Total No. of Questions : 8]

SEAT No. :

P2637

[Total No. of Pages : 3

[5154]-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) ***Answers 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) Explain need of high strength steel and high strength concrete in prestressed concrete. **[5]**

b) A post tensioned pre stressed Concrete beam section has top flange 400 × 200 mm, web 300 × 900 mm and bottom flange 500 × 300 mm is simply supported over an effective span of 15 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 both end, Calculate total loss of prestress at the age of 100 days if K = 0.0026/m length of cable, slip of anchorage = 2mm, Cc = 1.8, Es = $2x \times 10^5$ Mpa, Concrete grade M 40, Creep and relaxation = 2% of initial prestress. **[20]**

OR

Q2) a) Explain various concepts of analysis of prestressed concrete section. **[8]**

b) An unsymmetrial prestressed concrete section has top flange 450 × 200mm, bottom flange 500 mm × 300 mm, and web 200 mm × 1000mm, it is supported over a span of 16m carries super imposed load of 15 KN/m, the effective prestressing force is 1200 KN located at 100 mm from 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. **[17]**

P.T.O.

Q3) Design a Post tensioned Pre stressed concrete beam using I - section for flexure to carry a live load of 18 KN/m over a simply supported span of 16m with M 45 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) Explain any one method of post tensioning with neat sketches. **[5]**

b) A post tensioned pre stressed concrete Two-way slab of 6m × 5m with discontinuous edge to support imposed load of 4 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 4 KN/m^2 and dead load as 5 KN/m^2 for panel AB and BC respectively. The self weight of beam AB is taken as a 4 KN/m and for BC as 3.0 KN/m. The relative stiffness of all members is same. 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 20% redistribution of moments for vertical load moments. Use M25 and Fe 500. **[25]**

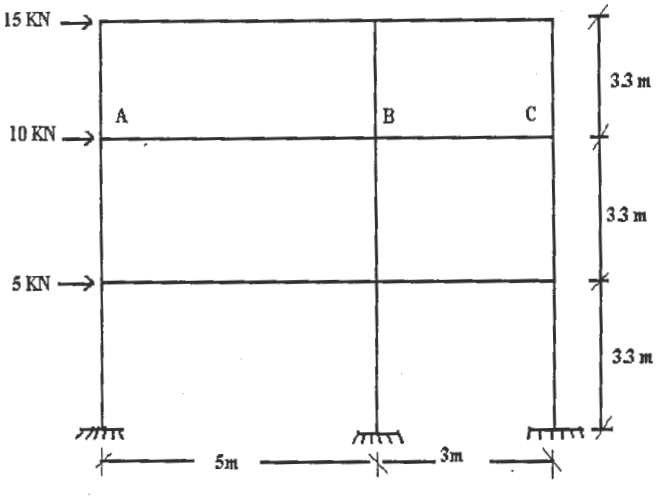

Fig. 1

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 GHI using proper substitute frame method if it is subjected to vertical ultimate dead load and live load of intensities 18 KN/m and 20 KN/m on Span GH and 16 KN/m and 20 KN/m on HI respectively. The Horizontal forces are as shown in figure. Calcualte maximum span moment for GH and Support moment at H. Design Beam GHI for combined effect of horizontal and vertical loading Using 20% redistribution of moments for vertical loading. Use M25 and Fe 500. **[18]**

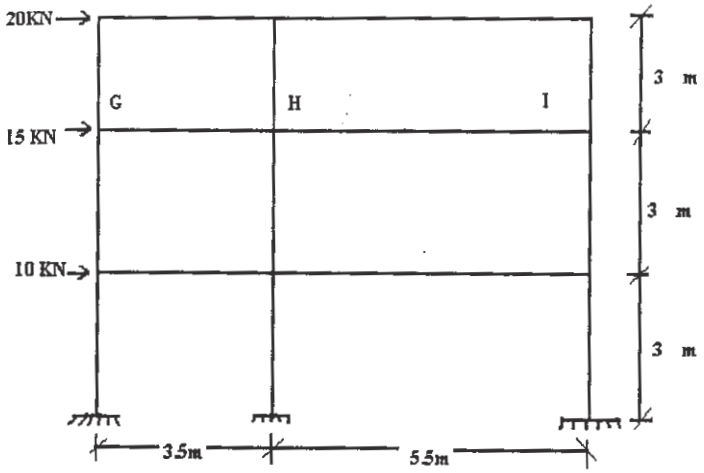

Fig 2

Q7) a) Explain with neat sketches various types of combined footing and state in what situation these are used. **[5]**

b) Design a Rectangular water tank resting on ground of 2.5 lack Liter capacity, open at top, the joint between wall and base slab is rigid, taking L/B ratio as 1.85 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 approximate method. **[20]**

OR

Q8) Design a T-Shape Cantilever retaining wall with following data: **[25]**

a) Height of soil to be retained above base = 5.0 m.

b) Unit weight of Soil = 18 KN/m^3.

c) Angle of repose = 30º.

d) SBC of Soil = 210 KN/m^2.

e) Coff. of friction between base & soil = 0.48.

f) Material - M25 & Fe - 500.

g) Leveled Backfill.

Show all necessary stability checks & details of reinforcement in stem, heel & toe.