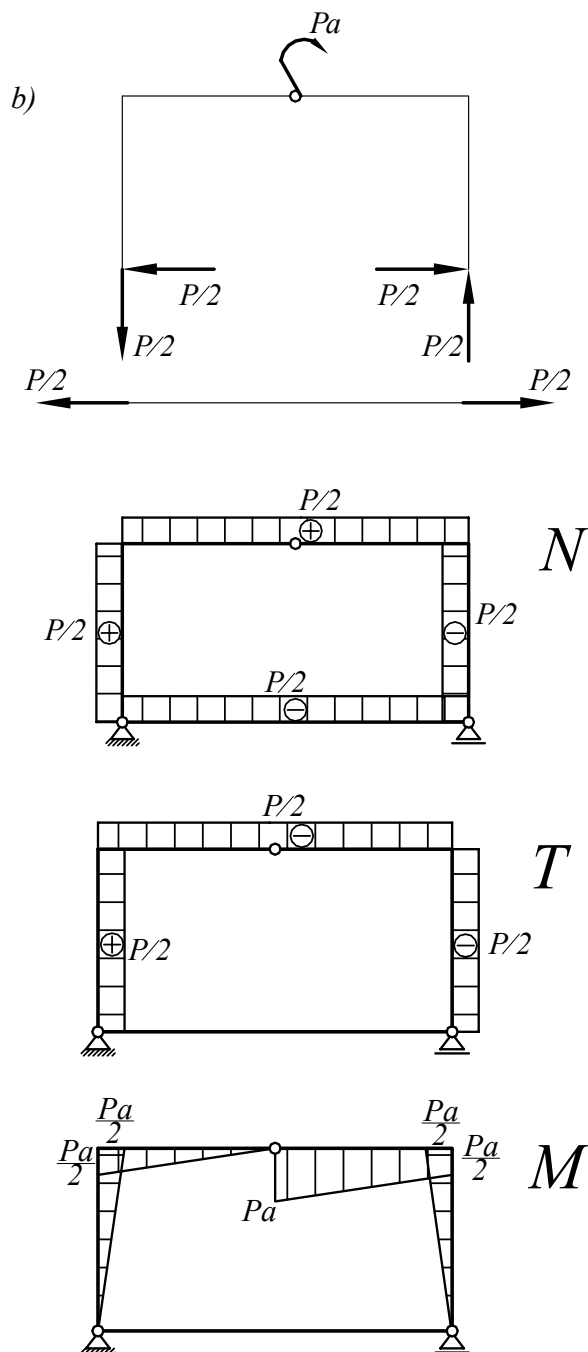
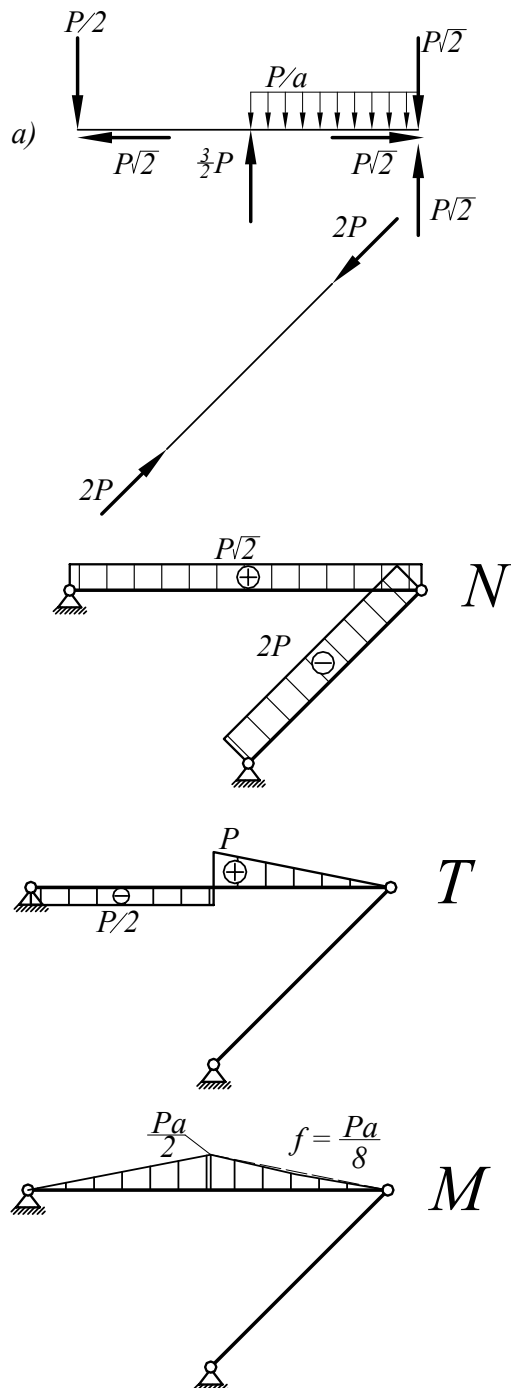
