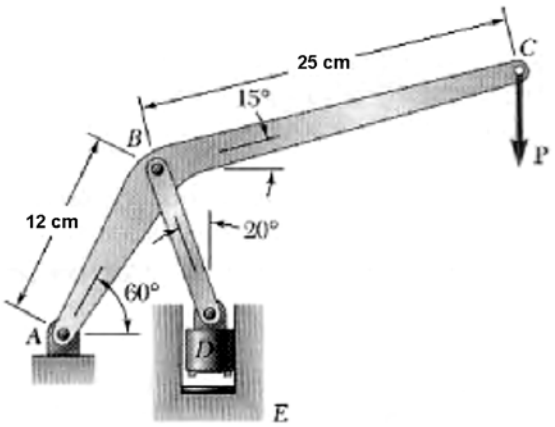
ISPIT IZ STATIKE ZENICA, 12. 4. 2007.

B

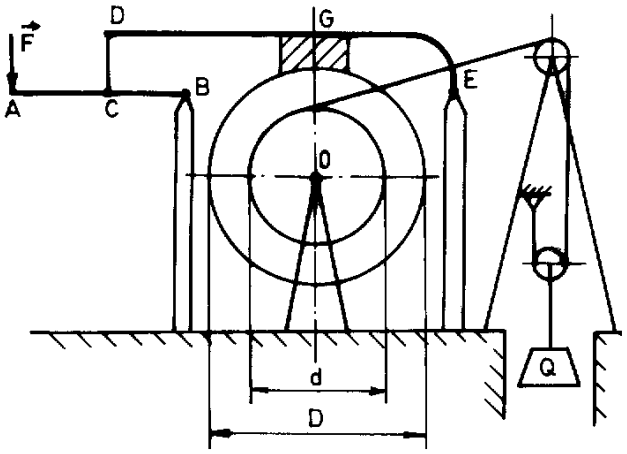
1.

Presa prikazana na slici služi za zatvaranja malih konzervi. Ako je veličina Sile P=250 N odrediti veličinu vertikalne sile koja djeluje na poklopac konzerve u E.



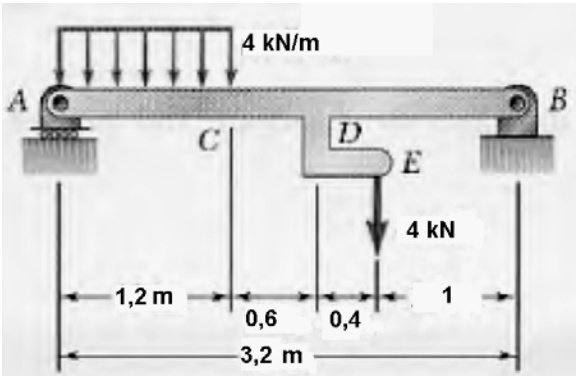
2.

Za spuštanje tereta na gradilištu upotrebljava se vitlo sa kočnicom kako je prikazano na slici. Odrediti silu F za maksimalnu težinu tereta Q=7,5 kN koji se može spuštati. Koeficijent trenja je μ=0,3.
Zadane su veličine:
Dijametar kočionog vijenca D=50cm
Dijametar bubnja d=20 cm
Udaljenosti poluga AB=1m
BC = 10 cm; DE=1,2m; GE=60 cm.



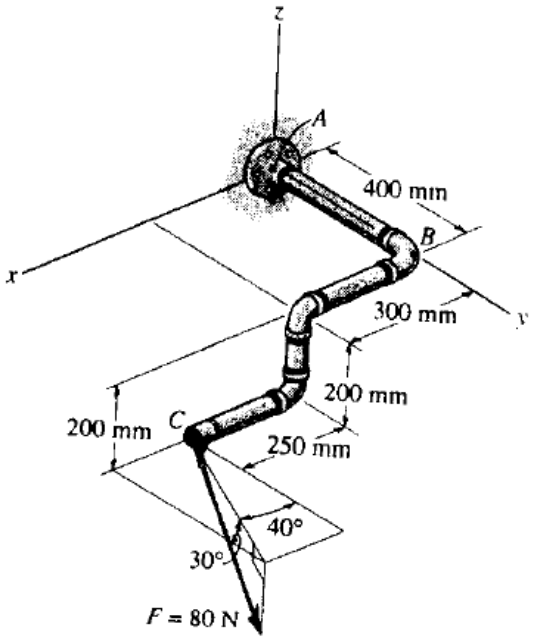
3.

