American University of Beirut
Department of Civil and Environmental Engineering

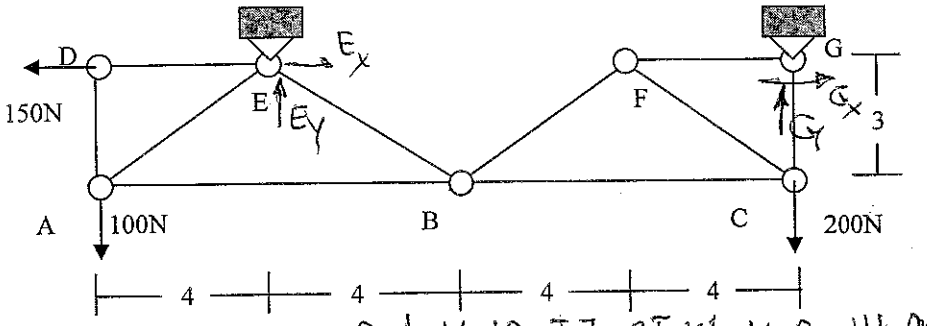
Spring 2007-2008 **Instructor: Professor Fouad Kasti**

CIVE 210	Statics	Exam #2 Part II	Fri May 30, 08	1/2

3/4 Hour Exam, Closed Books

Problem #2: (50%)

For the truss shown to the right, hinge supported at E and G, with applied concentrated vertical 100 N force down at A, vertical 200N force down at C, and horizontal 150N to the left force at D, answer the following questions using clear Free Body Diagrams and writing appropriate equilibrium equations whenever needed:



INTERNAL DET: R=4, M=10, J=7 $2J=14$, $M+R=14$ OK

EXTERNAL J=7 P=1 R=4 N=3 $N+P=4=R$ OK

1- Briefly study stability and determinancy (6%). E_x IN $\Sigma F_x=0$ $\Sigma F_y=0 \rightarrow E_y$ $\Sigma M=0 \rightarrow E_y$ // G_y @ d=12

GLOBAL: $E_x+G_x-150=0$ $E_y+G_y-300=0$ $12G_y-12\times200+100\times4=0$ $G_y=\frac{2000}{12}=166.67\uparrow$

2- Determine the reactions at E and G (8%). Indicate magnitude / direction

LOCAL: $\Sigma M_B=0$ $8G_y-8\times200-3\times G_x=0$ $(+1333.33-1600)=3G_x$

3- Determine the axial forces in members AB, AD, DE, AE and BE by the joint method only (20%). Indicate magnitude / direction, state whether tension / compression.

$G_x=88.90\leftarrow$ $E_x=88.9\rightarrow$ $E_y=133.33\uparrow$

4- Without using the results in 3- above, determine the axial forces in members BF, BC, FC, and FG using the section method only (16%). Indicate magnitude / direction, state whether tension / compression.

(3) D: $T_{AD}=0$, $T_{ED}=150(T)$

A: $\frac{3}{5}T_{EA}=100$, $T_{EA}=166.67(T)$, $\frac{4}{5}T_{EA}+T_{AB}=0$, $T_{AB}=133.33(C)$

E: 133.33 − 166.67 × 3/5 = 133.3 − 100 = 33.3, $T_{EB}\times3/5=$ $T_{EB}=55.5$ (C)

(4) $\Sigma F_y=0$ $166.67-100-T_{BF}\frac{3}{5}=0$ $T_{BF}=55.55$ (T)

$\Sigma F_y=0$ $\frac{3}{5}T_{CF}+166.67-100=0$ $T_{CF}=-111.1$ (C) $=111.1$ (C)

$\Sigma M_C=0$ $T_{FG}=88.9$ (C)

$\Sigma F_x=0=-88.90-T_{FG}-T_{BC}-\frac{4}{5}T_{CF}=0$

$T_{CB}=-44.4$ (C)

American University of Beirut
Department of Civil and Environmental Engineering
Spring 2007-2008 **Instructor: Professor Fouad Kasti**