Total No. of Questions : 8]

SEAT No. :

P1506

[Total No. of Pages : 4

[4759] - 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.3or 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 indicate 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 the various losses in Prestressed Concrete. **[8]**

b) A Post tensioned prestressed Concrete beam section has top flange 500× 150mm, web 200×800 mm and bottom flange 400 ×300mm is simply supported over an effective span of 16 meter. The beam is prestressed with 6 no's of 12/5 Freyssinet parabolic cables (Fy = 1650 MPa) with their C.G. 100mm from extreme bottom fiber, stressed one at a time from only one 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 = 2×10^5 MPa, Concrete grade M40, Creep and relaxation = 2% of initial prestress. **[17]**

OR

Q2) a) Explain Stress Concept and Load balancing concept. **[8]**

b) An unsymmetrical prestressed concrete section has top flange 500×200mm, bottom flange 400mm×300mm, and web 200mm×800mm, it is supported over a span of 15m carries super imposed load of 13KN/m, the effective prestressing force is 1000KN located at 100mm from soffit of the section at mid span, cable profile is parabolic and concentric at suppport. 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 25KN/m^3. **[17]**

P.T.O.

Q3) Design a Post tensioned Prestressed concrete beam using I- section for flexure to carry a live load of 15KN/m over a simply supported span of 17m 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 prestressed concrete Two-way slab of 7m ×8m with discontinuous edge to support imposed load of 4KN/m^2 using S3 strands each having cross sectional area 100mm^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 4m centre to centre analyze the rigid jointed frame taking live load as 3.5KN/m^2 and dead load as 3KN/m^2 for panel AB and BC respectively. The self weight of beam AB is taken as 4KN/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 15% redistribution of moments for vertical load moments. Use M20 and Fe415. **[25]**

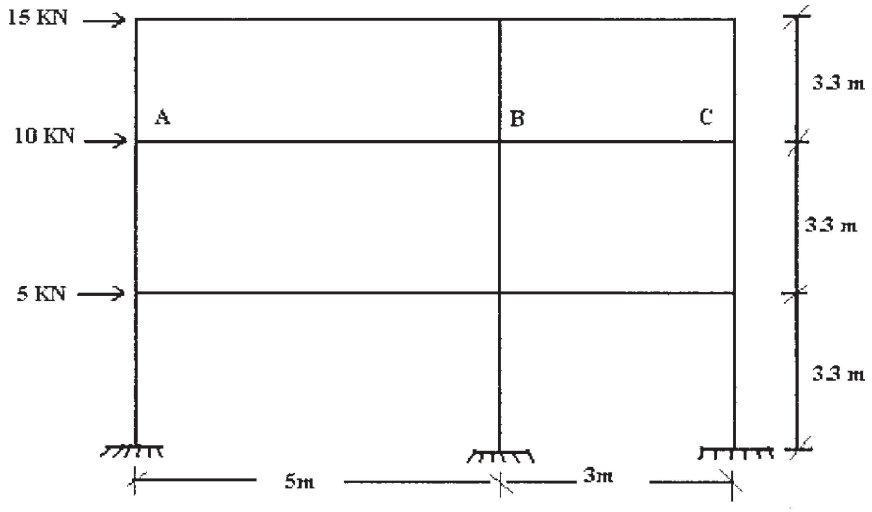

Fig. 1

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 15KN/m and 18KN/m on Span GH and 18KN/m and 22KN/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 10% redistribution of moments for vertical loading. Use M25 and Fe 415. **[18]**

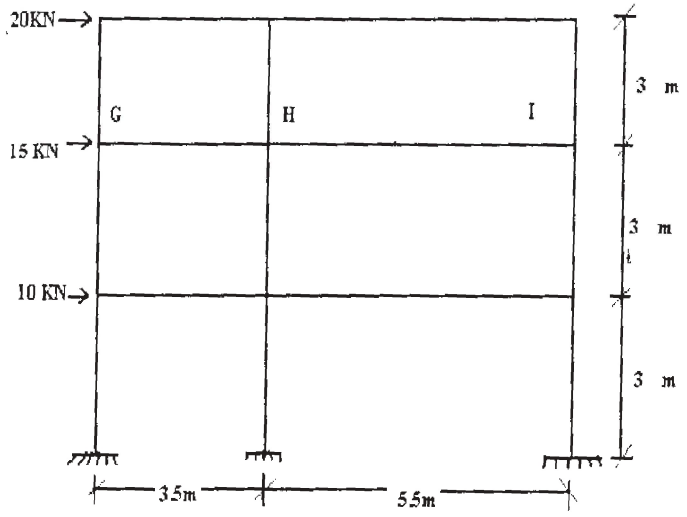

Fig 2

Q7) a) State the Necessity of Combined footing and mentioned situations where it is to be provided. **[5]**

b) Design a Rectangular water tank resting on ground of 3.0 lack Liter capacity, open at top, the joint between wall and base slab is rigid, taking L/B ratio as 1.75 the safe bearing capacity of supporting strata is 200KN/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 = 4.5m

b) Unit weight of Soil = 17 KN/m^3

c) Angle of repose = 32^o

d) SBC of Soil = $200KN/m^2$

e) Coeff. of friction between base & soil = 0.45

f) Material - M25 & Fe -500

g) Leveled Backfill

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

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