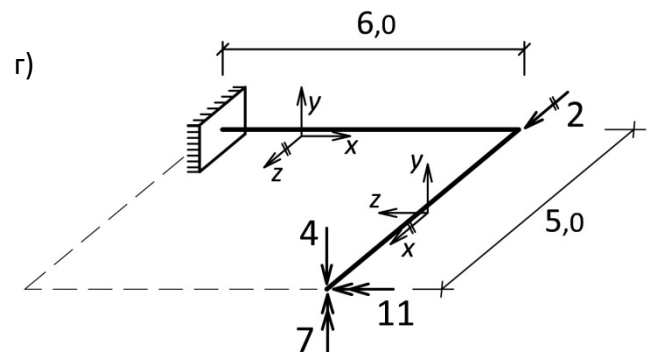
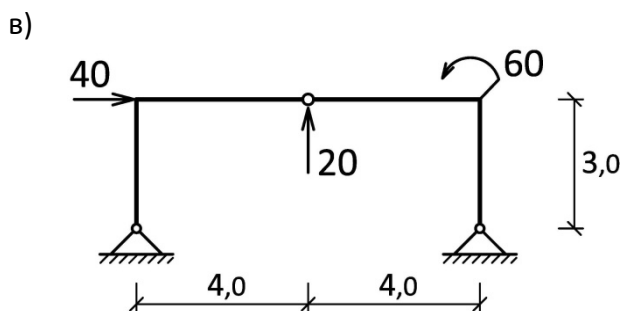
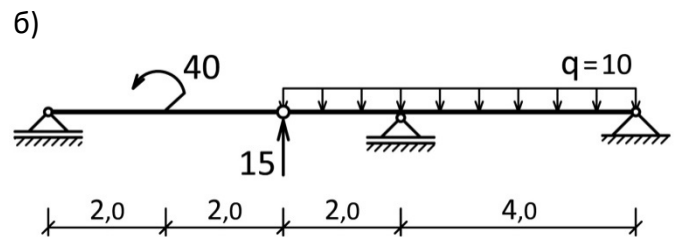
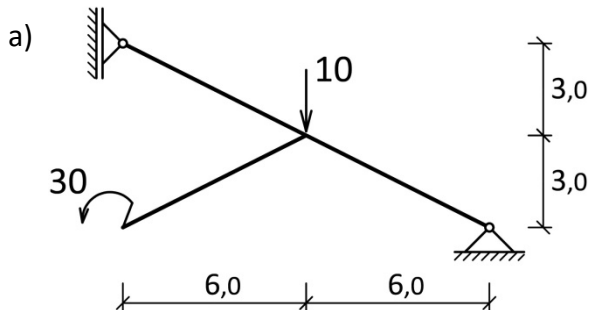


**ГРАЂЕВИНСКИ ФАКУЛТЕТ УНИВЕРЗИТЕТА У БЕОГРАДУ**  
 Усмени (теоријски) део испита из **ТЕХНИЧКЕ МЕХАНИКЕ 1**  
 (писмени део одржан 10.09.2020.)

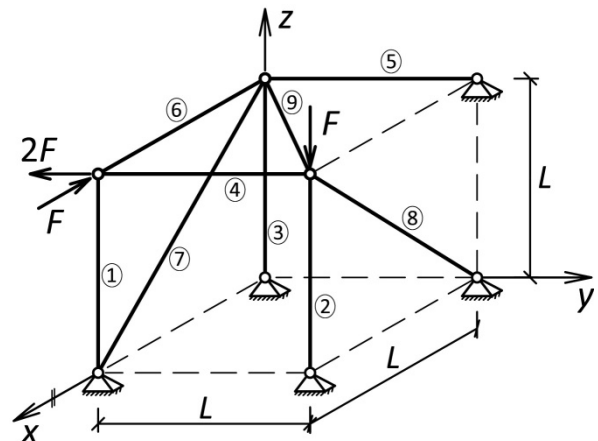
**1. ЗАДАТАК** (условни 50 %)

Нацртати дијаграме сила у пресеку за приказане носаче.



