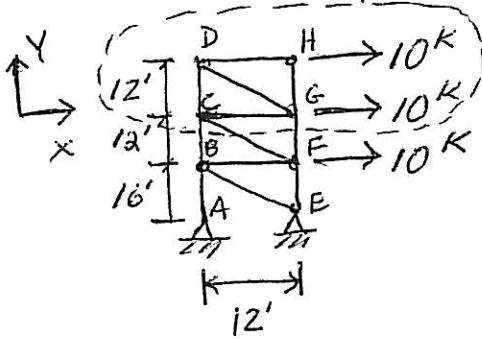


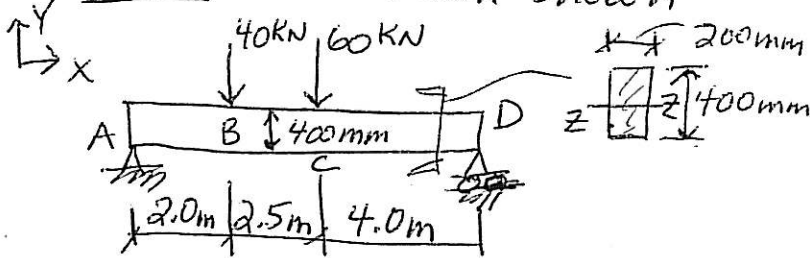
Name _____

30) 1. Given: The plane truss shown, $E=29000\text{Ksi}$, $\nu=0.30$, $G=11,200\text{Ksi}$
 Required a) Reactions at A & E



- b) F_{DH} , F_{HG} , F_{DG} , F_{CD} , F_{AB} using the method of joints
 c) F_{BC} , F_{CF} , F_{GF} using the section marked
 d) For member AB, calculate all six stresses and six strains if its cross section area is 8.0in^2 . (use the local coordinate system with the x axis going from A toward B)

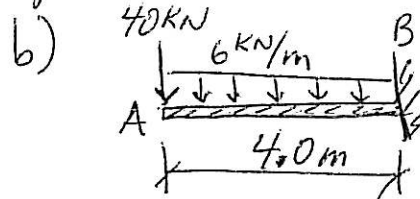
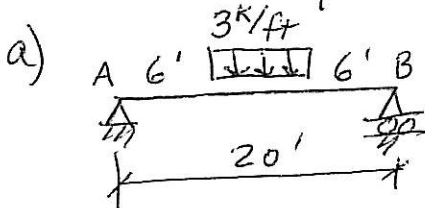
30) 2. Given: The beam shown



Reqd

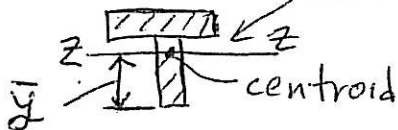
- a) Reactions at A & D
 b) Shear & Moment diagrams
 c) $\sigma_{xx\text{ max}}$ Tension, $\sigma_{xx\text{ max}}$ compression
 Tell where they occur
 d) The shear flow $q = \frac{VQ}{I}$ at the neutral axis along segment AB

30) 3. Draw shear & moment diagrams for



30) 4. Calculate A , \bar{y} , I_{zz}

Two Plates 3" x 11"

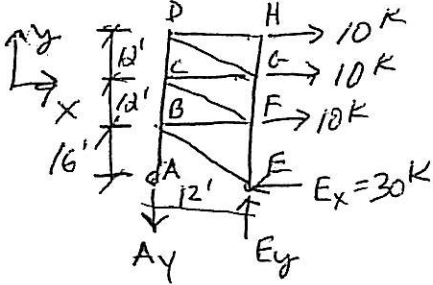


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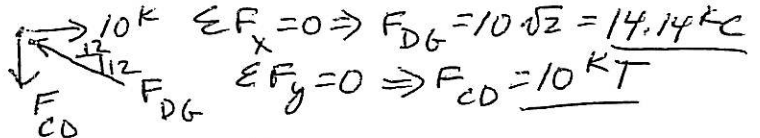
30) 1. Plane Truss, $E = 29000 \text{ ksi}$, $\nu = 0.30$, $G = 11,200 \text{ ksi}$



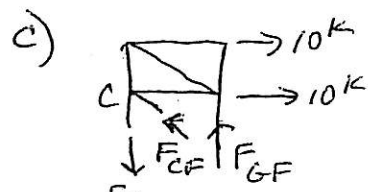
Sol a) $A_y = \frac{1}{12} [10k(40+28+16)] = 70k \downarrow$, $E_y = 70k \uparrow$, $E_x = 30k \leftarrow$

b) $F_{DH} = 10k T$, $F_{HG} = 0$

J+D



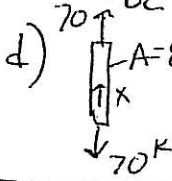
J+A $\sum F_y = 0 \Rightarrow F_{AB} = 70k T$



