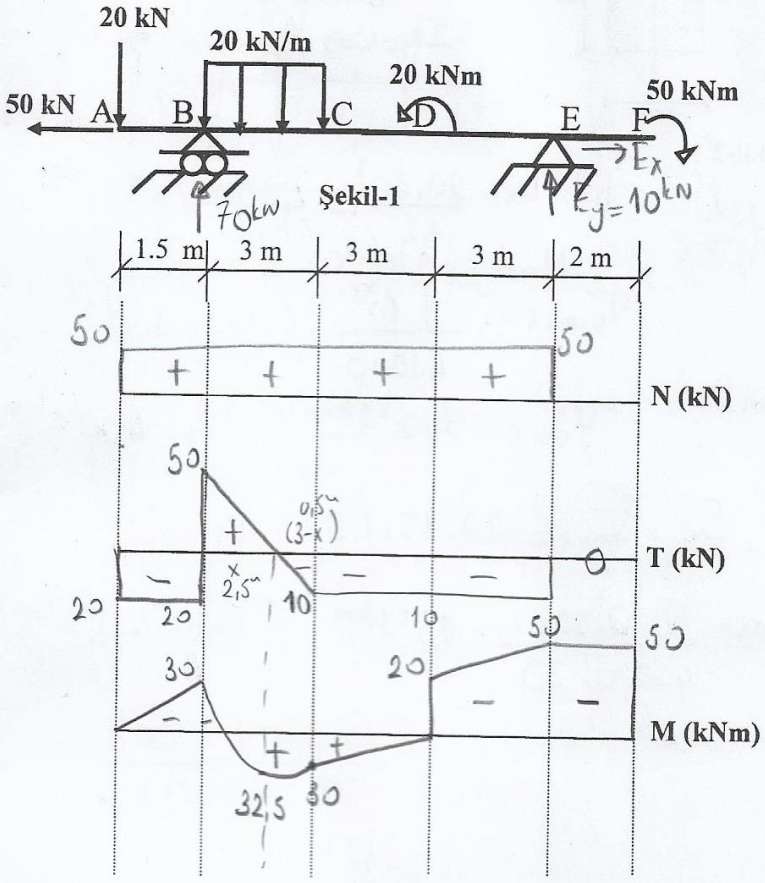
25p 1 Şekil 1'de yükleme durumu verilen kirişin normal kuvvet (N), kesme kuvveti (T) ve eğilme momenti (M) diyagramlarını çiziniz.



$\rightarrow \Sigma F_x = 0 \Rightarrow E_x - 50 = 0$

$E_x = 50\,kN\ (\rightarrow)$

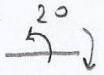
$\curvearrowleft \Sigma M_B = 0 \Rightarrow E_y \cdot 9 - 20 \cdot 3 \cdot 1{,}5 - 50 + 20 + 20 \cdot 1{,}5 = 0$

$E_y = 10\,kN\ (\uparrow)$

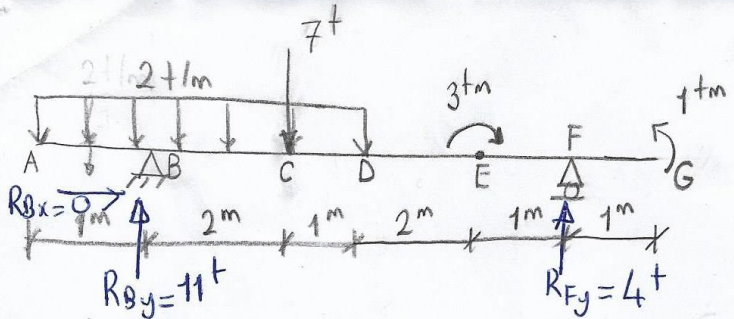
$\Sigma F_y = 0 \Rightarrow B_y + 10 - 20 \cdot 3 - 20 = 0$

$B_y = 70\,kN\ (\uparrow)$

$\frac{x}{(3-x)} = \frac{50}{10}$



Soru ②



Açıklık ve yükleme durumu şekilde verilen kirişin kesme kuvveti(T) ve eğilme momenti(M) diyagramlarını çiziniz.