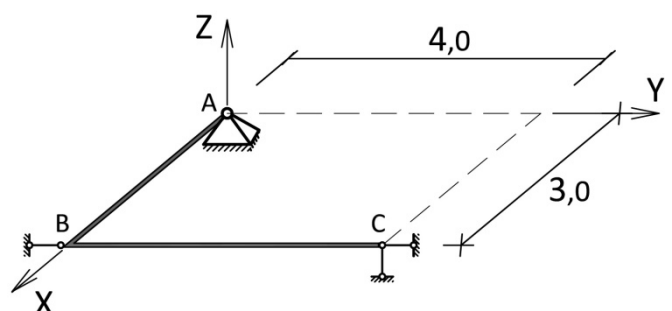
**2. ЗАДАТАК** (20 %)

- Навести став који може да се формулише за систем сила са заједничком нападном тачком.
- Одредити силе у штаповима приказаног просторног решеткастог носача.



**3. ЗАДАТАК** (30 %)

- Објаснити појам критичне конфигурације. Навести и објаснити неке примере критичне конфигурације код носача у равни
- За приказани просторни носач испитати да ли су везе добро или лоше распоређене.

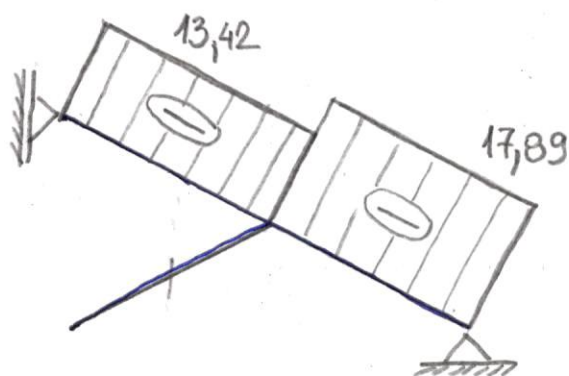
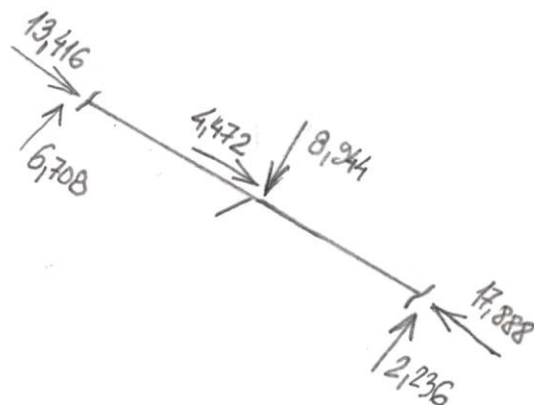
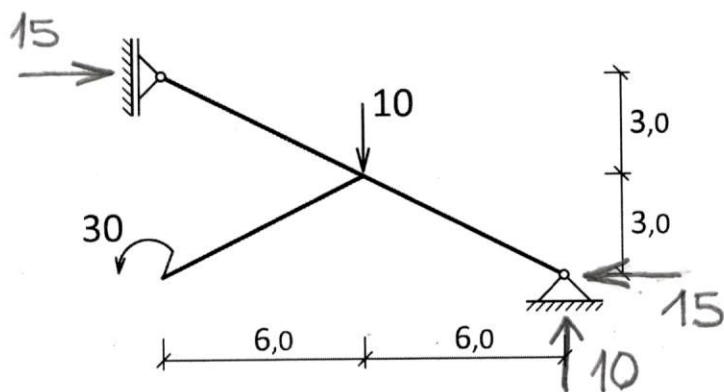


Напомена: У свим задацима димензије за дужине и силе су:  $m, kN$

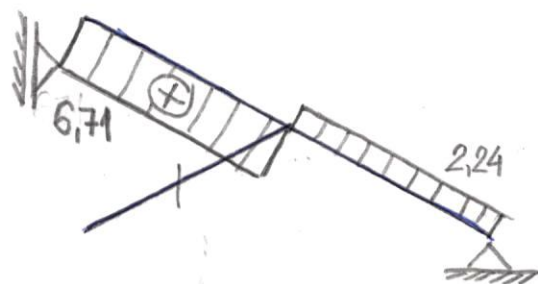
**- решења -**

**1. ЗАДАТАК** (условни 50 %)

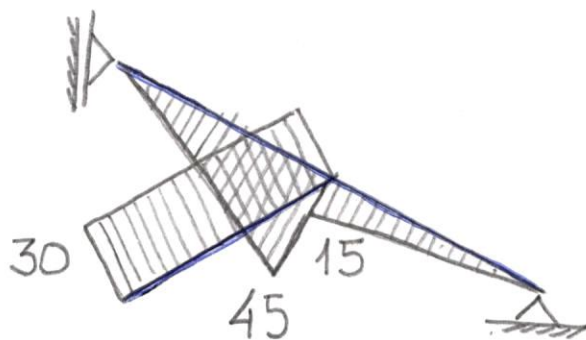
a)