Nacrtati dijagrame momenta savijanja i transferzalne sile u gredi.

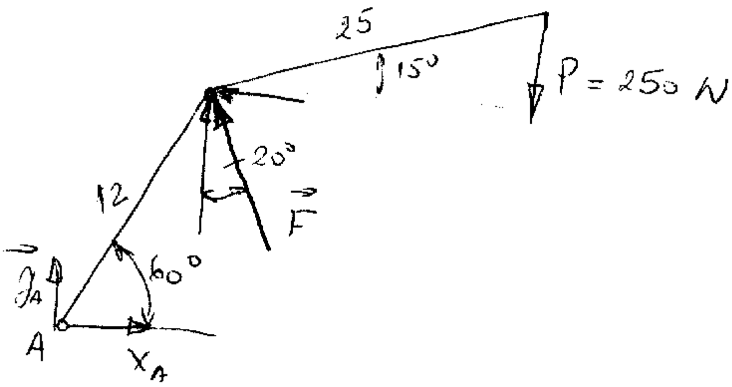


4.

Cjevovod na slici je opterećen silom F=80N. Odrediti moment sile za tačku B.



1. zad. grupa B



$\circlearrowleft_{+})\ \Sigma M_A = 0 \quad -P\cdot(25\cos 15^\circ + 12\cos 60^\circ) + F\cos 20^\circ \cdot 12\cos 60^\circ$

$+ F\sin 20^\circ \cdot 12 \sin 60^\circ = 0$

$F\,(12\sin 20^\circ \sin 60^\circ + 12\cos 20^\circ \cos 60^\circ) = P\,(25\cos 15 + 12\cos 60^\circ)$

$F\cdot(12\cdot 0{,}342\cdot 0{,}866 + 12\cdot 0{,}9397\cdot 0{,}5) = P\cdot(25\cdot 0{,}966 + 12\cdot 0{,}5)$

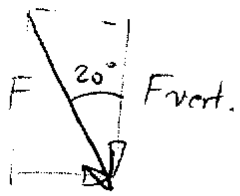
$F = \dfrac{P\cdot 30{,}148}{12\cdot(0{,}296 + 0{,}46985)} = \dfrac{P\cdot 30{,}148}{9{,}19}$