$\curvearrowleft \Sigma M_A = 0 \Rightarrow R_{Fy}\cdot 6 - 7\cdot 2 - 3 + 1 + 2\cdot 1\cdot 0{,}5 - 2\cdot 3\cdot 1{,}5 = 0$

$R_{Fy} = 4^t\ (\uparrow)$

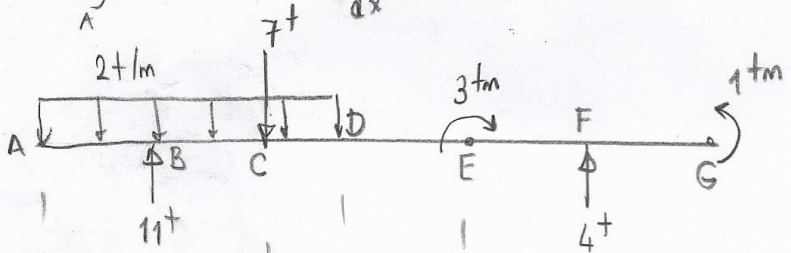
$\uparrow \Sigma F_y = 0 \Rightarrow R_{By} - 2\cdot 4 - 7 + 4 = 0 \Rightarrow R_{By} = 11^t\ (\uparrow)$

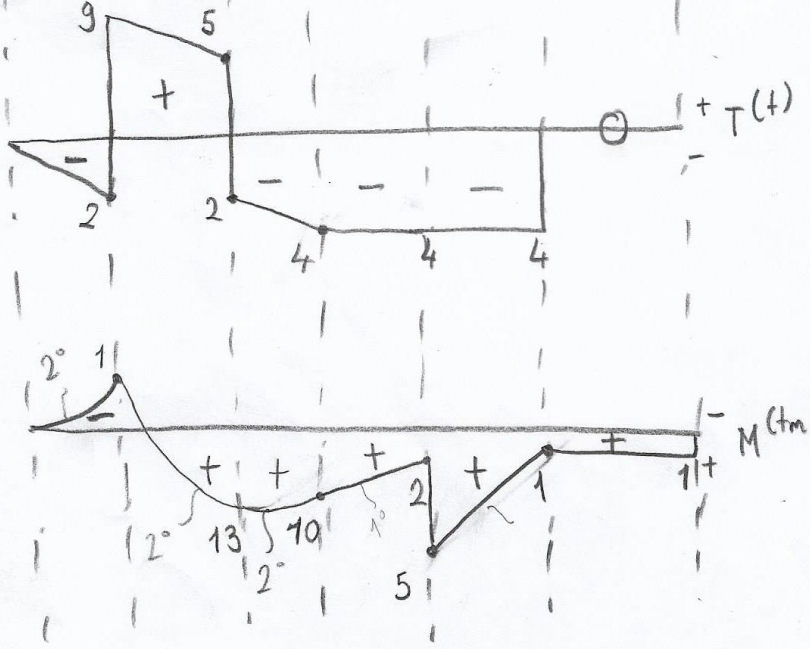
$\rightarrow \Sigma F_x = 0 \Rightarrow R_{Bx} = 0$

(*) q : yayılı yük

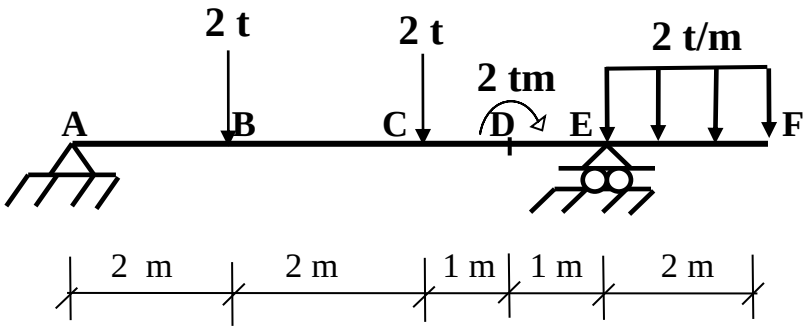
$$T = \int_A^B q\,dx \quad , \quad q = \frac{dT}{dx}$$

