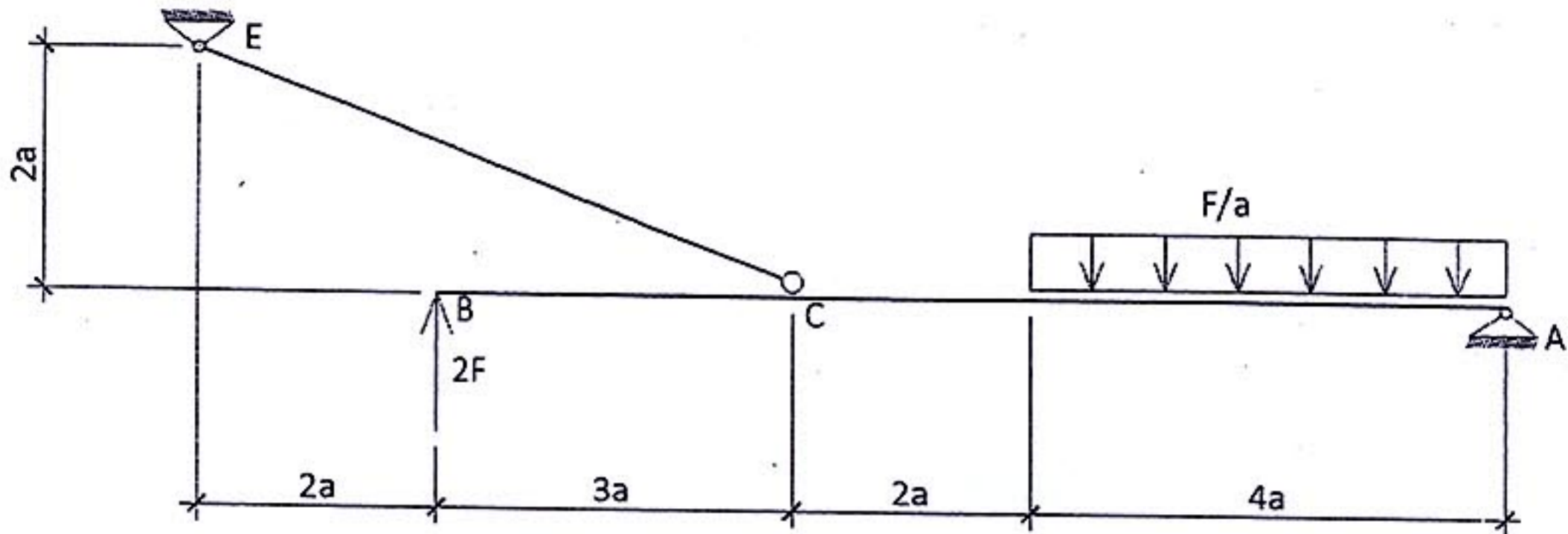


Ime i prezime: _____
Broj indeksa: _____

1. Zadatak

Za dati nosač i opterećenje odrediti:

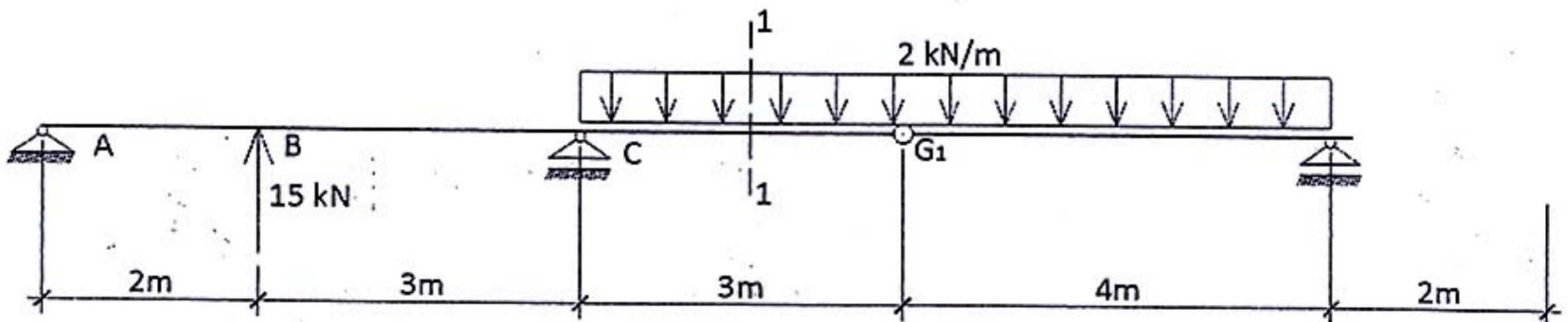
- a/ Reakcije oslonaca i silu u štapu (štap je zanemarljive težine);
- b/ Dijagrame presječnih sila.