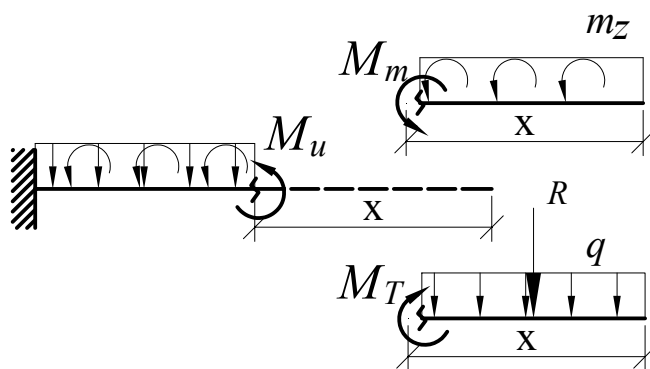
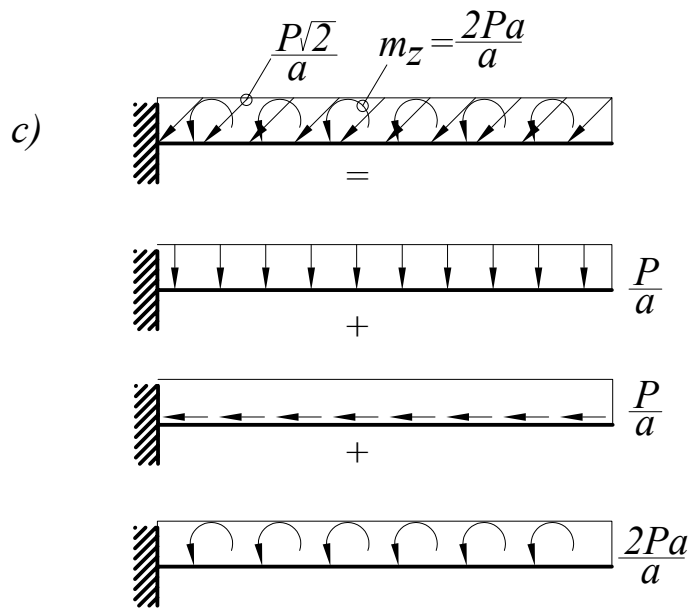