$$M = \int_A^B T\,dx \quad , \quad T = \frac{dM}{dx}$$



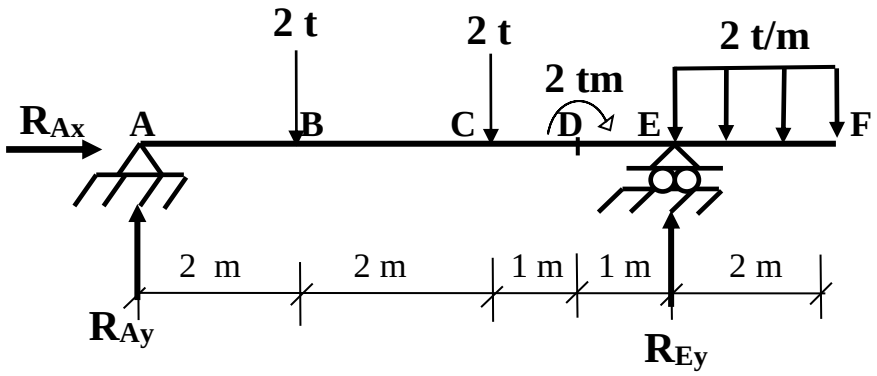


2. Şekilde verilen kirişin kesme kuvveti (T) ve eğilme momenti (M) diyagramlarını çiziniz.



Mesnet reaksiyonları belirlenir:

$$\Sigma F_x = 0\,,\quad \Sigma F_y = 0\,,\qquad \Sigma M_A = 0$$



$\Sigma F_x = 0$; $R_{Ax} = 0$

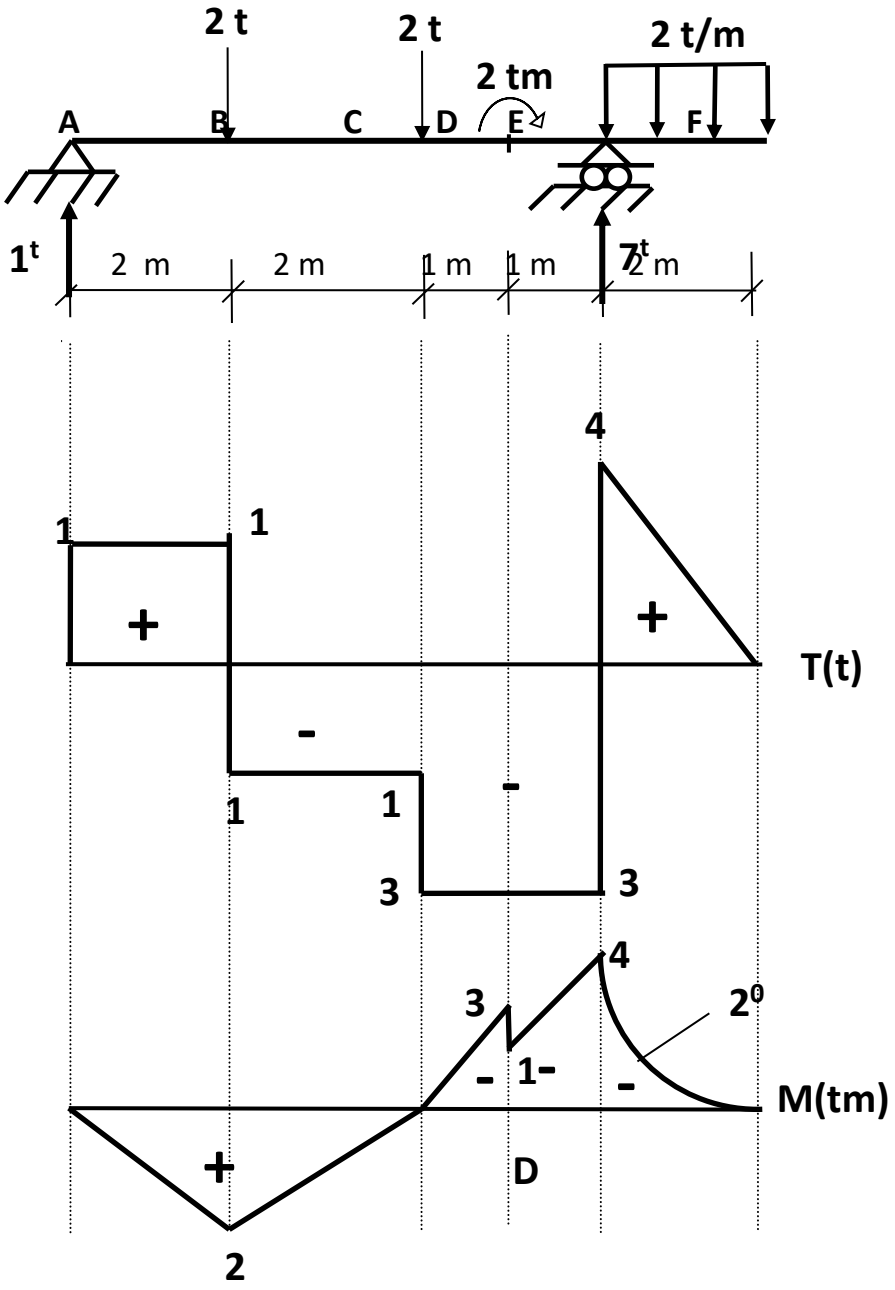
$(\circlearrowleft)\ \Sigma M_A = 0$; $R_{Ey} \,.\, 6^{m} - 2 \,.\, 2^{m} - 2 \,.\, 4^{m} - 2^{t/m} \,.\, 2^{m} \,.\, 7^{m} - 2^{tm} = 0;$

