Kafrelsheikh University
Faculty Of Engineering
Department Of Civil Engineering
Second Year, Structural Analysis (CES2006)

Date 04/06/2018
Time Allowed: 3 Hours
Full Mark: 85
2 pages

ANSWER AS MUCH AS YOU CAN

For all questions (E =20000000 t/m², a = 1*10⁻⁵ / °c).

Q1) For the shown composite structure and using consistent deformation method, Use symmetry to draw B.M.D and find the vertical deflection at free ends. (15 Marks) (ILOS a-3, b-1, c-2)
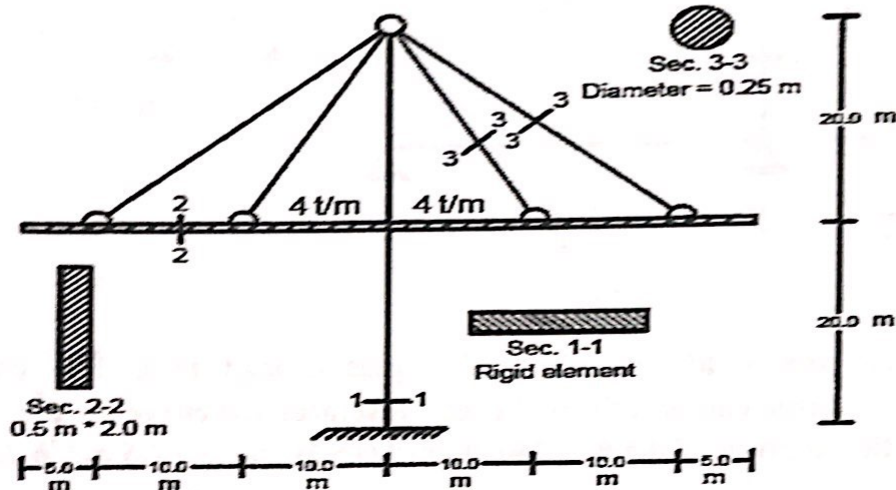
Q2) For truss shown in figure and using consistent deformation method. Find forces in all truss members due to a uniform increase in temperature of 20 ° c in member (de) then find rotation of member be. (all members have cross sectional area = 25 cm²). (15 Marks) (ILOS a-1, b-2, c-6)
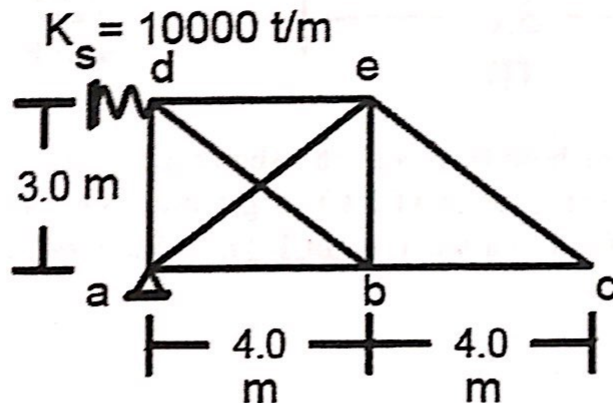

Q3) For closed frame shown in figure.
   A- Using method of three moments equation, Draw N.F.D and B.M.D. (15 Marks)
   B- Assuming steel type 44, Find the value of load P such that the maximum allowable stresses in the column ab at the marked section should not be exceeded (Take the effect of buckling into consideration) (15 Marks) (ILOS a-3, b-1, c-2)

IPE 600	
h = 60 cm	I_x = 92080 cm⁴
b = 22 cm	I_y = 3390 cm⁴
A=156 cm²	

IPE 600

X - Z PLANE

P   4 t/m   P

b

IPE 600

8.0 m

IPE 600

a

|——— 20.0 ———|
m

Y - Z PLANE
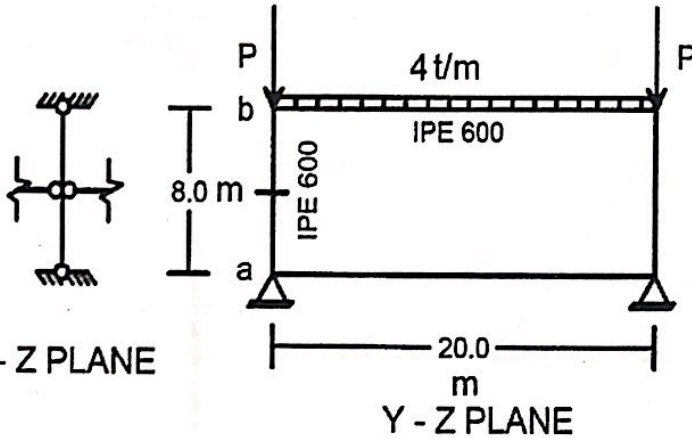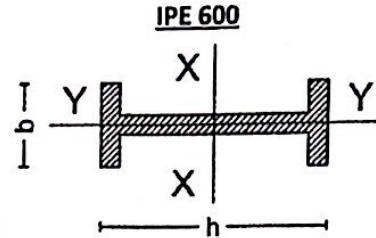
K The least of	$0.7+0.05(G_A+G_B)$
	$0.85+0.05\ G_{min}$

$$K \leq 1.0$$

Q4) Calculate the yield load (P_y), The plastic load (P_p), The corresponding displacements at free end and draw the load displacement curve for the shown beam, the cross section is given (Take σ_y = 24000 t/m²) **(15 Marks)** *(ILOS a-1, b-2, c-6)*

P

|——— 3.0 ———|
m

|— 60 cm —|
2 cm
60 cm
|—2 cm—|
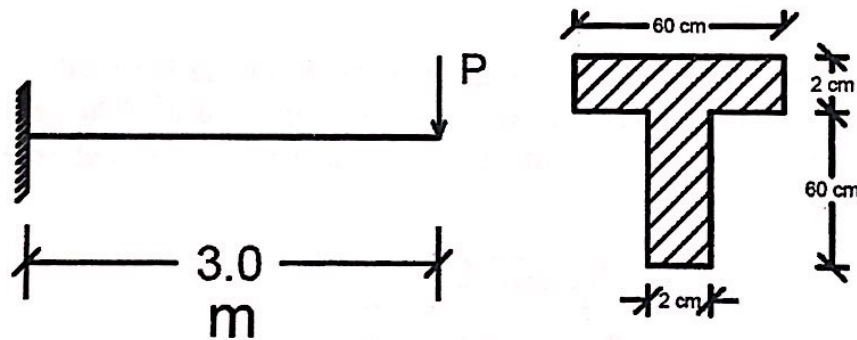
Q5) Write step by step how to model the shown beam under the given system of reversible loads using program SAP2000 to get maximum and minimum straining actions then draw the final solution. **(10 Marks)** *(ILOS a-3, b-1, c-2)*

8 t   10 t

|—2.0—| 8.0 |—2.0—| |—2.0—|
m   m   m   m

& With My Best Wishes &