# GRAĐEVINSKI FAKULTET UNIVERZITETA U BEOGRADU

Usmeni (teorijski) deo ispita iz **TEHNIČKE MEHANIKE 1**  
 (pismeni održan 29.08.2005.)

## 1.ZADATAK



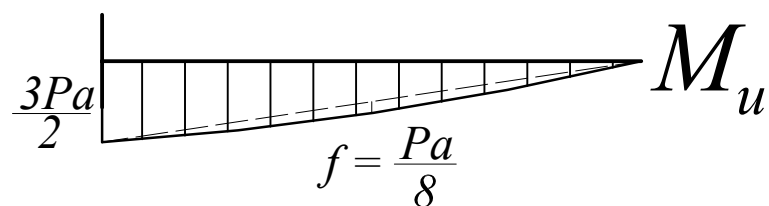
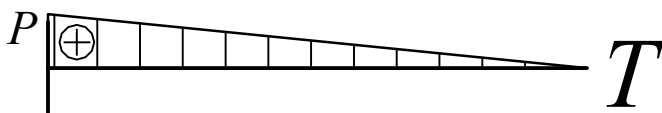
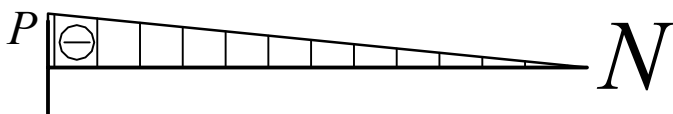


$$M_u = M_m + M_T$$

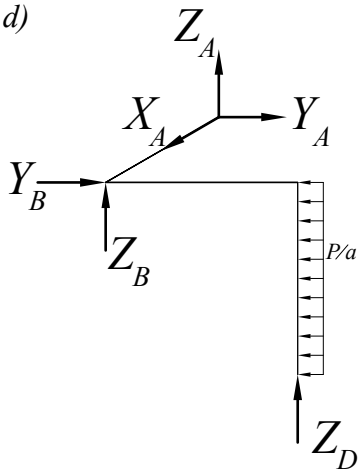
$$M_m = m \cdot x$$

$$M_T = R \cdot \frac{x}{2}; R = q \cdot x$$

$$M_u = m \cdot x - R \cdot \frac{x}{2}$$



d)



$$\Sigma X = 0 : X_A = 0$$

$$\Sigma Y = 0 : Y_B + Y_A - P = 0$$

$$\Sigma Z = 0 : Z_A + Z_B + Z_D = 0$$

$$\Sigma M_X^A = 0 : Z_D \cdot a - P \cdot \frac{a}{2} = 0$$

$$\Sigma M_Y^A = 0 : Z_B \cdot a + Z_D \cdot a = 0$$

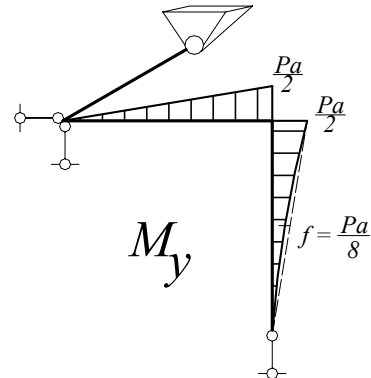
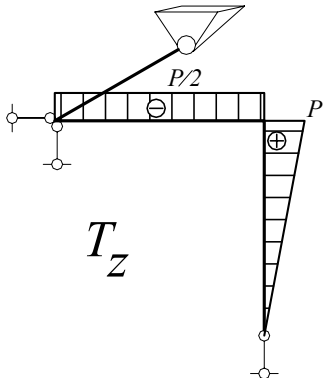
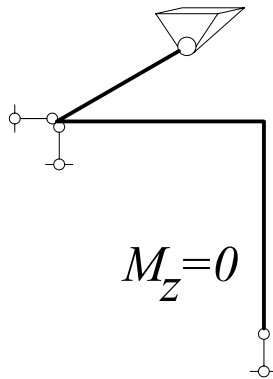
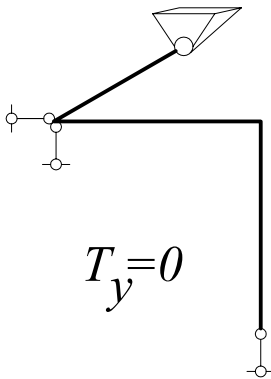
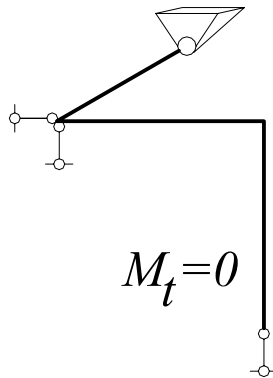
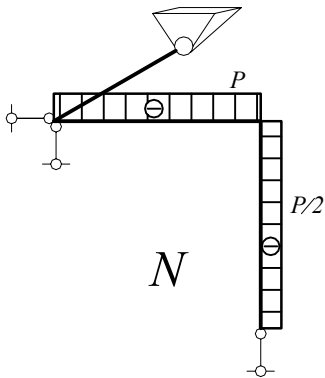
$$\Sigma M_Z^A = 0 : Y_B \cdot a - P \cdot a = 0$$

