ELMANSOURA UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF STRUCTURAL ENGINEERING
THEORY OF STRUCTURES (3)
FIRST TERM EXAM.

DATE: 30/12/2012
TIME ALLOWED ; 3 HOURS
FULL MARK = 70 POINTS
ACADEMIC NUMBER : 8313
PROF.DR. MOHAMED NAGUIB ABOU EL SAAD

Any data missing may be assumed MAXIMUM CREDIT = 70 POINTS

Question 1: 15 points

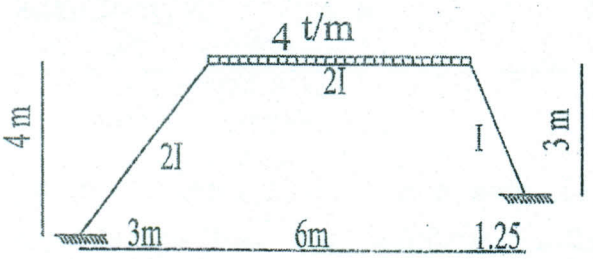


Fig.(1−a)

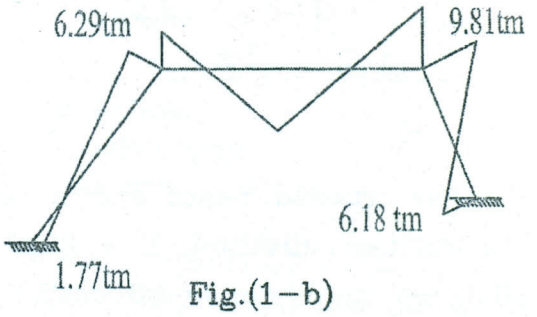


Fig.(1−b)

Confirm by calculation sheet that the bending moment diagram for the frame shown in Fig(1−a) is given in Fig.(1−b) using moment distribution method.

Question 2: 15 points

For the frame shown in Fig.(2), the final moment Mac=−6.66 tm, and Mca=10.67 tm due to the given loads, draw the final N.F., S.F., and B.M.D. using slope deflection method. E is constant.

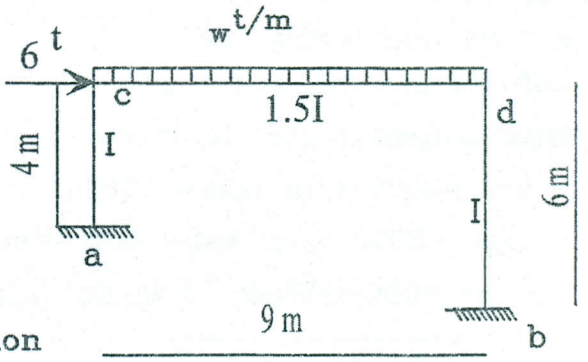


Fig.(2)

Question 3: 10 points

For the truss shown in Fig.(3), if the member end forces for member cd is {4.695, 0.0, −4.695, 0.0} and the forces in the springs are 0.0t, and −0.24t at supports a and b , respectively , find the member end forces for members ad and ac in local and global systems.

All members have A= 20 cm2 and E=2000 t/cm2.

ks1 = 1000 t/m and ks2 = 800 t/m

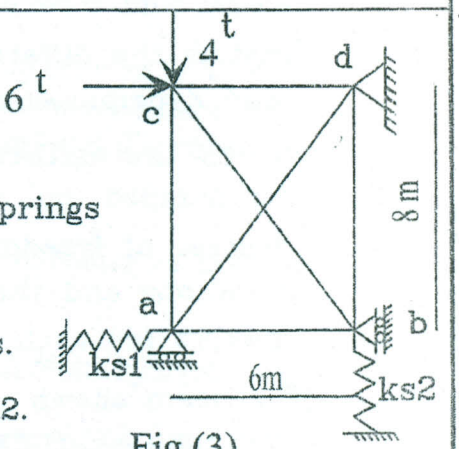


Fig.(3)

Question 4: 15 points

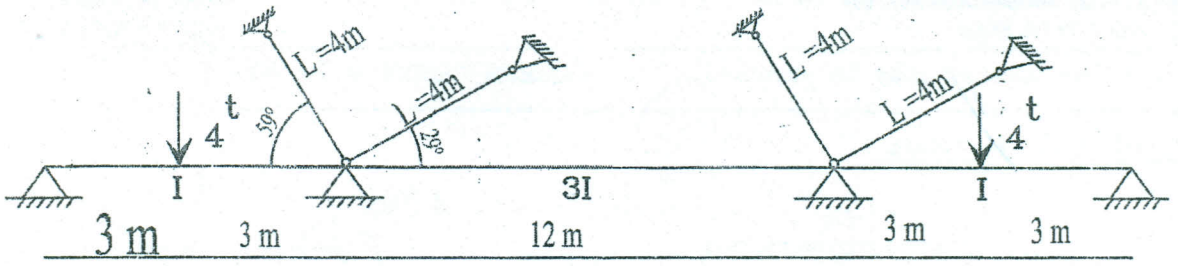


Fig.(4)

For the trussed beam shown in Fig.(4), give a complete analysis using the stiffness method. E = 2000 t/cm2 , I = 0.005 m4 and the area for all truss members = 20 cm2.

Question 5: 10 points

For the beam shown in Fig.(5). if the distance x = 2 cm and using the stiffness method find the displacement vector in cases :

i) ks1 =2000 t/m ,ks2= 1000t/m

ii) ks1 =2000 t/m ,ks2= 500 t/m

E = 2000 t/cm2 , I =0.001 m4.

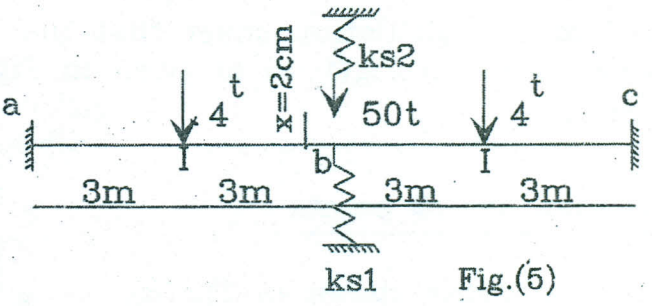


Fig.(5)

Question 6: 12 points

1)Write the meaning of the mathematical model and free body diagram.

2)What is the difference between static and dynamic analysis of structures.

3)Sketch the mathetical model snd F.B.D. for damped and un-damped single degrees of freedom in free and forced vibrations and then write equation of motion for each case.

4)For beam shown in Fig.(6-b) , find the span L to give the same period of vibration for beam Fig.(6-a).

E = 2000 t/cm2 , I =0.004 m4.

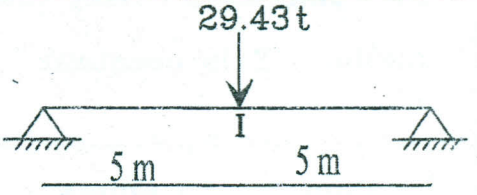
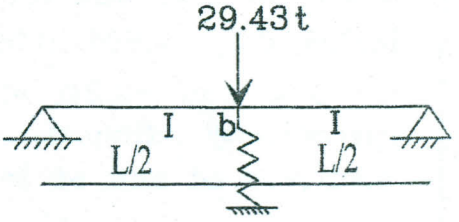


Fig.(6-a)



ks= 5000 t/m

Fig.(6-b)

GOOD LUCK PROF. DR. ENG. Mohamed Naguib.