2. Zadatak

Za dati nosač odrediti:

- a/ Reakcije oslonaca;
- b/ Dijagrame presječnih sila;
- c/ Funkcije momenta i transverzalne sile u presjeku 1-1.

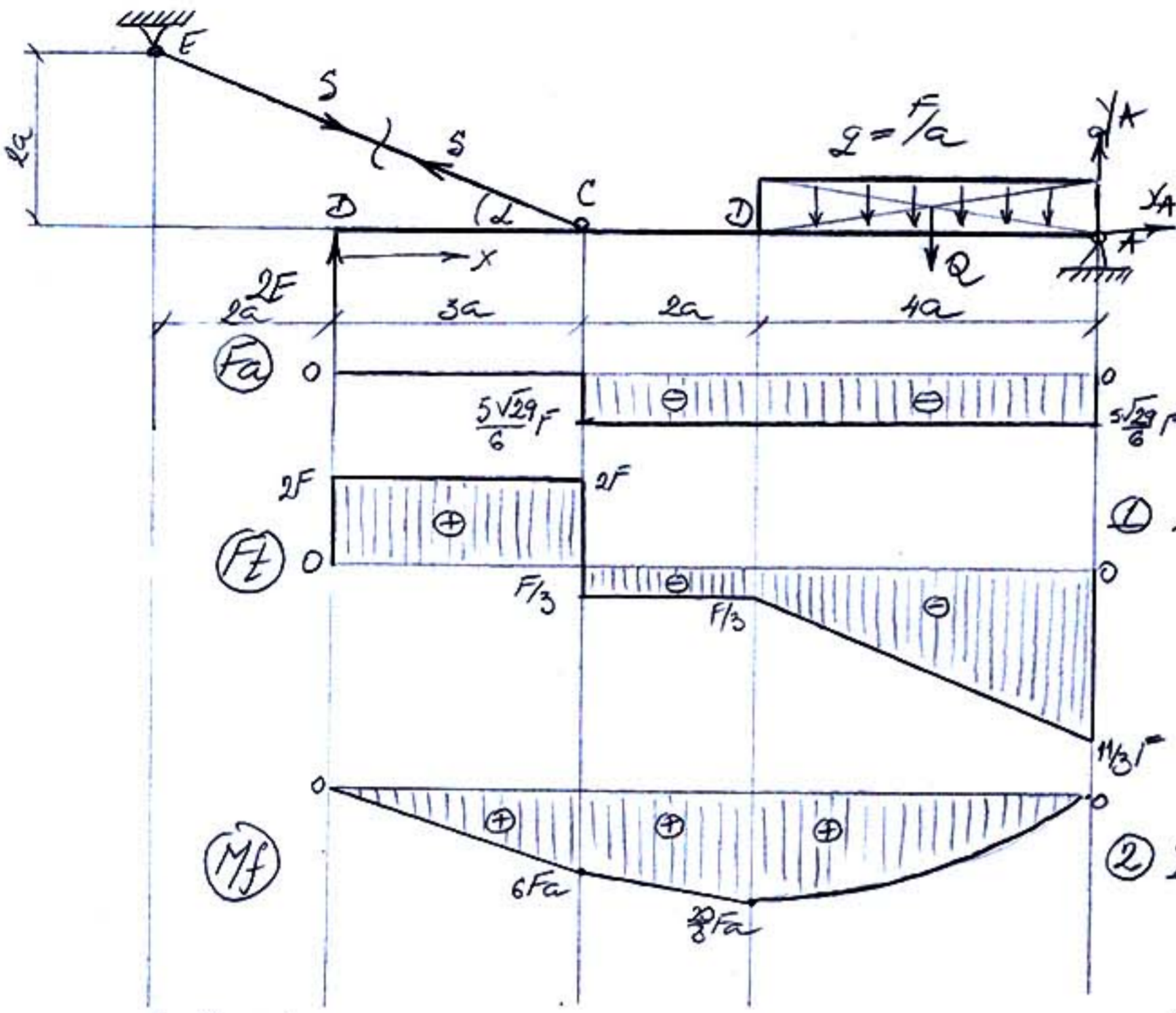


Prof.dr Olivera Jovanovic

СТАТУКА - I корозбурум

ірыя I

①



$$Q = q \cdot 4a = \frac{F}{a} \cdot 4a = 4F$$

$$\cos \alpha = \frac{5a}{\sqrt{25a^2 + 4a^2}} = \frac{5}{\sqrt{29}}$$

$$\sin \alpha = \frac{2a}{\sqrt{29a^2}} = \frac{2}{\sqrt{29}}$$

① $\sum M_A = 0$

$$2F \cdot 9a + S \sin \alpha \cdot 6a - Q \cdot 2a = 0 \quad | :a$$

$$S \cdot 6 \cdot \frac{2}{\sqrt{29}} = 8F - 18F$$

$$S = \frac{-10F}{12} \sqrt{29} \Rightarrow S = -\frac{5\sqrt{29}F}{6}$$

② $\sum Y_i = 0$

$$2F + S \sin \alpha - Q + Y_A = 0$$

$$Y_A = -2F + \frac{5\sqrt{29}F}{6} \cdot \frac{2}{\sqrt{29}} + 4F$$

