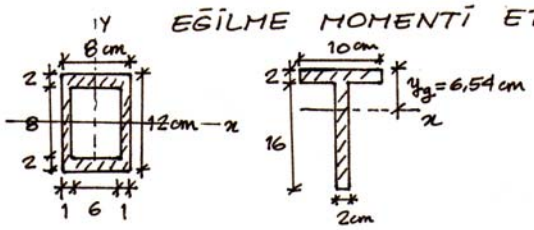
UYGULAMA 5

EĞİLME MOMENTİ ETKİSİ (BASİT EĞİLME)

EĞİLME MOMENTİ ETKİSİ

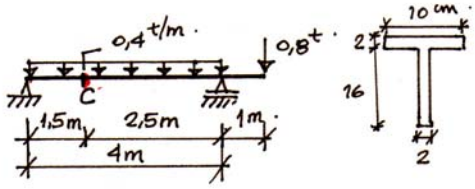
SORU 1:



Şekilde verilen kesitlerin x ve y eksenlerine göre taşıyabilecekleri en büyük eğilme momentlerini (M_x^{max}, M_y^{max}) hesaplayınız.

$\sigma_{em} = 1400\ kg/cm^2$

SORU 2:



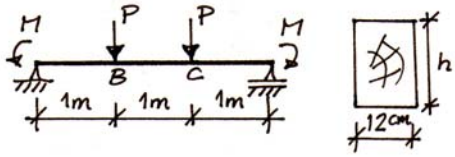
$\sigma_{em} = 1400\ kg/cm^2$.

Şekilde ölçüleri ve yükleri verilen sistemde,

a-) C kesitindeki iç kuvvetleri hesaplayınız.

b-) Kesitteki maksimum ve minimum normal gerilmeleri hesaplayıp gerilme diyagramını çiziniz.

SORU 3:



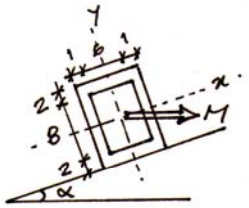
$\sigma_{em} = 100\ kg/cm^2$.

Şekilde ölçüleri ve yükleri verilen basit kirişte $M = 0{,}4$ tm., $P = 1$ t. dur.

a-) T ve M iç kuvvet diyagramlarını çiziniz.

b-) BC arasındaki kesiti boyutlandırınız (h=?).

SORU 4:



Şekilde ölçüleri verilen kesitte,

a) $\alpha = 10°$ ise,

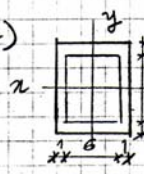
b) $\alpha = 20°$ ise,

kesitin taşıyabileceği M eğilme momentini hesaplayınız.

$\sigma_{em} = 1400\ kg/cm^2$.

UYGULAMA 5 ÇÖZÜMLERİ

1-)

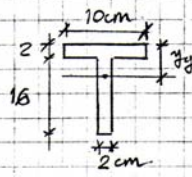


$I_x = 896\ cm^4$ $(M_x)_{max} = 1,4 \times 149,3 = 2,09\ tm$.

$I_y = 368\ cm^4$ $(M_y)_{max} = 1,4 \times 92 = 1,29\ tm$.

$W_x = 149,3\ cm^3$

$W_y = 92\ cm^3$



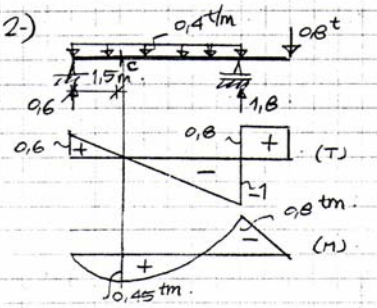
$$I_x = \frac{10 \cdot 2^3}{12} + 10 \cdot 2 \cdot (6,54-1)^2 + \frac{2 \cdot 16^3}{12} + 2 \cdot 16 \cdot (10-6,54)^2 = 1686,3\ cm^4$$

$$I_y = \frac{2 \cdot 10^3}{12} + \frac{16 \cdot 2^3}{12} = 177,3\ cm^4$$

$$(W_x)_{min} = \frac{1686,3}{11,46} = 147\ cm^3, \quad W_y = \frac{177,3}{5} = 35,46\ cm^3.$$

$(M_x)_{max} = 1,4 \times 147 = 2,06\ tm.$, $(M_y)_{max} = 0,5\ tm$.

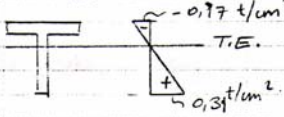
2-)



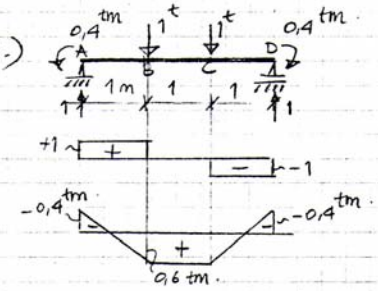
$$\sigma_{max} = \frac{45}{147} = 0,31\ t/cm^2 < 1,4\ t/cm^2$$

$$(W_x)_{max} = \frac{1686,3}{6,54} = 258\ cm^3.$$

$$\sigma_{min} = \frac{45}{258} = 0,17\ t/cm^2 < 1,4\ t/cm^2$$

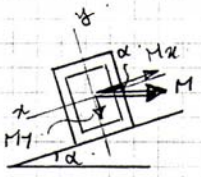


3-)



$$\frac{\frac{60}{12h^2}}{6} \leq 0,1 \rightarrow h \geq 17,32\ cm. \rightarrow h = 18\ cm.$$

4-)



$M_x = M\cos\alpha$; $M_y = M\sin\alpha$

a-) $$\sigma_{max} = \frac{M\cos 10}{149,3} + \frac{M\sin 10}{92} = 1,4 \rightarrow M = 1,65\ tm.$$

b-) $$\sigma_{max} = \frac{M\cos 20}{149,3} + \frac{M\sin 20}{92} = 1,4 \rightarrow M = 1,4\ tm.$$