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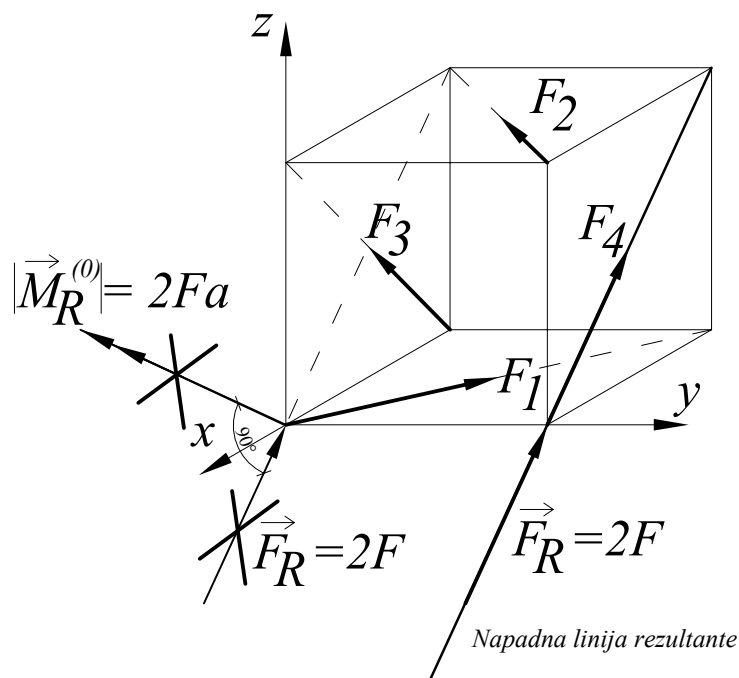
$$\Rightarrow X_A = 0; Y_A = 0; Z_A = 0;$$

$$Y_B = P; Z_B = -\frac{P}{2}; Z_D = \frac{P}{2}$$

d)



## 2.ZADATAK



$$\vec{F}_1 = \left\{ -\frac{F}{\sqrt{2}}; \frac{F}{\sqrt{2}}; 0 \right\}$$

$$\vec{r}_1 = \{0, 0, 0\}$$

$$\vec{M}_1 = \{0, 0, 0\}$$

$$\vec{F}_2 = \left\{ -\frac{F}{\sqrt{2}}; -\frac{F}{\sqrt{2}}; 0 \right\}$$

$$\vec{r}_2 = \{0, a, a\}$$

$$\vec{M}_2 = \left\{ \frac{F}{\sqrt{2}} \cdot a, -\frac{F}{\sqrt{2}} \cdot a, \frac{F}{\sqrt{2}} \cdot a \right\}$$

$$\vec{F}_3 = \left\{ \frac{F}{\sqrt{2}}; 0; \frac{F}{\sqrt{2}} \right\}$$

$$\vec{r}_3 = \{-a, 0, 0\}$$

$$\vec{M}_3 = \left\{ 0, \frac{F}{\sqrt{2}} \cdot a, 0 \right\}$$

$$\vec{F}_4 = \left\{ -\frac{F}{\sqrt{2}}; 0; \frac{F}{\sqrt{2}} \right\}$$

$$\vec{r}_4 = \{0, a, 0\}$$

$$\vec{M}_4 = \left\{ \frac{F}{\sqrt{2}} \cdot a, 0, \frac{F}{\sqrt{2}} \cdot a \right\}$$