$$Y_A = \frac{-6 + 5 + 12}{3} F \Rightarrow Y_A = \frac{11}{3} F$$

③ $\sum X_i = 0$

$$-S \cos \alpha + X_A = 0$$

$$X_A = S \cos \alpha = -\frac{5\sqrt{29}F}{6} \cdot \frac{5}{\sqrt{29}}$$

$$X_A = -\frac{25}{6} F$$

I частин

$$M_B^l = 0$$

$$M_C^l = 2F \cdot 3a = 6Fa$$

$$M_D^l = 2F \cdot 5a + S \sin \alpha \cdot 2a = 10Fa - \frac{5\sqrt{29}F}{6} \cdot \frac{2}{\sqrt{29}} \cdot 2a$$

$$= \frac{30 - 10}{3} Fa = \frac{20}{3} Fa$$

$$M_D^d = Y_A \cdot 4a - Q \cdot 2a = \frac{11}{3} F \cdot 4a - 4F \cdot 2a = \frac{44 - 24}{3} Fa = \frac{20}{3} Fa$$

$$M_A^d = 0$$

II частин

	$F_a = 0$	$F_{a3} = 0$	$F_{a2} = 0$
B-C $x \in [0, 3a)$	$F_t = 2F$	$F_{t3} = 2F$	$F_{t2} = 2F$
	$M_f = 2Fx$	$M_{f3} = 0$	$M_{f2} = 6Fa$

