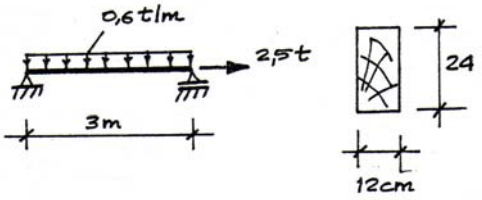
UYGULAMA 8
BİLEŞİK EĞİLME ETKİSİ

1-)



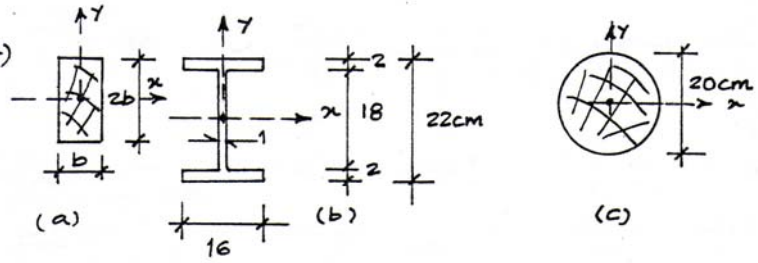
Şekilde yükleme durumu ve ölçüleri verilen kirişte enkesitin yeterli olup olmadığını kontrol edinit.

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

$\tau_{em} = 10\ kg/cm^2$

$E = 10^5\ kg/cm^2$, $f_{em} = L/300$

2-)



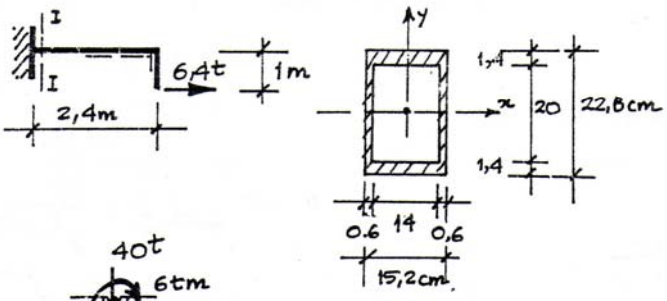
Şekilde verilen kesitlerde normal kuvvet ağırlık merkezinde etkimektedir. Buna göre,

a-) $M_x = +1\ tm$, $P = +3\ ton$ ise b değeri ne olmalıdır ($\sigma_{em} = 120\ kg/cm^2$).

b-) $P = -10\ ton$ ise taşınabilecek en büyük $+M_x$ değeri nedir? ($\sigma_{em} = 1400\ kg/cm^2$).

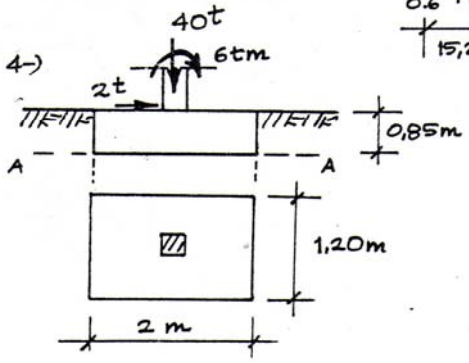
c-) $M_x = -0{,}54\ tm$ ise taşınabilecek en büyük normal kuvveti (çekme) hesaplayınız ($\sigma_{em} = 120\ kg/cm^2$).

3-)



Şekilde verilen sistemde I-I kesitinde en elverişsiz normal gerilmeleri hesaplayarak kesit üzerinde gösteriniz. $\sigma_{em} = 1400\ kg/cm^2$

4-)

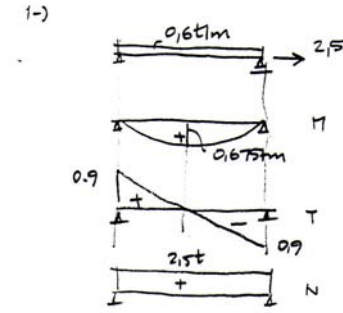


Şekilde verilen tekil temelde betonarme kolondan gelen yükler zemin seviyesinde gösterilmiştir. Buna göre zemin yüzünden 0,85 m derinlikte (A-A) maksimum ve minimum normal gerilmelerin değerlerini hesaplayınız. $(\sigma_{em})_{zemin} = 30\ t/m^2$, $\gamma_{beton} = 2{,}5\ t/m^3$.

UYGULAMA 8 ÇÖZÜMLERİ

BİLEŞİK EĞİLME

1-)



$I_x = 12.24^3/12 = 13824\ cm^4$

$W_x = 1152\ cm^3$

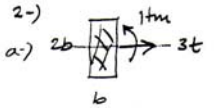
$$\sigma_{max} = + \frac{2500}{12x24} \pm \frac{0,675.10^5}{1152} = \begin{cases} +67,27\ kg/cm^2 \\ -49,91 \end{cases} \} < 100$$

$$\tau_{max} = 1,5 . \frac{900}{12.24} = 4,69\ kg/cm^2 < 10$$

$$f_{max} = \frac{5}{384} \cdot \frac{6.300^4}{10^5 . 13824} = 0,46\ cm < \frac{300}{300} = 1cm$$

2-)

a-)

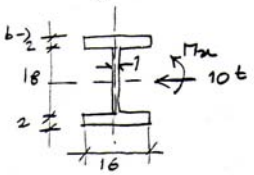


$$\sigma_{max} = \frac{3x10^3}{2b.b} + \frac{1.10^5}{b.(2b)^2/6} = 120 \rightarrow 480b^3 - 6000b - 6x10^5 = 0$$

$b = 11,16\ cm \rightarrow b \cong 12cm$

$h = 24cm$

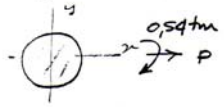
b-)



$I_x = 6907,33\ cm^4$, $W_x = 627,94\ cm^3$, $A = 82cm^2$

$$\sigma_{max} = - \frac{10}{82} - \frac{M_x . 100}{627,94} = -1,4 \rightarrow M_x \cong 8,03tm$$

c-)



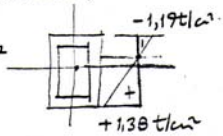
$$\sigma_{max} = \frac{P.10^3}{\pi . 10^2} + \frac{0,54.10^5}{\pi . 10^4/4/10} = 120 \rightarrow P = 16,10\ t$$

3-)

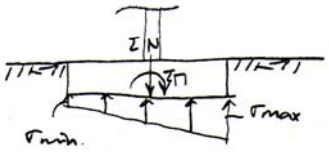
$I_x = 5679,65\ cm^4 \rightarrow W_x = 498,21\ cm^3$, $A = 66,56\ cm^2$

$M = 6,4\ tm$ $N = 6,4t$

$$\sigma_{max\ min} = \frac{6,4}{66,56} \pm \frac{640}{498,21} = \begin{cases} +1,38\ t/cm^2 \\ -1,19\ t/cm^2 \end{cases}$$



4-)



$N = 40 + 2.1,20.0,85.2,5 = 45,1t$

$M = 6 + 2.0,85 = 7,7tm$

$$\sigma_{max\ min} = - \frac{45,1}{1,2.2} \mp \frac{7,7}{1,2.2^2/6} = \begin{cases} -28,42\ t/m^2 < 30t/m^2 \\ -9,17\ t/m^2 \end{cases}$$