$\sum F_x = 0 \Rightarrow F_{CF} = 20\sqrt{2} = 28.3k C$

$\sum M_F = 0 \Rightarrow F_{BC} = \frac{1}{12} [10(12) + 10(24)] = 30k T$

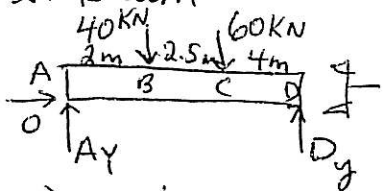
$\sum M_C = 0 \Rightarrow F_{GF} = \frac{1}{12} (10 \times 12) = 10k C$



$\sigma_{xx} = \frac{70k}{8 \text{ in}^2} = 8.75 \text{ ksi T}$, $\nu_{yy} = \nu_{zz} = \tau_{xy} = \tau_{xz} = \tau_{yz} = 0$

$\epsilon_{xx} = \frac{\sigma_{xx}}{E} = \frac{8.75}{29000} = .00030$, $\epsilon_{yy} = \epsilon_{zz} = -.3(.00030) = -.000090 \text{ in/in}$
 $\gamma_{xy} = \gamma_{xz} = \gamma_{yz} = 0$

2. Beam



Sol a) $D_y = \frac{1}{8.5} [40(2) + 60(4.5)] = 41.2 \text{ kN} \uparrow$, $A_y = 100 - 41.2 = 58.8 \text{ kN} \uparrow$

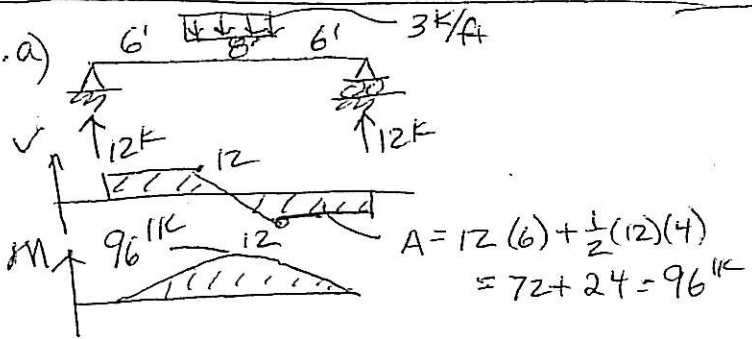


c) $I = \frac{1}{12} (200)(400^3) = 1.067 \times 10^9 \text{ mm}^4$, $\sigma_{xx \text{ max}} = \frac{165 \times 10^6 \text{ N-mm} (200 \text{ mm})}{1.067 \times 10^9 \text{ mm}^4} = 30.93 \text{ N/mm}^2 \text{ (MPa)}$

Max T @ C Bottom, max C at C top

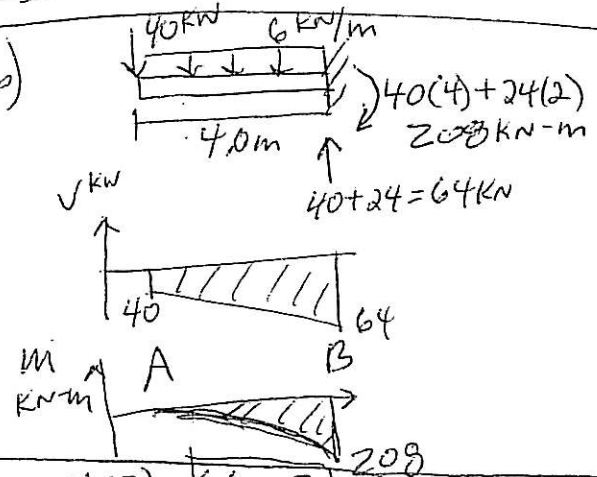
d) $q = \frac{VQ}{I} = \frac{58.8 (200)(200)(100)}{1.067 \times 10^9 \text{ mm}^4} = .220 \text{ kN/mm}$

3. a)

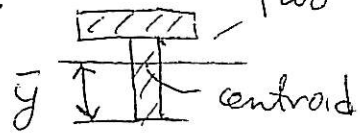


$A = 12(6) + \frac{1}{2}(12)(4) = 72 + 24 = 96 \text{ k}$

b)



4. Two plates 3" x 11"



Sol $A = 2(33) = 66 \text{ in}^2$
 $\bar{y} = \frac{33(12.5) + 33(5.5)}{66} = 9.0 \text{ in}$

$I_{zz} = \frac{1}{12} (11)(3^3) + 33(12.5-9)^2 + \frac{1}{12} (3)(11^3) + 33(9-5.5)^2$
 $= 24.8 + 404.3 + 332.8 + 404.3 = 1166 \text{ in}^4$