(N)

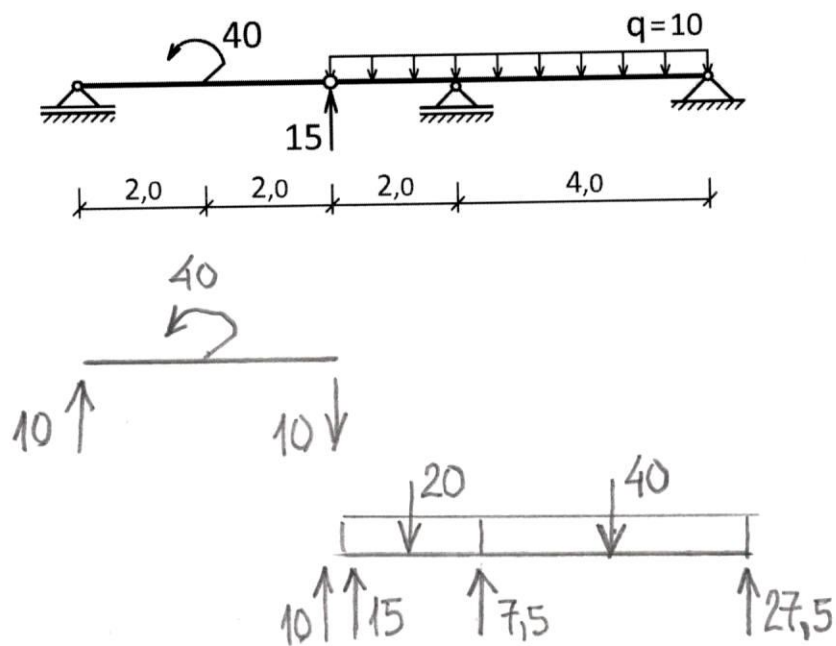


(T)

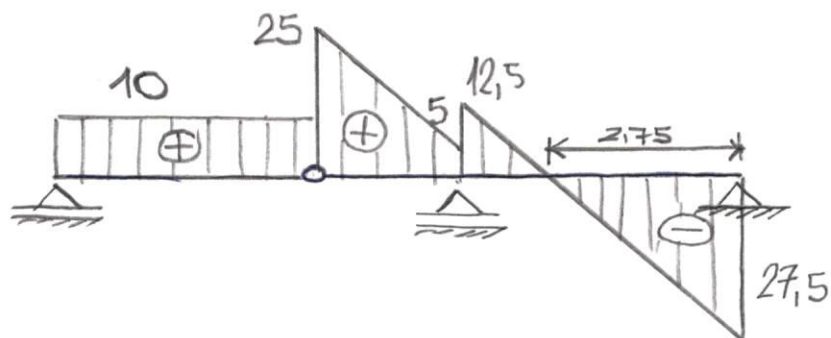


(M)

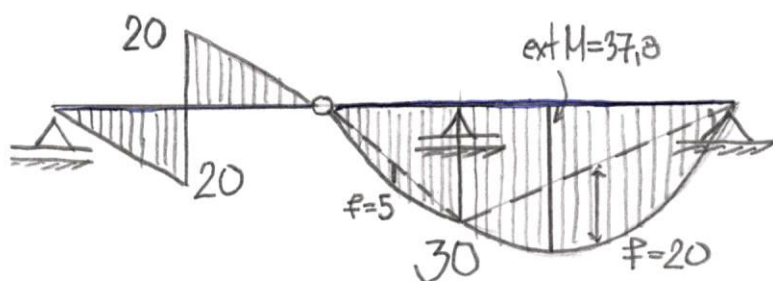
6)



(N)

