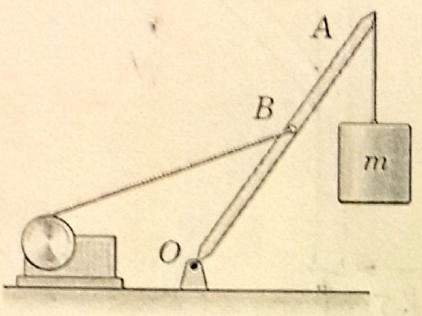
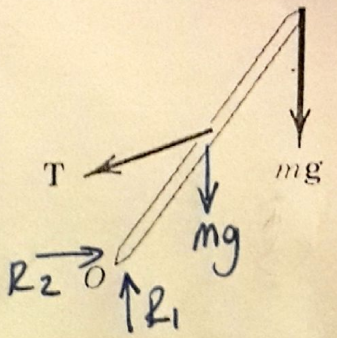
İ.Ü. MÜH. FAK. METALURJİ MÜH. BÖLÜMÜ

METALURJİ MÜHENDİSLERİ İÇİN MUKAVEMET DERSİ VİZE SINAVI **17.04.2014**

Sınav süresi 90 dakikadır. Notlar kapalıdır, hesap makinesi kullanılabilir. Cevaplar okunaklı ve anlaşılır olarak yazılmalı, tüm hesaplamalar cevap kağıdında gösterilmelidir. Aksi takdirde yapılanlar dikkate alınmayacaktır. Başarılar dilerim. Y.Doç.Dr. Yunus Ziya ARSLAN

SORU 1: Serbest cisim diyagramlarında eksik olan kuvvetleri şekiller üzerinde gösteriniz. Sol sütundaki şekiller üzerinde gösterilmemiş olsa dahi tüm elemanların kütlelerini *m* olarak kabul ediniz.





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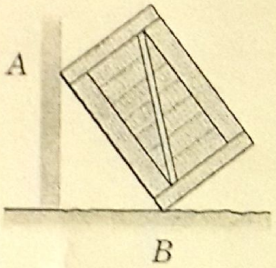

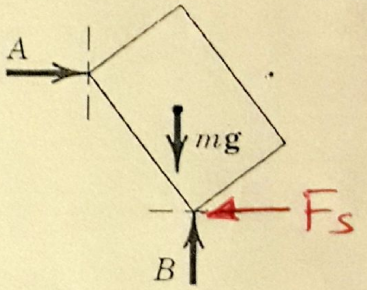

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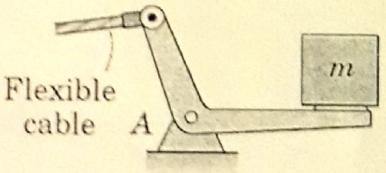

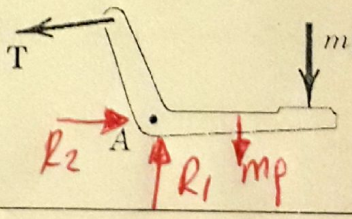

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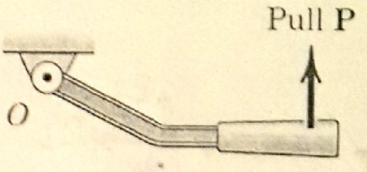

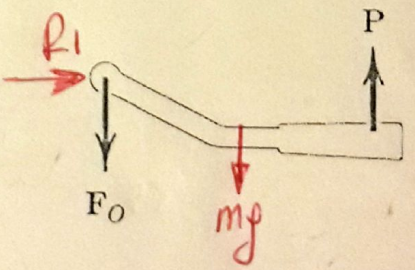

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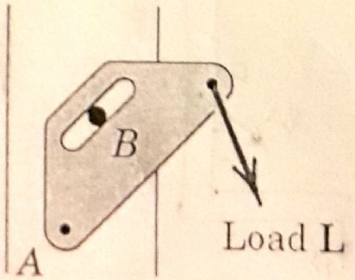

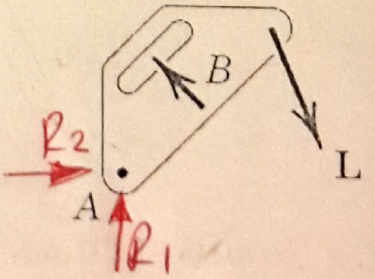

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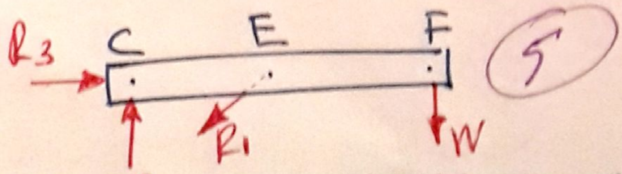
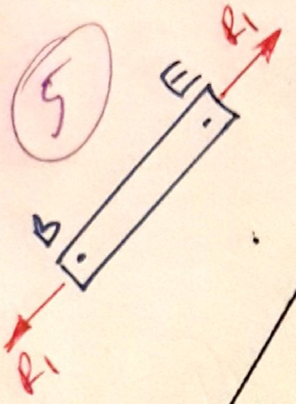
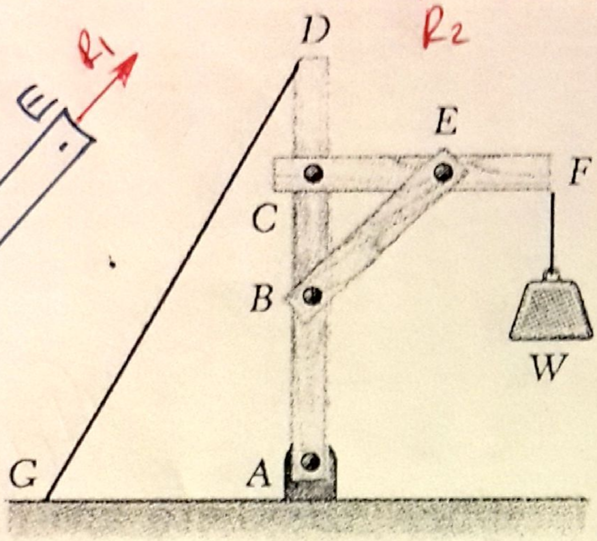
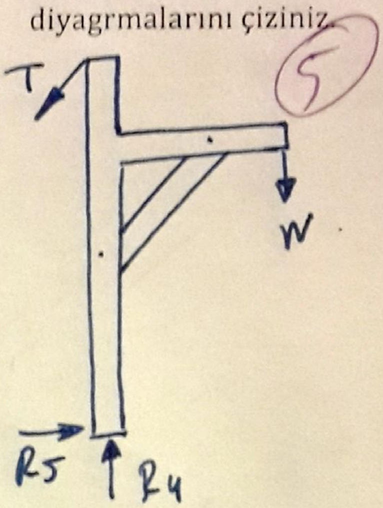


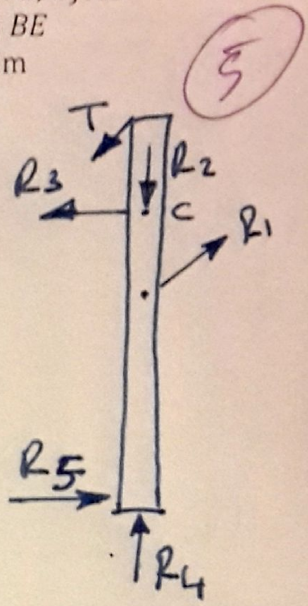
SORU 2.



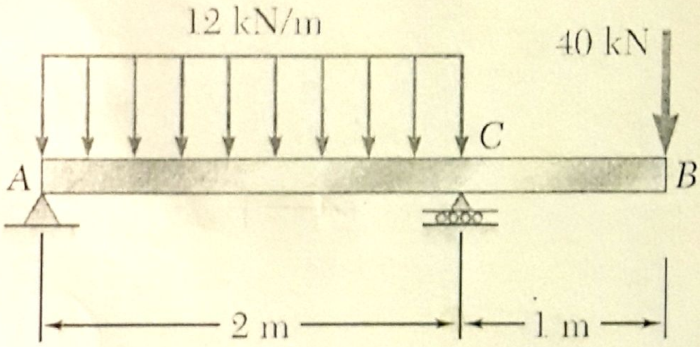


Şekildeki yapının i) bütününün, ii) *AD* linkinin iii) *CF* linkinin ve iv) *BE* linkinin ayrı ayrı serbest cisim diyagrmalarını çiziniz.





