

Kulišić(bez 7.6.)

7.INERCIJSKI I NEINERCIJSKI SUSTAVI

7.1

$$m = 100 \text{ kg}$$

a) $\uparrow a = 0 \text{ m/s}^2$

$$ma = G - F$$

$$F = G = 381 \text{ N}$$

b) $\uparrow a = 1 \text{ m/s}^2$

$$ma = F - G$$

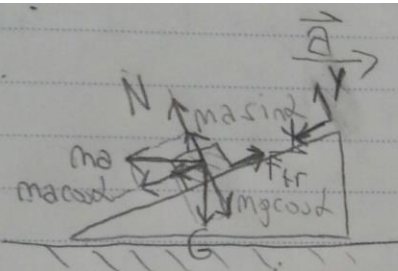
$$F = ma + G = 100 + 381 = 481 \text{ N}$$

c) $\downarrow a = 1 \text{ m/s}^2$

$$ma = G - F$$

$$F = G - ma = 381 \text{ N}$$

7.2.

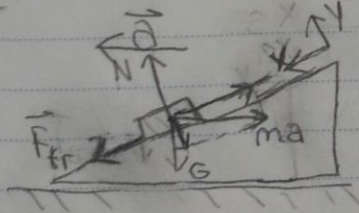


$$x: mg \sin \alpha + ma \cos \alpha - \mu N = 0$$

$$y: N + ma \sin \alpha - mg \cos \alpha = 0$$

$$mg \sin \alpha + ma \cos \alpha = \mu (mg \cos \alpha - ma \sin \alpha)$$

$$a = \frac{\mu g \cos \alpha - g \sin \alpha}{\cos \alpha + \mu \sin \alpha} = -1.77 \text{ m/s}^2$$



$$x: mg \sin \alpha - ma \cos \alpha + \mu N = 0$$

$$y: N - ma \sin \alpha - mg \cos \alpha = 0$$

$$ma \cos \alpha - mg \sin \alpha = \mu (ma \sin \alpha + mg \cos \alpha)$$

$$a = \frac{g \sin \alpha + \mu g \cos \alpha}{\cos \alpha - \mu \sin \alpha} = 11.6 \text{ m/s}^2$$

7.3.

$$m = 1 \text{ kg}$$

a) na ekvatoru

$$F_{cf} = m\omega^2 r = 0.034 \text{ N}$$

b) $\alpha = 45^\circ$

$$F_{cf} = m\omega^2 r \cdot \sin \alpha = 0.024 \text{ N}$$

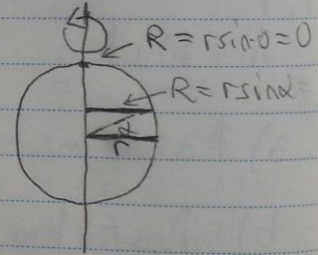
c) na polu

$$F_{cf} = 0 \text{ N}$$

$$T = 24 \text{ h} = 24 \cdot 60 \cdot 60 = 8.64 \cdot 10^4 \text{ s}$$

$$R_z = 6.37 \cdot 10^6 \text{ m}$$

$$\omega = 2\pi f = \frac{2\pi}{T} = 7.27 \cdot 10^{-5} \text{ s}^{-1}$$



7.4

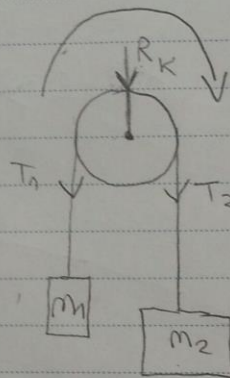
$$m_1 = 0.18 \text{ kg}$$

$$m_2 = 0.22 \text{ kg}$$

$$m_k = 0.3 \text{ kg}$$

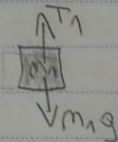
$$R_k = 0.1 \text{ m}$$

$$a = ?$$

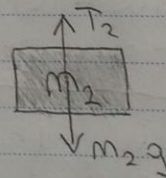


$$I_k = T_2 \cdot R_k - T_1 \cdot R_k$$

$$I_k = \frac{m_k R_k^2}{2}$$



$$m_1 a = T_1 - m_1 g$$



$$m_2 a = m_2 g - T_2$$

$$\frac{m_k R_k^2}{2} \cdot \frac{a}{R_k} = (m_2 g - m_2 a) R_k - (m_1 a + m_1 g) \cdot R_k \quad / : 2$$

$$m_k a = 2 m_2 g - 2 m_2 a - 2 m_1 a - 2 m_1 g$$

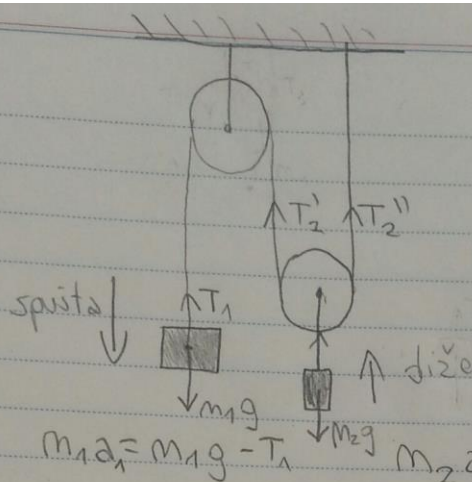
$$a(m_k + 2 m_2 + 2 m_1) = 2 g(m_2 - m_1)$$

$$a = \frac{2 g(m_2 - m_1)}{m_k + 2 m_2 + 2 m_1} = 0.713 \frac{\text{m}}{\text{s}^2}$$

7.5.

$$m_1 = 2 \text{ kg}$$

$$m_2 = 0.5 \text{ kg}$$



vrjedi da je: $T_1 = T_2' = T_2'' = T$

$$(1) \quad m_1 a_1 = m_1 g - T$$

$$(2) \quad m_2 a_2 = 2T - m_2 g$$

i vrijedi da kad uteg m_1 se spusti za put s tada se uteg m_2 podigne za $\frac{s}{2}$ iz čega dobivamo "vezu" između $\frac{s}{2}$ akceleracija:

$$s = \frac{1}{2} a_1 t^2 ; \frac{s}{2} = \frac{1}{2} a_2 t^2 \Rightarrow \frac{1}{2} a_1 t^2 = a_2 t^2 \Rightarrow a_1 = 2 a_2$$

to uvrstimo u početne jednačice 1, 2 :

$$2 m_1 a_2 = m_1 g - T$$

$$m_2 a_2 = 2T - m_2 g$$

$$\begin{cases} T = m_1 g - 2 m_1 a_2 \\ T = \frac{m_2 a_2 + m_2 g}{2} \end{cases}$$

$$m_1 g - 2 m_1 a_2 = \frac{m_2 a_2 + m_2 g}{2}$$

$$2 m_1 g - m_2 g = m_2 a_2 + 4 m_1 a_2$$

$$a_2 = \frac{2 m_1 g - m_2 g}{4 m_1 + m_2} = 4.04 \frac{\text{m}}{\text{s}^2}$$

$$a_1 = 2 a_2 = 8.08 \frac{\text{m}}{\text{s}^2}$$