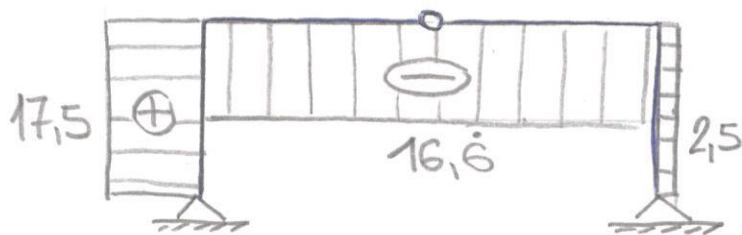
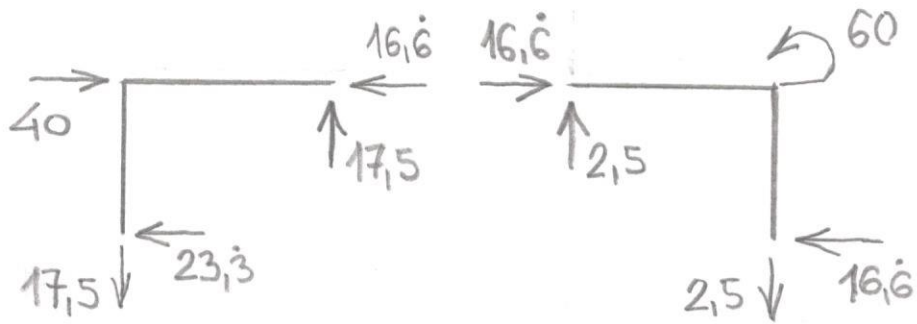
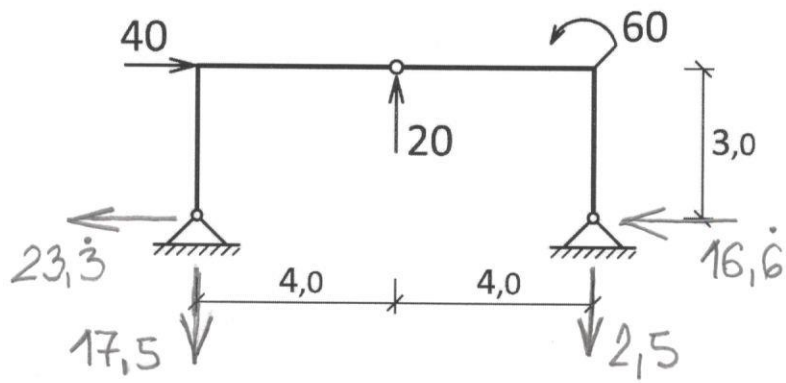


(T)

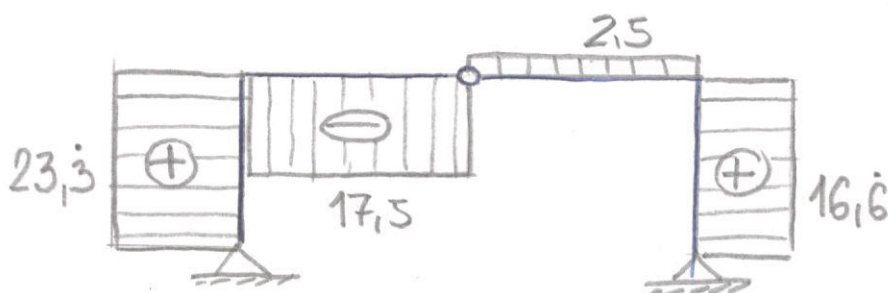


(M)

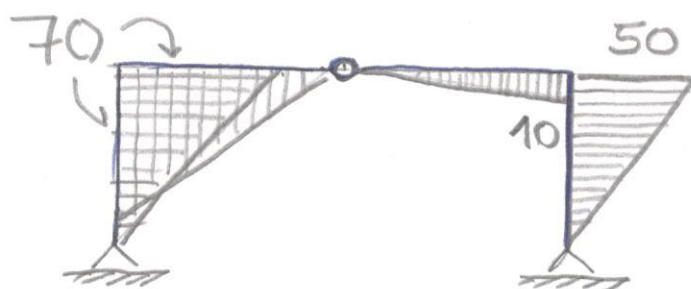
B)



(N)

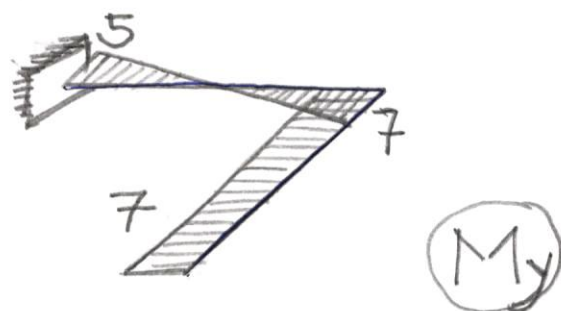
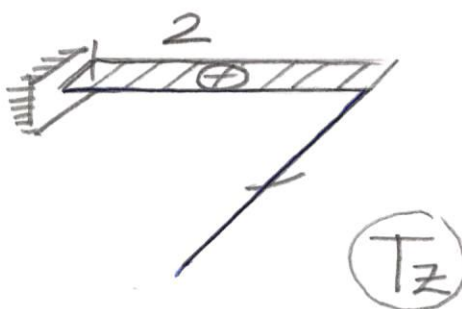
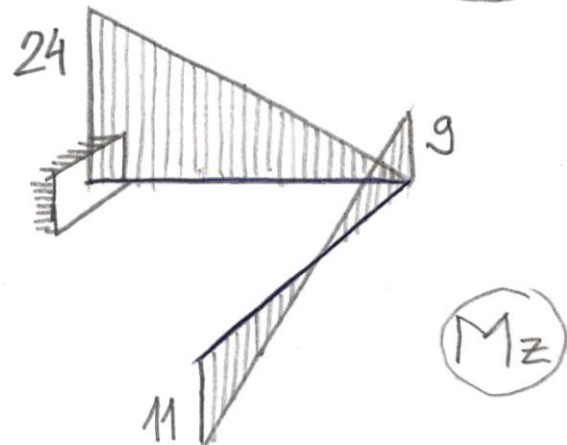
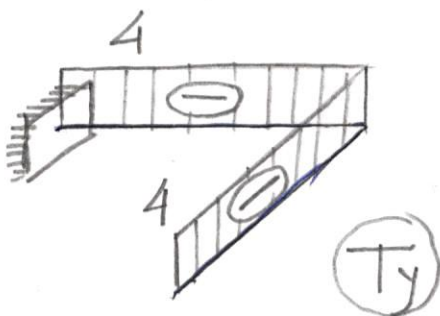
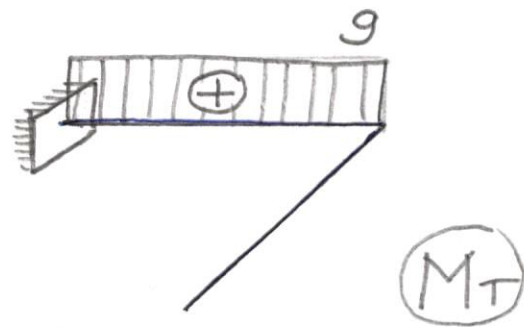
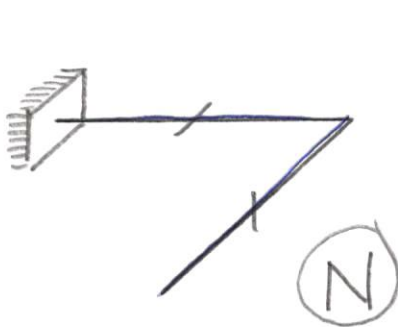
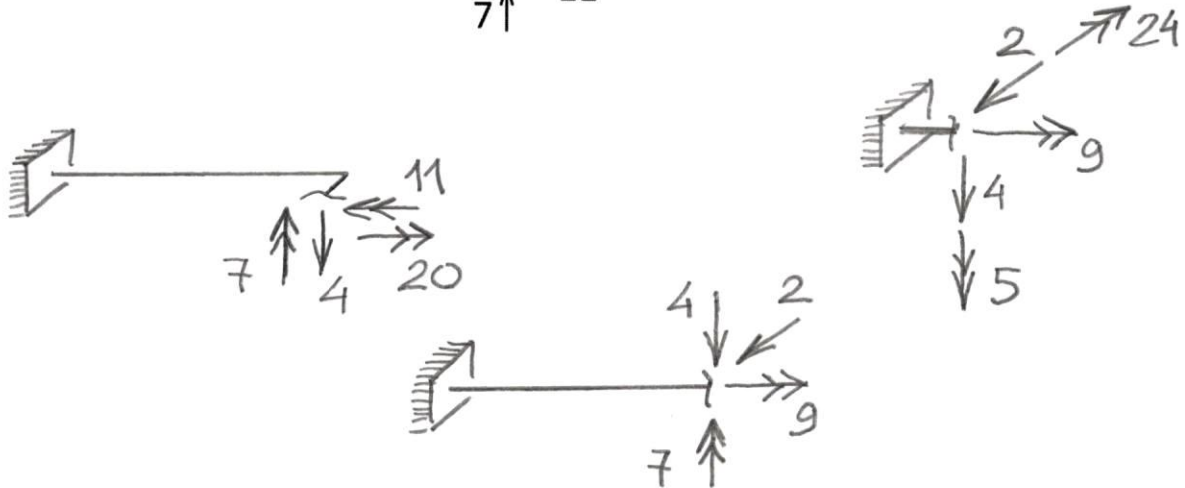
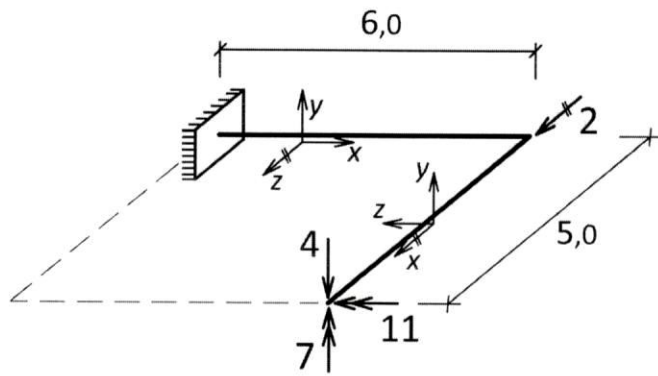


(T)



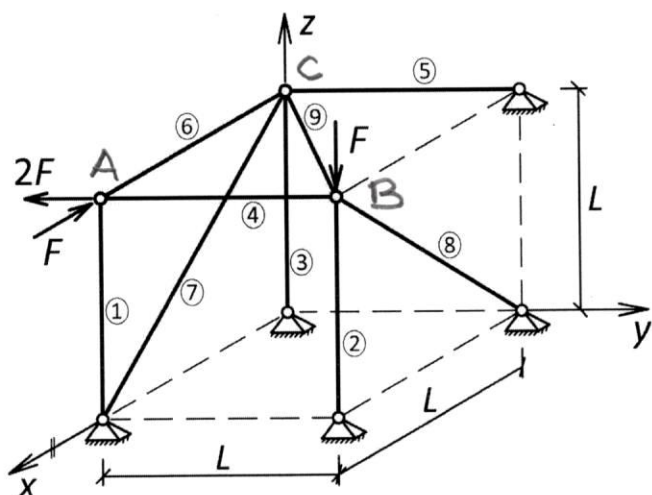
(M)

r)

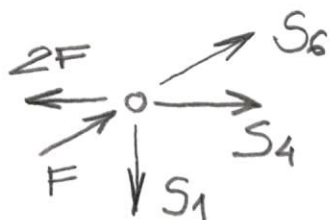


## 2. ЗАДАТАК (20 %)

6)



- РАВНОТЕЖА ЧВОРА A

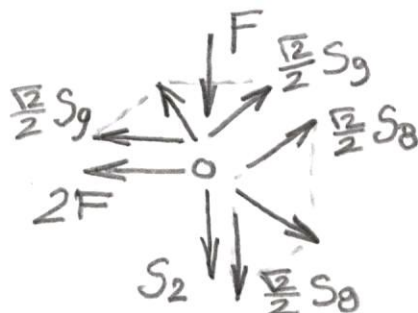


$$\sum F_x = 0: -S_6 - F = 0 \Rightarrow \underline{S_6 = -F}$$

$$\sum F_y = 0: S_4 - 2F = 0 \Rightarrow \underline{S_4 = 2F}$$

$$\sum F_z = 0: \Rightarrow \underline{S_1 = 0}$$

- РАВНОТЕЖА ЧВОРА B



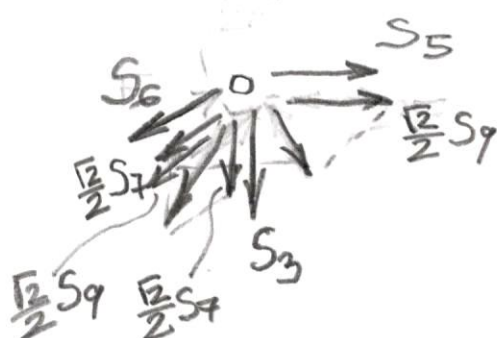
$$\sum F_x = 0: \frac{\sqrt{2}}{2} S_8 + \frac{\sqrt{2}}{2} S_9 = 0 \Rightarrow \underline{S_8 = 2\sqrt{2}F}$$

