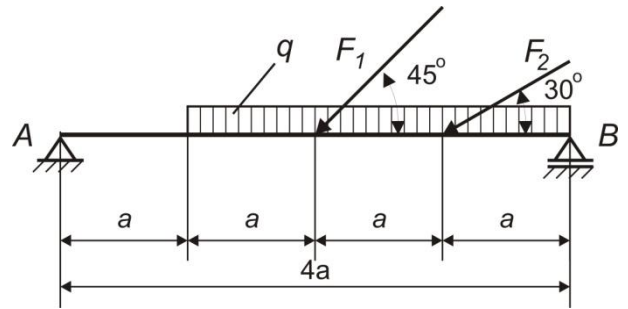


ZADATAK 2.

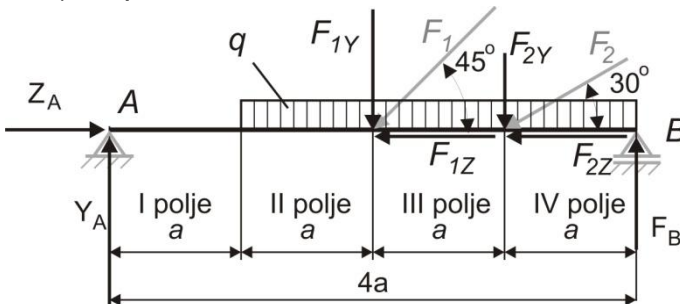
Za nosač prikazan na slici, čija su opterećenja:

$F_1=20\sqrt{2}\text{ kN}$, $F_2=20\text{ kN}$, $q=5\text{ kN/m}$ $a=1\text{ m}$, računskim putem odrediti:

- otpori oslonaca
- nacrtať osnovne statičke dijagrame



a) Otpori oslonaca



$$F_{1Z} = F_1 \cos 45^\circ = 20\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 20 \text{ kN}$$

$$F_{1Y} = F_1 \sin 45^\circ = 20\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 20 \text{ kN}$$

$$F_{2Z} = F_2 \cos 30^\circ = 20 \cdot \frac{\sqrt{3}}{2} = 17.3 \text{ kN}$$

$$F_{2Y} = F_2 \sin 30^\circ = 20 \cdot \frac{1}{2} = 10 \text{ kN}$$

- $\sum Z_i = Z_A - F_{1Z} - F_{2Z} = 0 \rightarrow Z_A$
- $\sum Y_i = Y_A - F_{1Y} - F_{2Y} - 3 \cdot a \cdot q + F_B = 0$
- $\sum M_A = 2a \cdot F_{1Y} + 3a \cdot F_{2Y} + 2,5a \cdot q \cdot 3a - 4a \cdot F_B = 0 \rightarrow F_B$

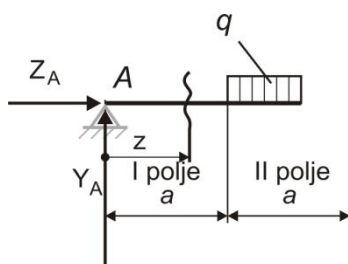
$$1) \rightarrow Z_A = F_{1Z} + F_{2Z} = 20 + 17.3 = 37.3 \text{ kN}$$

$$3) \rightarrow F_B = \frac{1}{4a} (2a \cdot F_{1Y} + 3a \cdot F_{2Y} + 2,5a \cdot q \cdot 3a)$$

$$F_B = \frac{1}{4 \cdot 1} (2 \cdot 1 \cdot 20 + 3 \cdot 1 \cdot 10 + 7,5 \cdot 5 \cdot 1^2) = 26.875 \text{ kN}$$

$$2) \rightarrow Y_A = F_{1Y} + F_{2Y} + 3 \cdot a \cdot q - F_B = 20 + 10 + 3 \cdot 5 \cdot 1 - 26.875 = 18.125 \text{ kN}$$

b) Osnovni statički dijagrami



Polje I $0 < z < a$

Aksijalna sila: $F_a = -Z_A$

$$z=0$$

$$F_a = -37.3 \text{ kN}$$

$$z=a=1\text{m}$$

$$F_a = -37.3 \text{ kN}$$

Transverzalna sila: $F_T = Y_A$

$$F_T = 18.125 \text{ kN}$$

$$F_T = 18.125 \text{ kN}$$

Moment savijanja sa leve strane:

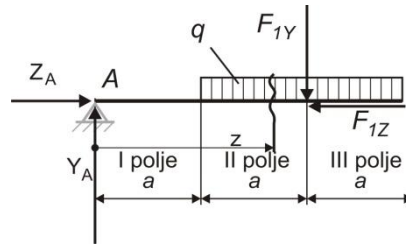
$$M_f = Y_A \cdot z$$

$$M_f = 0$$

$$M_f = 18.125 \text{ kNm}$$

Ime i prezime	Broj indeksa	Datum:	Pregledao:

Polje II $a < z < 2a$



$$z=a=1$$

$$z=2a=2\text{m}$$

Aksijalna sila: $F_a = -Z_A$

$$F_a = -37.3 \text{ kN}$$

$$F_a = -37.3 \text{ kN}$$

Transverzalna sila: $F_T = Y_A - q(z - a)$

$$F_T = 18.125 \text{ kN}$$

$$F_T = 13.125 \text{ kN}$$

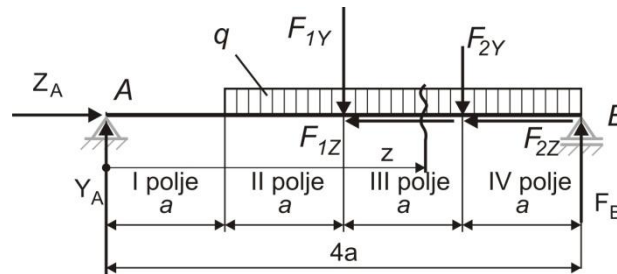
Moment savijanja sa leve strane:

$$M_f = Y_A \cdot z - q \frac{(z-a)^2}{2}$$

$$M_f = 18.125 \text{ kNm}$$

$$M_f = 33.75 \text{ kNm}$$

Polje III $2a < z < 3a$



$$z=2a=2$$

$$z=3a=3\text{m}$$

Aksijalna sila: $F_a = -Z_A + F_{1Z}$

$$F_a = -17.3 \text{ kN}$$

$$F_a = -17.3 \text{ kN}$$

Transverzalna sila: $F_T = Y_A - q(z - a) - F_{1Y}$

$$F_T = -6.875 \text{ kN}$$

$$F_T = -11.875 \text{ kN}$$

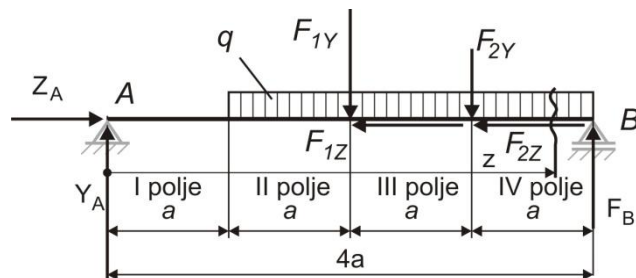
Moment savijanja sa leve strane:

$$M_f = Y_A \cdot z - q \frac{(z-a)^2}{2} - F_{1Y}(z - 2a)$$

$$M_f = 33.75 \text{ kNm}$$

$$M_f = 24.375 \text{ kNm}$$

Polje IV $3a < z < 4a$



$$z=3a=3$$

$$z=4a=4\text{m}$$

Aksijalna sila: $F_a = -Z_A + F_{1Z} + F_{2Z}$

$$F_a = 0 \text{ kN}$$

$$F_a = 0 \text{ kN}$$

Transverzalna sila: $F_T = Y_A - q(z - a) - F_{1Y} - F_{2Y}$

$$F_T = -21.875 \text{ kN}$$

$$F_T = -26.875 \text{ kN}$$

Moment savijanja sa leve strane:

$$M_f = Y_A \cdot z - q \frac{(z-a)^2}{2} - F_{1Y}(z - 2a) - F_{2Y}(z - 3a)$$

$$M_f = 26.875 \text{ kNm}$$

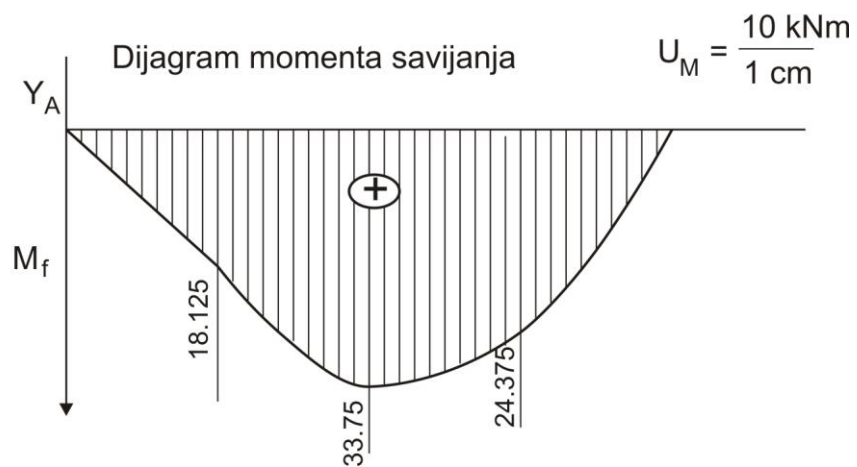
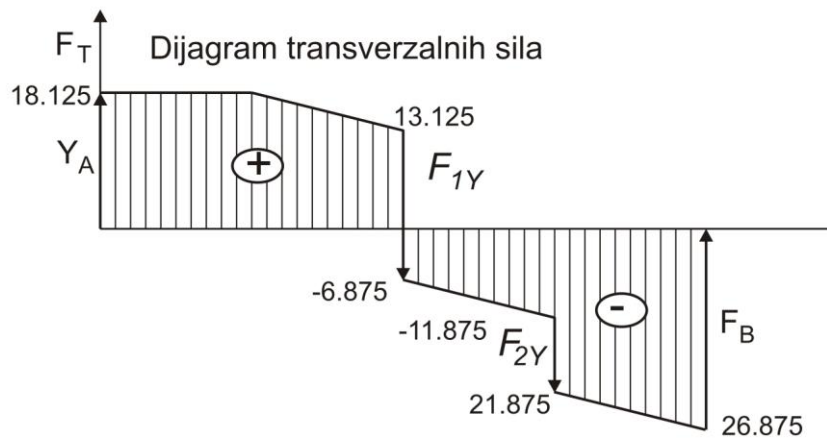
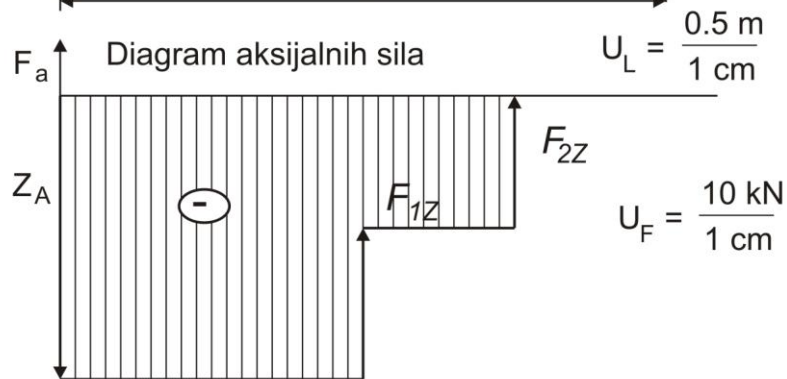
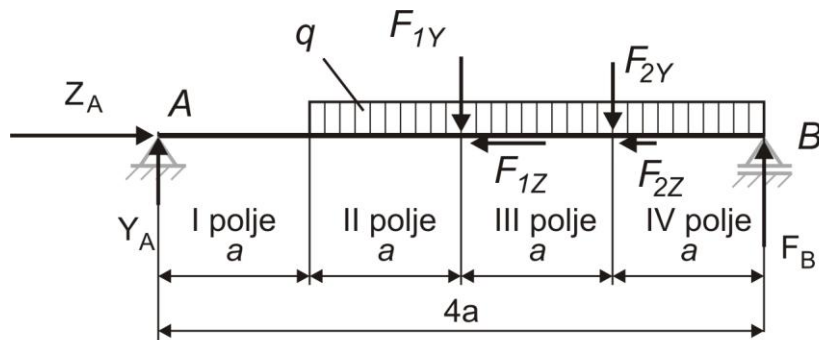
$$M_f = 0 \text{ kNm}$$

Ime i prezime

Broj indeksa

Datum:

Pregledao:



Ime i prezime	Broj indeksa	Datum:	Pregledao: