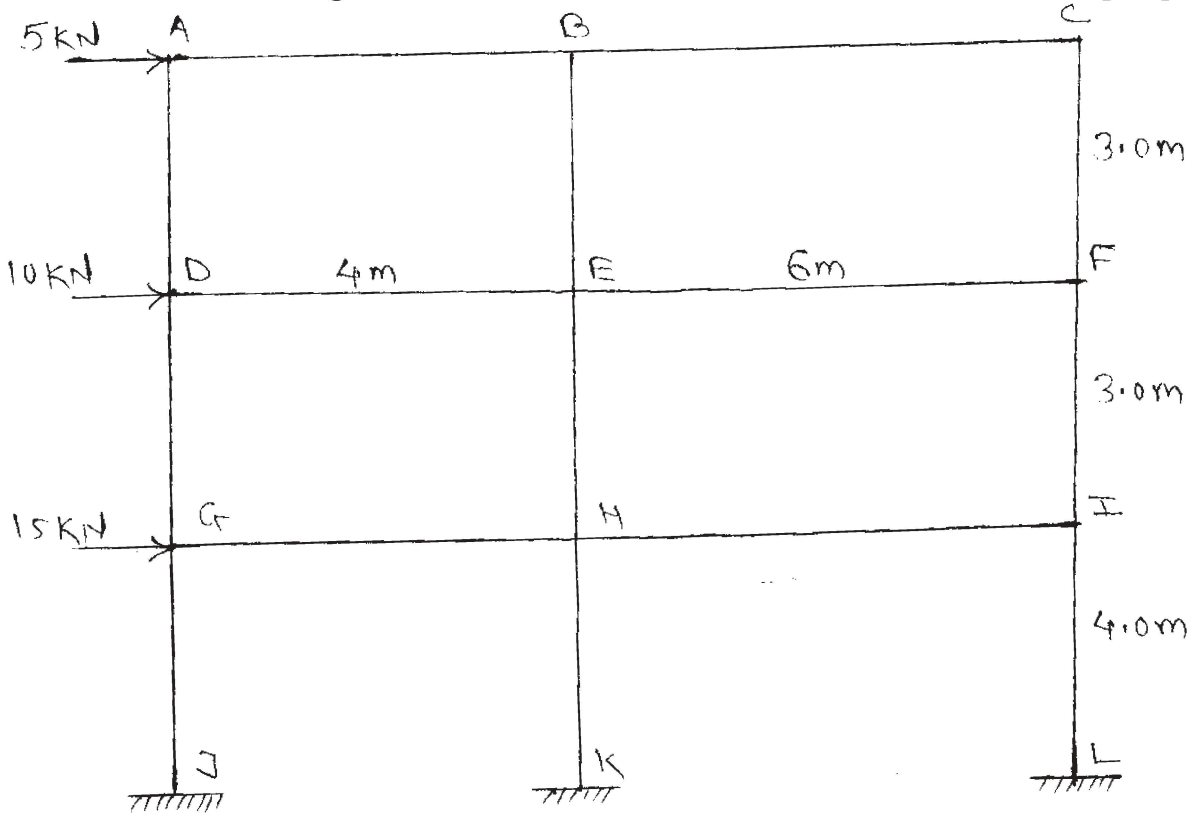


Fig(1) Que. 5

OR

Q6) a) Explain in detail Cantilever method of analysis. **[7]**

b) Analyze the rigid jointed frame as shown in fig(2) by cantilever method for lateral loads. Flexural rigidity of all members is same. Analyze beam GHl using proper substitute frame method if it is subjected to vertical ultimate dead load and live load of intensities 15 kN/m and 17 kN/m on span GH and 19 kN/m and 20 kN/m on HI respectively. The Horizontal forces are as shown in figure. Calculate maximum span moment for GH and support moment at H. Design Beam GHI for combined effect of horizontal and vertical loading using 15% redistribution of moments for vertical loading. Use M25 and Fe 500. **[18]**



Fig(2) Que. 6(b)

Q7) a) Draw schematic active earth pressure diagram for three layered backfill if y and K_a are increasing from top layer to the bottom, mentioning pressure intensities at the interface. **[5]**

b) Design a circular water tank resting on ground of 3.0 lack liter capacity, open at top, the joint between wall and base slab is rigid, the safe bearing capacity of supporting strata is 200 kN/m^2, Design the wall and bottom slab of the tank. Draw details of reinforcement, use I.S CODE method. **[20]**

OR

Q8) Design a rectangular combined footing with rib for the following data. Centre to centre distance between columns =3.3 m, working load on first column =450kN, working load on second column =550 kN, SBC of strata =200 kN/m^2 assume size of columns as 300 mm x525mm for both columns, use M20 and Fe-500 Draw SFD and BMD, show complete reinforcement details. **[25]**