$$\sum F_y = 0: -\frac{\sqrt{2}}{2} S_9 - 2F = 0 \Rightarrow \underline{S_9 = -2\sqrt{2}F}$$

$$\sum F_z = 0: -S_2 - \frac{\sqrt{2}}{2} S_8 - F = 0 \Rightarrow \underline{S_2 = -3F}$$

- РАВНОТЕЖА ЧВОРА C

$$\Rightarrow \underline{S_7 = 3\sqrt{2}F}$$



$$\sum F_x = 0: \frac{\sqrt{2}}{2} S_7 + S_6 + \frac{\sqrt{2}}{2} S_9 = 0$$

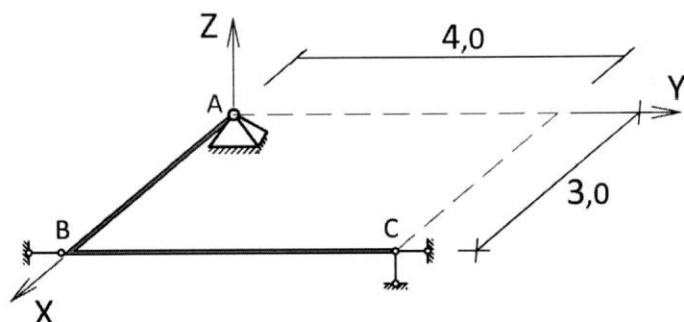
$$\sum F_y = 0: S_5 + \frac{\sqrt{2}}{2} S_9 = 0 \Rightarrow \underline{S_5 = 2F}$$

$$\sum F_z = 0: -S_3 - \frac{\sqrt{2}}{2} S_7 = 0 \Rightarrow \underline{S_3 = -3F}$$



### 3. ЗАДАТАК (30 %)

б)



A-РЕФЕРЕНТНА ТАЧКА :  $\delta \vec{r}_A = 0$

$$\delta \vec{r}_B = \delta \vec{r}_A + \delta \vec{\theta} \times \vec{r}_{AB} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \delta \theta_x & \delta \theta_y & \delta \theta_z \\ 3 & 0 & 0 \end{vmatrix} = \{0, 3\delta \theta_z, -3\delta \theta_y\}$$

$$\delta \vec{r}_C = \delta \vec{r}_A + \delta \vec{\theta} \times \vec{r}_{AC} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ \delta \theta_x & \delta \theta_y & \delta \theta_z \\ 3 & 4 & 0 \end{vmatrix} = \{-4\delta \theta_z, 3\delta \theta_z, 4\delta \theta_x - 3\delta \theta_y\}$$

$$\delta r_{B,y} = 0 \Rightarrow \delta \vec{r}_B \cdot \vec{j} = 3\delta \theta_z = 0$$

$$\delta r_{C,y} = 0 \Rightarrow \delta \vec{r}_C \cdot \vec{j} = 3\delta \theta_z = 0$$

$$\delta r_{C,z} = 0 \Rightarrow \delta \vec{r}_C \cdot \vec{k} = 4\delta \theta_x - 3\delta \theta_y = 0$$

$$\Rightarrow \begin{bmatrix} 0 & 0 & 3 \\ 0 & 0 & 3 \\ 4 & -3 & 0 \end{bmatrix} \begin{Bmatrix} \delta \theta_x \\ \delta \theta_y \\ \delta \theta_z \end{Bmatrix} = \begin{Bmatrix} 0 \\ 0 \\ 0 \end{Bmatrix}$$

$$\Rightarrow \det A = 0$$



БЕЗЕ СУ ЛОШЕ РАСПОРЕЂЕНА

(СИСТЕМ ЈЕ У КРИТИЧНОЈ КОНФИГУРАЦИЈИ)