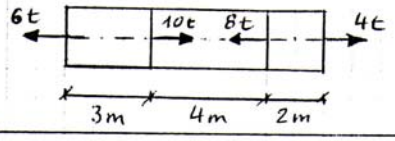
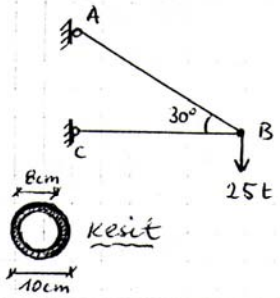
UYGULAMA 2
NORMAL KUVVET ETKİSİ

(1) Şekildeki çubuğun kesiti sabittir ve malzemenin emniyet gerilmesi $\sigma_{em} = 1400\ kg/cm^2$ dir. Çubuğun kesit alanını hesaplayınız.

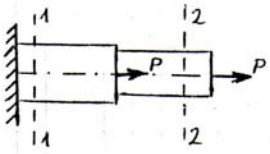


(2)

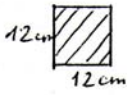


Şekildeki sistemde AB çubuğu, kesiti şekilde verilen borudan yapılmıştır. Kesitin yeterli olup olmadığını inceleyiniz. $\sigma_{em} = 1400\ kg/cm^2$.

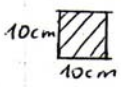
(3) Şekildeki çubuğun taşıyabileceği P yükünü hesaplayınız. $\sigma_{em} = 100\ kg/cm^2$.



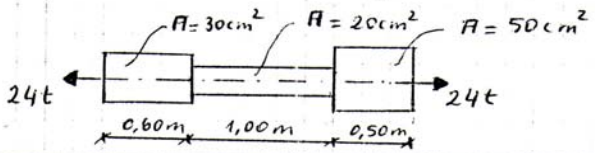
1-1 kesiti



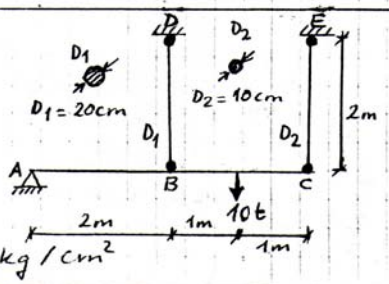
2-2 kesiti



(4) Şekildeki çubukta toplam boy uzamasını hesaplayınız. $E = 2.10^6\ kg/cm^2$.

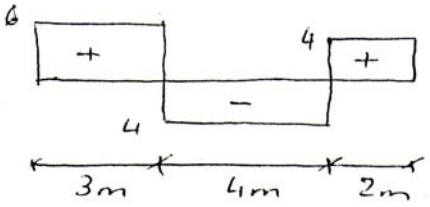


(5) Verilen sistemde A noktasındaki mesnet tepkisi ile BD ve CE çubuklarında oluşan kuvvetleri bulunuz. $E = 2,1.10^6\ kg/cm^2$



UYGULAMA 2 ÇÖZÜMLERİ

1)



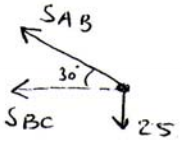
$N_{max} = 6\ t$

$\frac{6000}{A} \leq 1400$

$A \geq \frac{6000}{1400} = 4,3\ cm^2$

$A = 4,3\ cm^2$

2)



$A = \frac{\pi (10^2 - 8^2)}{4} = 28,27\ cm^2$

$+\uparrow \Sigma Y = 0 \quad S_{AB} \cdot \sin 30 - 25 = 0 \Rightarrow S_{AB} = 50\ t$

$\sigma = \frac{50000}{28,27} = 1770 > 1400 = \sigma_{em}$

kesit yetersiz değil.

3)

AB bölgesinde:

$\sigma = \frac{2P}{144} = \frac{P}{72}$ ⇐ maximum gerilme

BC bölgesinde:

$\sigma = \frac{P}{100}$

$\sigma_{max} \leq \sigma_{em} \Rightarrow \frac{P}{72} \leq 100 \Rightarrow P \leq 7200\ kg.$

4)

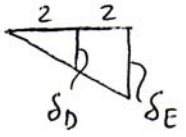
$\delta_{toplam} = \frac{24000 \cdot 60}{2 \cdot 10^6 \cdot 30} + \frac{24000 \cdot 100}{2 \cdot 10^6 \cdot 20} + \frac{24000 \cdot 50}{2 \cdot 10^6 \cdot 50}$

$\delta_{toplam} = 0,024 + 0,060 + 0,012 = 0,096\ cm$

5)

$\Sigma Y = 0 \quad V_A + V_D + V_E = 10\ t$

$\Sigma M_A = 0 \quad 2V_D + 4V_E = 30$



$\frac{\delta_D}{\delta_E} = \frac{2}{4} \Rightarrow \frac{V_D \cdot 200}{E \cdot \pi \cdot \frac{20^2}{4}} \times \frac{E \cdot \pi \cdot \frac{10^2}{4}}{V_E \cdot 200} = \frac{2}{4}$

$\Rightarrow V_D = 2V_E$

$V_E = 3,75\ t \quad V_D = 7,5\ t \quad V_A = -1,25\ t$