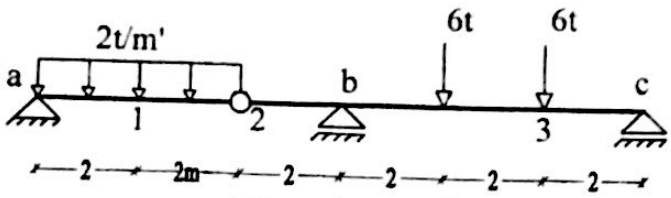
KAFRELSHEIKH UNIVERSITY
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
STRUCTURAL ANALYSIS (2)
SECOND TERM EXAM.

DATE: 8/6/2017
TIME ALLOWED :3 HOURS
FULL MARK = 85 POINTS
ACADEMIC NUMBER :CES2006
PROF.DR. MOHAMED RAGUIB ABOU EL SAAD

Any data missing may be assumed MAXIMUM CREDIT = 85 POINTS

Question 1: 15+15= 30 points



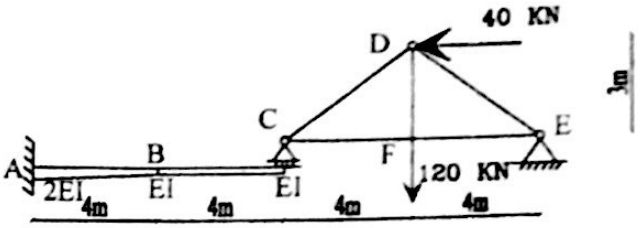


Fig.(1−a)

i)−For the beam shown in Fig.(1−a), ,compute deflection at points 1, 2, 3 , the relative rotation at the intermediate hinge, and a rotation at support a. (EI is uniform along the beam and equals 4200 t.m2)

ii)−For the beam shown in Fig.(1−b), the EI value of the cantilever ABC varies linearly from 2EI at support A to EI at B and is constant from B to C. Determine the deflections at points F and C.

$EI_{\text{for ABC}}$ =1080000 KN.m and $EA_{\text{for truss}}$ =300000 KN.

Question 2: 15 points

For the frame shown in Fig.(2),

draw the bending moment diagrams

by using the method of virtual work.

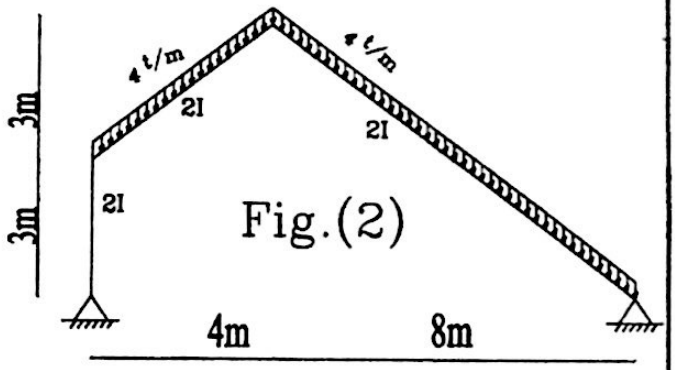


Fig.(2)

Question 2: 15 points

For the truss shown in Fig.(3),

Area of member BD = 100 mm^2, and

for all other members = 300 mm^2 .

Member AD is too long by 1.5 mm and all members are subject to an increase in temperature of 10° C

E = 205 KN/ mm^2 and $\alpha = 12 \times 10^{-6}$ /C.

Compute the forces in all members due to all previous information's.

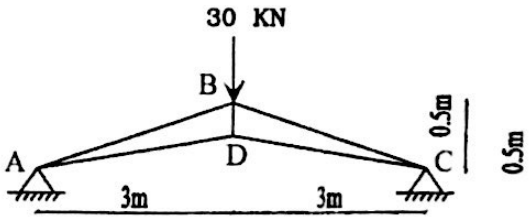


Fig.(3)

Scanned with CamScanner

Question 4 15 points

For the frame shown in Fig.(4),
compute and draw the B.M.Diagram,
using the three moment equations.
EI is uniform and constant for all members.

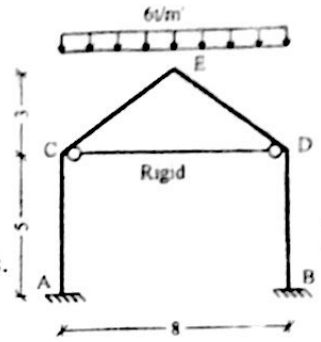


Fig.(4)

Question 5: 5+5+10= 20 points

i) Discuss the buckling length for all types of columns and write the second and fourth order differential equations for calculating the Euler loads , and then write their general solutions and the the boundary condition required for constant intergation for all cases.

ii) For both pin–ended column and using the second order differential equations find the buckling load.

iii)For the structure shown in Fig.(5), the column ab is hinged at its end a and holds in position by cable bg. A beam df is attached to column by hinge at d and tie ce. What will be the maximum additional vertical load that placed at the end b of the column if the buckling is taken into consideration.

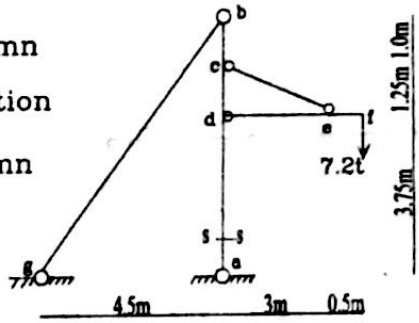
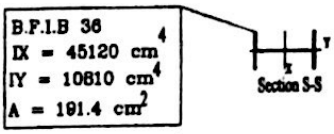


Fig.(5)

The used steel is steel 37.

$$f_{pb} = 1.4 - 0.000065\,(l/i)^2 \quad t/cm^2$$

$$K = 1.4/f_{pb}$$



GOOD LUCK PROF. DR. ENG. Mohamed Naguib.

Scanned with CamScanner