SORU 3.



Şekildeki kirişin kesit tesir diyagramlarını hepsi alt alta gelecek şekilde çiziniz.

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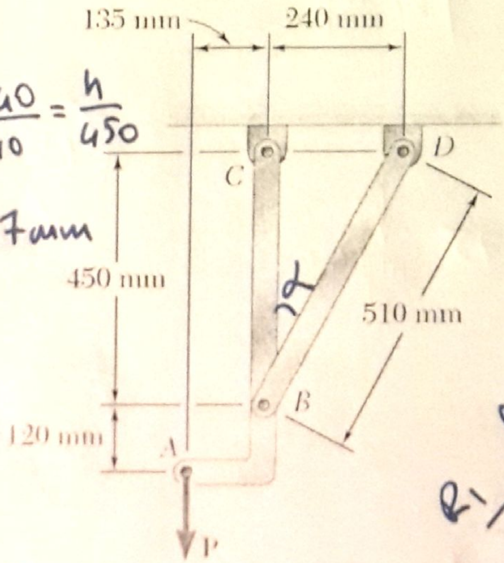
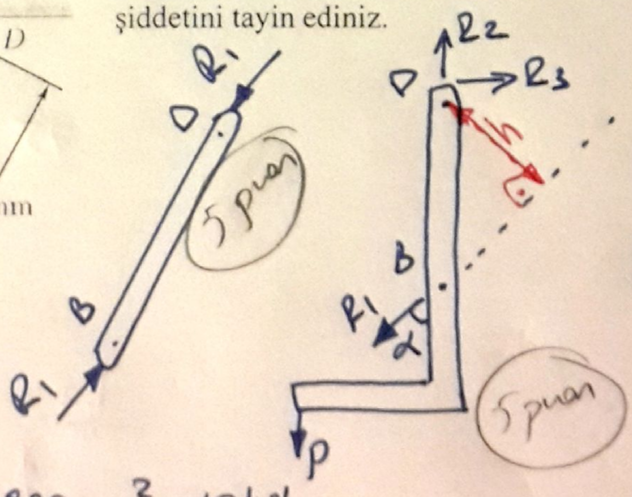
SORU 4.

$\sin\alpha = \frac{240}{510} = \frac{h}{450}$

$h = 211{,}7\,mm$



Şekildeki yapı statik dengededir. *BD* kolunun orta kısmı 800 mm^2 uniform kesitindedir. *BD* deki normal gerilmeyi 50 MPa alarak *P* kuvvetinin şiddetini tayin ediniz.



$\Sigma \vec{M_D} = 0$

$P \cdot 135 - R_1 \cdot 211{,}7 = 0$

$P = 62{,}72\,kN$

(10 puan)

$\sigma = \frac{F}{A} \Rightarrow F = R_1 = 50\,MPa \cdot 800\,mm^2 = 40\,kN$

(10 puan)

Gidişat yanlış → 10

[illegible] } 25

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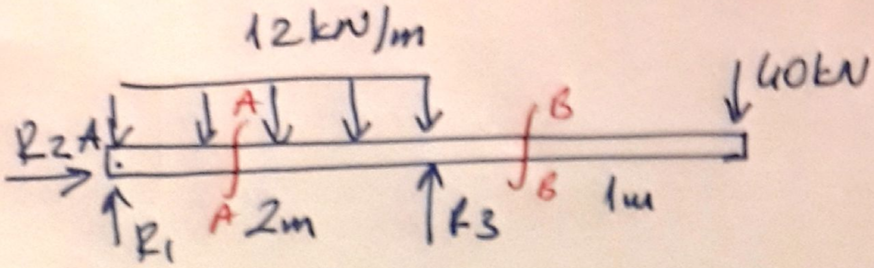
SORU 3

(30)



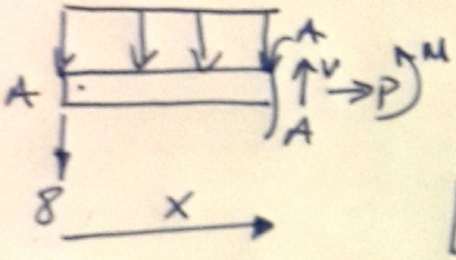
$\Sigma \vec{F_x} = 0 \Rightarrow R_2 = 0$

$\Sigma \vec{F_y} = 0 \Rightarrow R_1 + R_3 - 12.2 - 40 = 0 \Rightarrow R_1 + R_3 = 64kN$

$\Sigma \vec{M_A} = 0 \Rightarrow -12.2.1 + 2R_3 - 40.3 = 0 \Rightarrow 2R_3 = 144 \Rightarrow$ $\boxed{R_3 = 72kN}$ 5

$\boxed{R_1 = -8kN}$ 5

A-A kesiti, $0 \leq x \leq 2$



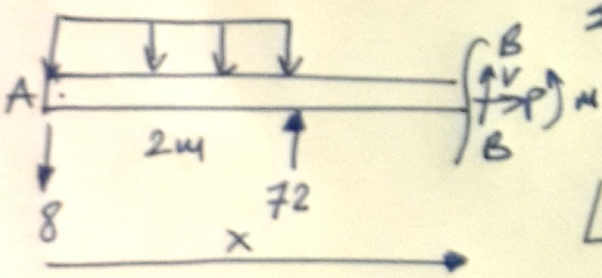
$\Sigma \vec{F_x} = 0 \Rightarrow P = 0$; $\Sigma \vec{F_y} = 0 \Rightarrow -12.x - 8 + V = 0$

$\boxed{V = 12x + 8}$ 5

$\Sigma \vec{M_A} = 0 \Rightarrow -12.x.\frac{x}{2} + Vx + M = 0 \Rightarrow M = 6x^2 - Vx$

$\boxed{M = -6x^2 - 8x}$ 5

B-B kesiti, $2 \leq x < 3$

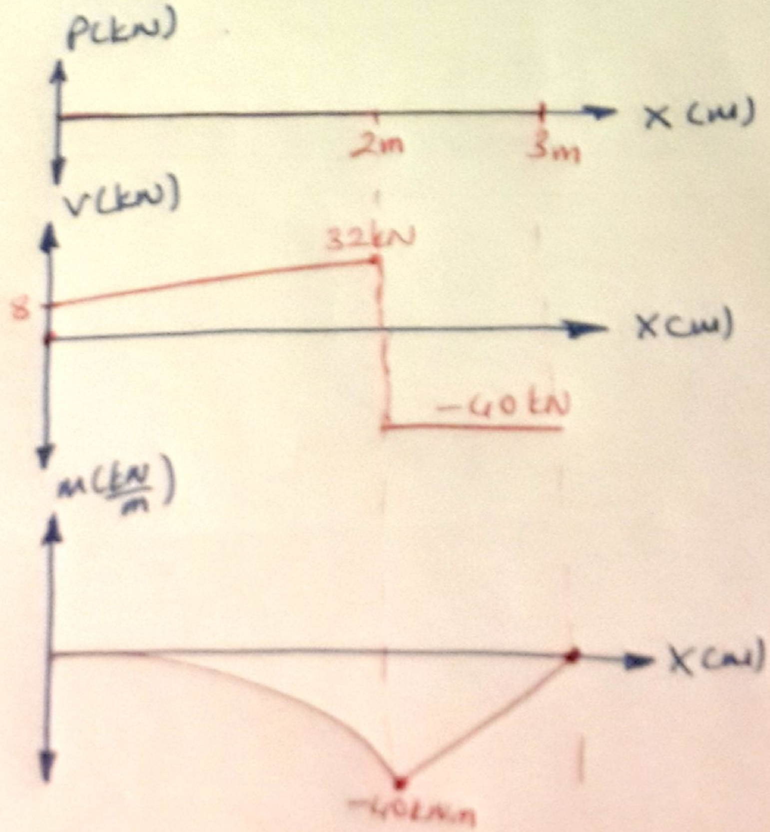


$\Sigma F_x = 0 \Rightarrow P = 0$; $\Sigma \vec{F_y} = 0 \Rightarrow -12.2 - 8 + 72 + V = 0$

$\boxed{V = -40kN}$ 5

$\Sigma \vec{M_A} = 0 \Rightarrow -12.2.1 + 72.2 + Vx + M = 0$

$\boxed{M = 40x - 120}$ 5



Gidişat yönü 15 puan

Gidişat değişim işaret tablosu 20 puan

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