	$F_a = S \cos \alpha = -\frac{25}{6} F$
C-D $x \in [3a, 5a)$	$F_t = 2F + S \sin \alpha = 2F - \frac{5}{3} F = \frac{F}{3}$
	$M_f = 2Fx + S \sin \alpha (x - 3a) = 2Fx - \frac{5}{3} Fx + \frac{5}{3} F \cdot 3a = \frac{F}{3} x + 5Fa$
	$F_{a3} = -\frac{25}{6} F$ $F_{a2} = -\frac{25}{6} F$
	$F_{t3} = \frac{F}{3}$ $F_{t2} = \frac{F}{3}$
	$M_{f3} = 6Fa$ $M_{f2} = \frac{20}{3} Fa$

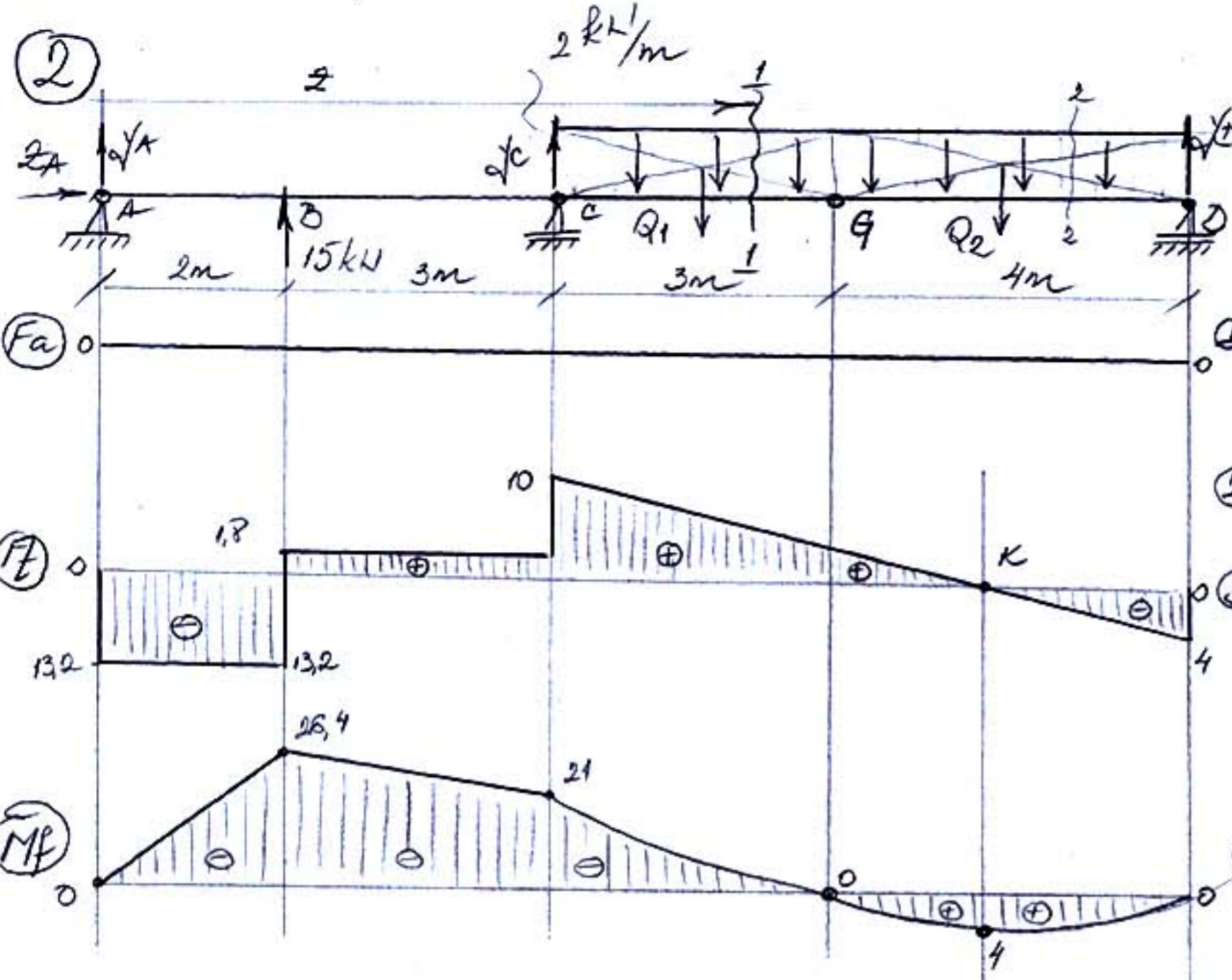
D-A $x \in [5a, 9a)$

$$F_a = S \cos \alpha = -\frac{25}{6} F$$

$$F_t = \frac{F}{3} - q \cdot (x - 5a)$$

$$= \frac{F}{3} - \frac{F}{a} x + 5F = \frac{16}{3} F - \frac{F}{a} x$$

$$M_f = \frac{F}{3} x + 5Fa - q \cdot (x - 5a) \cdot \frac{(x - 5a)}{2}$$



$$Q_1 = 2 \cdot 3 = 6 \text{ kN}$$

$$Q_2 = 2 \cdot 4 = 8 \text{ kN}$$

$$\textcircled{1} M_G^d = 0 \Rightarrow 2 \cdot 4 - Q_2 \cdot 2 = 0$$

$$\underline{2 \cdot 4 = 8 \text{ kN}}$$

$$\textcircled{2} \sum z_i = 0 \Rightarrow \underline{z_A = 0}$$

$$\textcircled{3} \sum M_A = 0 \Rightarrow 15 \cdot 2 + y_c \cdot 5 + y_D \cdot 12 - Q_1 \cdot 6.5 - Q_2 \cdot 10 = 0$$

$$\underline{y_c = \frac{-30 - 48 + 39 + 80}{5} = \frac{41}{5} \text{ kN} = 8.2}$$