$F = 3{,}28\cdot P$

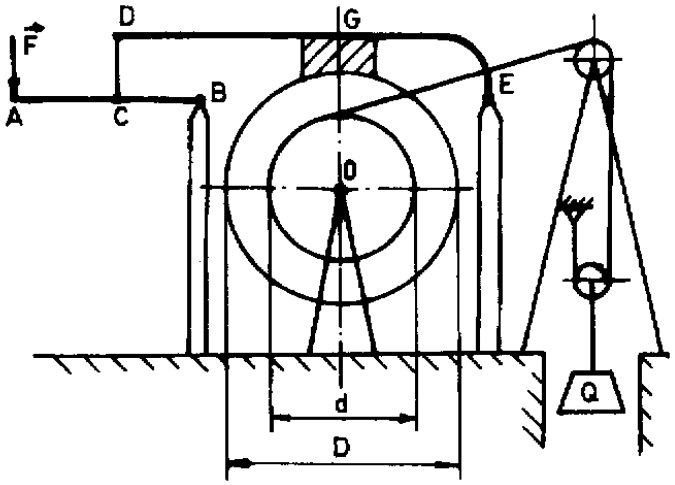
$F = 3{,}28\cdot 250$

$\underline{F = 820\ N}$

$F_{vert.} = F\cos 20^\circ = 770{,}65\,N$



2 B.



Za spuštanje tereta na gradilištu upotrebljava se vitlo sa kočnicom kako je prikazano na slici. Odrediti silu F za maksimalnu težinu tereta Q=7,5 kN koji se može spuštati. Koeficijent trenja je μ=0,3.
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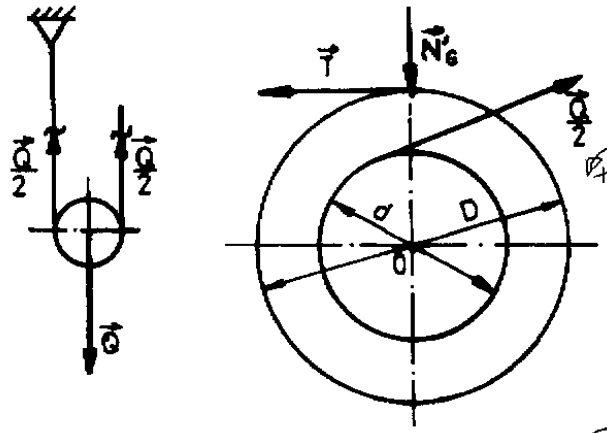


Ravnoteža kočionog doboša

$T = \mu N_G$

$\curvearrowleft \sum M_o = 0 \quad T\frac{D}{2} - \frac{Q}{2}\frac{d}{2} = 0 \quad /\cdot 2$

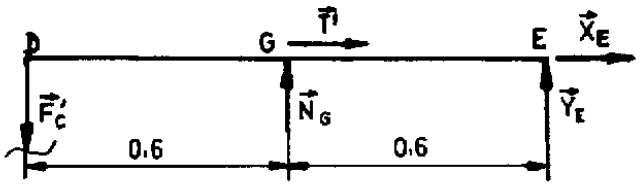
$T \cdot D - Q\frac{d}{2}$

$T = Q \cdot \frac{d}{2D} = 7{,}5 \cdot \frac{20}{2 \cdot 50} = 1{,}5\,kN$

$N_G = T/\mu = 5\ kN$

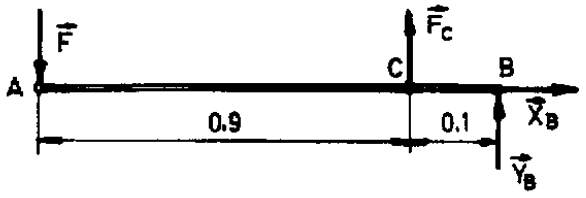
Ravnoteža poluge DE

$\curvearrowleft \sum M_E = 0 \quad N_G \cdot 0{,}6 - F_C \cdot 1{,}2 = 0$



$F_C = \frac{N_G \cdot 0{,}6}{1{,}2} = \frac{5 \cdot 0{,}6}{1{,}2}$

$F_C = 2{,}5\ kN$



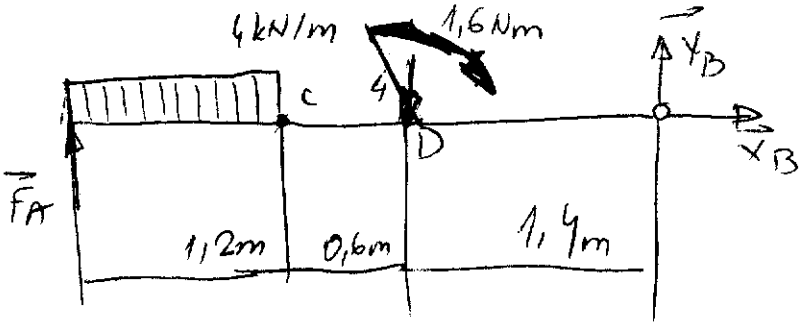
Ravnoteža poluge AB

$\curvearrowleft \sum M_B = 0 \quad F \cdot 1\text{m} - F_C \cdot 0{,}1\text{m} = 0$

$F = F_C \cdot 0{,}1$

$F = 2{,}5 \cdot 0{,}1 = 0{,}25\,kN$

3. zad B.



$\Sigma V = 0 \quad F_A - 4 \cdot 1,2 - 4 + Y_B = 0$

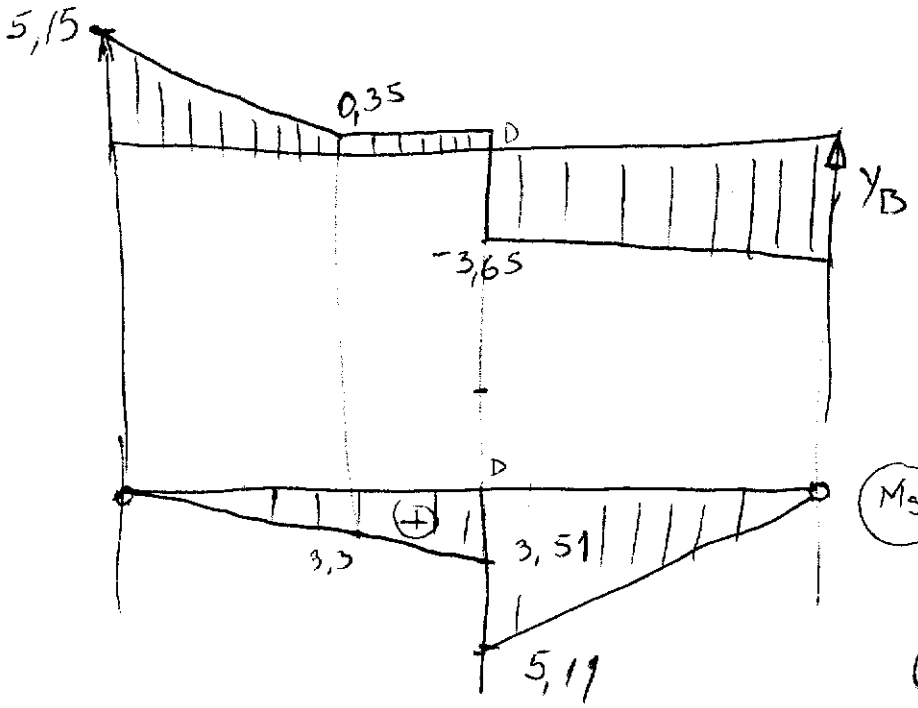
$\circlearrowleft \Sigma M_A = 0 \quad -4 \cdot 1,2 \cdot 0,6 - 4 \cdot 1,8 - 1,6 + Y_B \cdot 3,2 = 0$

$Y_B \cdot 3,2 = 2,88 + 7,2 + 1,6$

$Y_B \cdot 3,2 = 11,68$

$Y_B = 3,65\ N$

$F_A = 4,8 + 4 - Y_B = 8,8 - 3,65 = 5,15\ N$



$\circlearrowleft M_C = F_A \cdot 1,2 - 4 \cdot 1,2 \cdot 0,6 = 5,15 \cdot 1,2 - 2,88 = 3,3\ kNm$

$\circlearrowleft M'_{D,\mathcal{E}} = F_A \cdot 1,3 - 1,2 \cdot 4 \cdot 1,2 = 5,15 \cdot 1,8 - 5,76 = 3,51\ kNm$

4. grupa B

I način

$$M_x = F\cos 30° \cdot \cos 40° \cdot 200 - F\sin 30° \cdot 400$$

$$M_y = -F\cos 30° \sin 40° \cdot 200 + F\sin 30° \cdot 550$$

$$M_z = -F\cos 30° \sin 40° \cdot 400 + F\cos 30° \cos 40° \cdot 550$$

II način

$$\vec{M}_o F = \vec{r}_c \times \vec{F} = \vec{AC} \times \vec{F} =$$

$$= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 550 & 400 & -200 \\ F\cos 30° \sin 40° & F\cos 30° \cos 40° & -F\sin 30° \end{vmatrix}$$