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SF-6449

B. E. - II (Sem. IV) (Civil) Examination

May / June - 2011

Structural Analysis - I

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 2 (SEM. 4) (CIVIL)

Name of the Subject :

☛ STRUCTURAL ANALYSIS - 1

☛ Subject Code No. : 6 4 4 9 ☛ Section No. (1, 2,.....) : NIL

Seat No. :

Student's Signature

(2) Figures to the right indicate full marks.

(3) Assume suitable data when required and mention it clearly.

(4) Use of non-programmable calculator is permitted.

1 A space frame shown in fig. 1 is supported at A, B, C and D in a horizontal plane, through ball joints. The member EF is horizontal, and is at a height of 3m above the base. The loads at the joints E and F, shown in figure 1, act in a horizontal plane. Find the forces in all the members of the frame. (Use Tension coefficient method). **20**

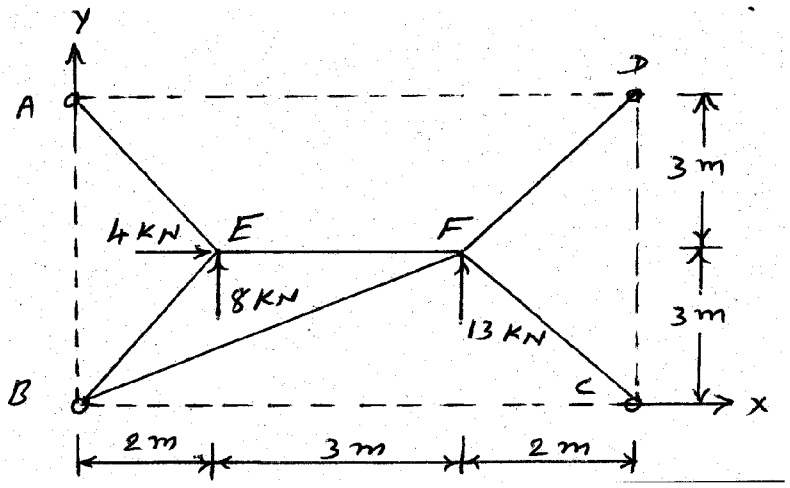

Fig. 1

2 Determine the principal moment of inertia of the section shown in fig. 2. All dimension shown are in mm. **15**

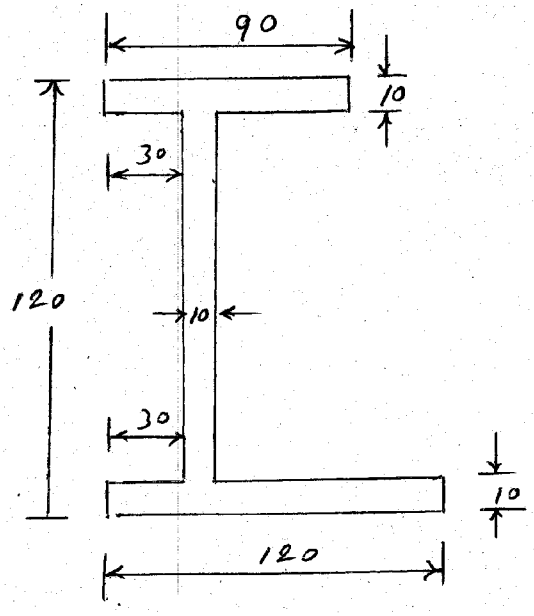

Fig. 2

OR

2 A beam of rectangular section, 80 mm wide and 120 mm deep is subjected to a bending moment of 14 kN.m. The trace of the plane of landing is inclined at 45° to the Y -Y axis of the section. Locate the neutral axis of the section and calculate the maximum bending stress induced in the section. **15**

3 (a) Write short note on shear centre. **4**

(b) Locate the shear centre of the channel section shown in fig.3 **11**

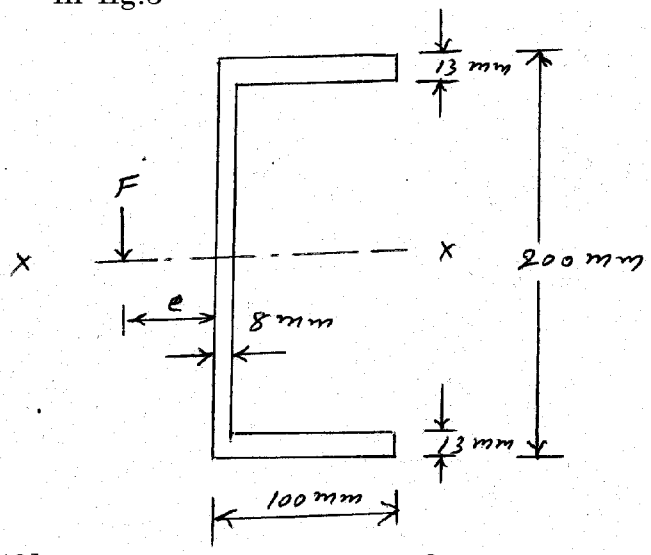

Fig. 3

4 (a) Define influence line diagram. How this is differentiated than normal diagram of SF and BM ? **6**

(b) Define conjugate beam. Explain its theorems. **6**

(c) What are the limitations of double integration method ? Under what circumstances conjugate method is useful. **6**

5 (a) Derive $y_{max} = wl^3/8EI$ for a cantilever beam having a UDL w kN/m thr'out, using double integration method. **8**

(b) Find slope and deflection at point B for a beam as shown in fig. 4 by using Castiglione's first theorem. EI = 10 x 10^{13} N.mm^2. **8**

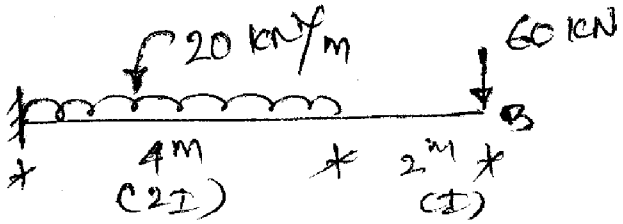

Fig. 4

OR

5 (a) Derive $Y_{max} = wl^3/8EI$ for a cantilever beam having a UDL w kN/m throughout, using conjugate beam method. **8**

(b) Determine vertical deflection at the free end of a cantilever beam as shown in fig. 5 E = 2 x 10^5 MPa and I = 8 × 10^8 mm^4. Use Castiglione's first theorem. **8**

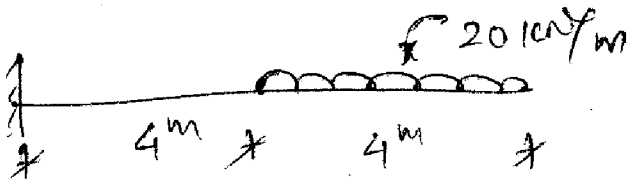

Fig. 5

6 (a) Two wheel loads of 16 kN and 8 kN at a fixed distance 2m apart, crosses a beam of 10 m span. Draw the ILD for BM and SF for a point 4m from the left side. Also find maximum BM and SF at that point. **10**

(b) Explain the procedure for finding out absolute maximum BM in the simply supported beam when a UDL of shorter than the span is moving. **6**

OR

6 (a) Draw ILD for SF and BM at a section 3m from left and of simply supported beam 12 m long. Also find maximum SF and BM at this section due to UDL of 2 kN/m and 5m length roll from left to right. **10**

(b) Explain the procedure for finding out absolute maximnum BM in the simply supported beam when a more than two point load is moving. **6**