$$\textcircled{4} \sum y_i = 0 \Rightarrow y_A + 15 + y_c + y_D - Q_1 - Q_2 = 0$$

$$\underline{y_A = -15 - \frac{41}{5} - 4 + 6 + 8 = -\frac{66}{5} \text{ kN} = -13.2}$$

уравнение

$$M_G = 0 \Rightarrow y_A \cdot 8 + 15 \cdot 6 + y_c \cdot 3 - Q_1 \cdot 1.5 = 0$$

$$-13.2 \cdot 8 + 90 + 8.2 \cdot 3 - 6 \cdot 1.5 = 0 \textcircled{7}$$

$$F_t^{1-1} = y_A + 15 + y_c - 2 \cdot (2-5)$$

$$= -13.2 + 15 + 8.2 - 2 \cdot 2 + 10 = \underline{\underline{20 - 22}}$$

$$M_f^{1-1} = y_A \cdot 2 + 15(2-2) + y_c \cdot (2-5) - 2(2-5) \frac{(2-5)}{2}$$

$$= -13.2 \cdot 2 + 15 \cdot 0 - 30 + 8.2 \cdot 2 - 41 \cdot \frac{2^2 + 10 \cdot 2}{2} - 25$$

$$= \underline{\underline{-2^2 + 20 \cdot 2 - 96}}$$

$$F_t^{2-2} = F_t^{1-1}, \quad M_f^{2-2} = M_f^{1-1}$$

$$F_{tK} = 20 - 22x \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} x = 10 \text{ m}$$

$$F_{tK} = 0$$

$$M_{fK} = -x^2 + 20x - 96$$

$$= -100 + 200 - 96 = 4 \text{ kNm}$$

$$M_A^L = 0$$

$$M_B^L = y_A \cdot 2 = -26.4 \text{ kNm}$$

$$M_C^L = y_A \cdot 5 + 15 \cdot 3 = -66 + 45 = -21 \text{ kNm}$$

$$M_C^d = 2 \cdot 7 - Q_2 \cdot 5 - Q_1 \cdot 1.5 = -21 \text{ kNm}$$

$$M_G = 0$$

$$M_D = 0$$