TOBB EKONOMİ VE TEKNOLOJİ ÜNİVERSİTESİ

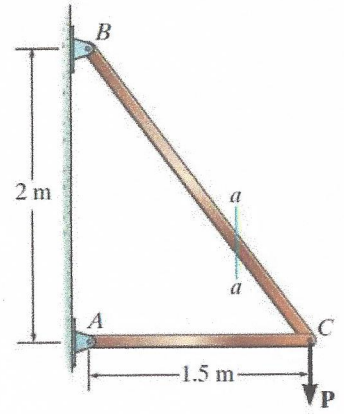
MAK 206 Strength of Materials – 2016-2017 Spring

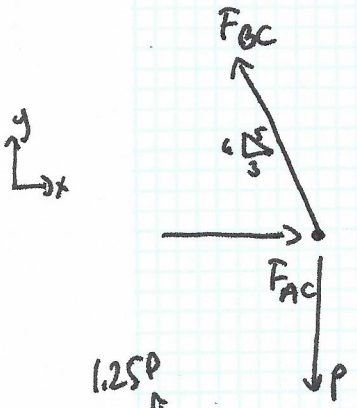
QUIZ 1

27 January 2017 Ad, Soyad: _____

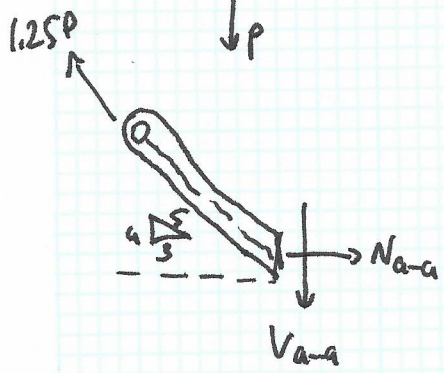
Prof. Dr. M. Ali Güler No: _____

Problem: Determine the largest load **P** that can be applied to the frame without causing either the average normal stress or the average shear stress at section *a–a* to exceed $\sigma = 70$ MPa and $\tau = 100$ MPa respectively. Area of crossection *a-a* is 1.5 meter-square.





$\uparrow \Sigma F_y = 0$; $F_{BC}\left(\frac{4}{5}\right) - P = 0$ $\quad F_{BC} = 1.25P$



$\xrightarrow{+} \Sigma F_x = 0$: $N_{a-a} - 1.25\left(\frac{3}{5}\right) = 0$ $\quad N_{a-a} = 0.75P$

$+\uparrow \Sigma F_y = 0$; $1.25P\left(\frac{4}{5}\right) - V_{a-a} = 0$ $\quad V_{a-a} = P$

$A_{a-a} = 1.5\ m^2$

$\sigma_{allow} = \frac{N_{a-a}}{A_{a-a}}$; $70(10^6) = \frac{0.75P}{1.5} \rightarrow P = 140$ MPa

$\tau_{allow} = \frac{V_{a-a}}{A_{a-a}}$; $100(10^6) = \frac{P}{1.5} \rightarrow P \geq 150$ MPa

Let me compare P values;

thus, largest $\boxed{P \text{ is } 140 \text{ MPa}}$