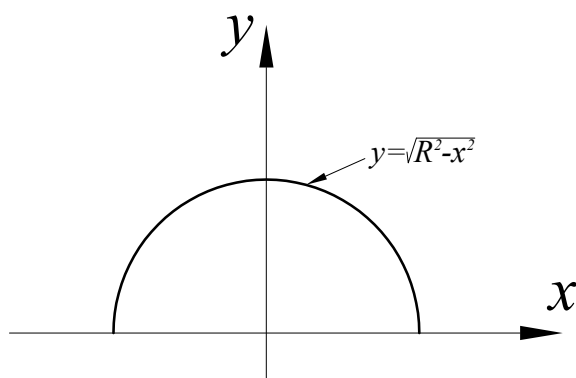
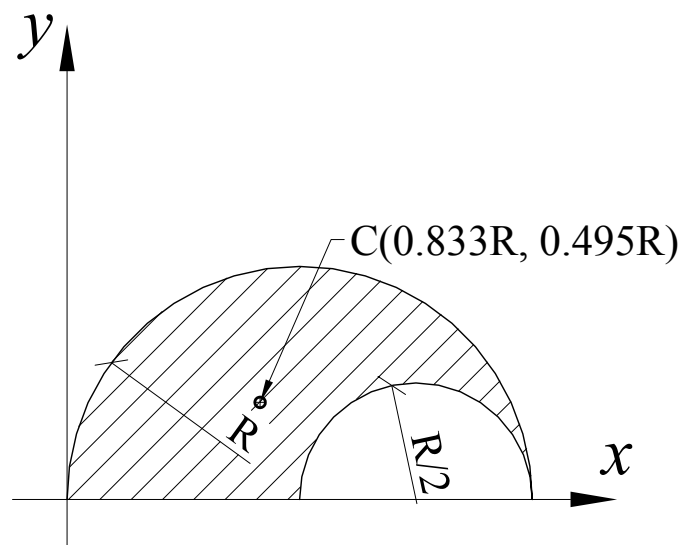
$$\vec{F}_R = \{-F \cdot \sqrt{2}; 0; F \cdot \sqrt{2}\}$$

$$\vec{M}_R^{(0)} = \{F \sqrt{2} \cdot a; 0; F \cdot \sqrt{2} \cdot a\}$$

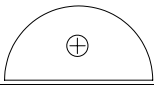
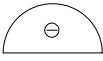
$$\vec{F}_R \cdot \vec{M}_R^{(0)} = 0 \Rightarrow \text{REZULTANTA}$$

$$\rho_H = \frac{|\vec{M}_R^{(0)}|}{|\vec{F}_R|} = a$$

### 3.ZADATAK



$$\begin{aligned}
 y_c &= \frac{1}{R^2 \pi} \int_{-R}^R \frac{y}{2} \cdot y dx \\
 &= \frac{1}{R^2 \pi} \int_{-R}^R (R^2 - x^2) dx \\
 &= \frac{4R}{3\pi} = 0.424R
 \end{aligned}$$

$i$	$F_i$	$x_i$	$y_i$	$x_i F_i$	$y_i F_i$
	$\frac{R^2 \pi}{2}$	$R$	$\frac{4R}{3\pi}$	$\frac{R^3 \pi}{2}$	$\frac{2R^3}{3}$
	$\frac{R^2 \pi}{8}$	$\frac{3}{2}R$	$\frac{2}{3} \frac{R}{\pi}$	$-\frac{3}{16} R^3 \pi$	$-\frac{1}{12} R^3$
$\Sigma$	$\frac{3}{8} R^2 \pi$			$\frac{5}{16} R^3 \pi$	$\frac{7}{12} R^3$

$$\begin{aligned}
 x_c &= \frac{\Sigma x_i F_i}{\Sigma F_i} = \frac{5}{6} R = 0.8333R \\
 y_c &= \frac{\Sigma y_i F_i}{\Sigma F_i} = \frac{14}{9} \frac{R}{\pi} = 0.495R
 \end{aligned}$$