$R_{Ey} = 7^{t}\ (\uparrow);$

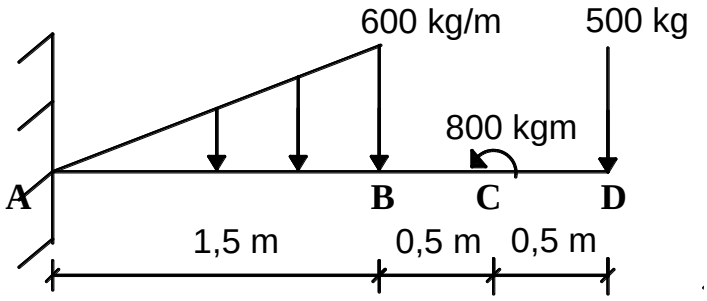
$(\uparrow)\ \Sigma F_y = 0$; $R_{Ay} + R_{Ey} - 2^{t} - 2^{t} - 2^{t/m} \,.\, 2^{m} = 0;$

$R_{Ay} + 7^{t} - 2^{t} - 2^{t} - 2^{t/m} \,.\, 2^{m} = 0;$

$R_{Ay} = 1^{t}\ (\uparrow)$

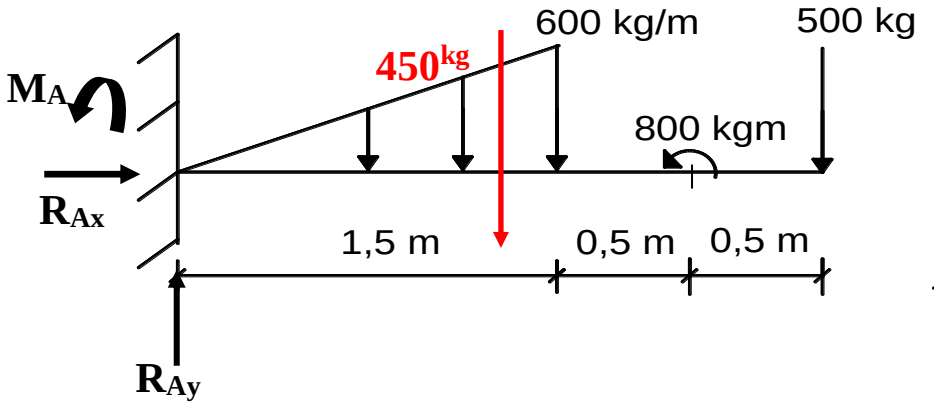

2 t
2 t
2 tm
2 t/m
A
B
C
D
E
F
1t
7t
2 m
2 m
1 m
1 m
2 m
1
1
4
1
1
3
3
T(t)
4
3
2⁰
1
M(tm)
2
D

3. Açıklık ve yükleme durumu şekilde verilen konsol kirişin kesme kuvveti (T) ve eğilme momenti (M) diyagramlarını çiziniz.



Mesnet reaksiyonları belirlenir:

$$\Sigma F_x = 0\,,\quad \Sigma F_y = 0\,,\quad \Sigma M_A = 0$$



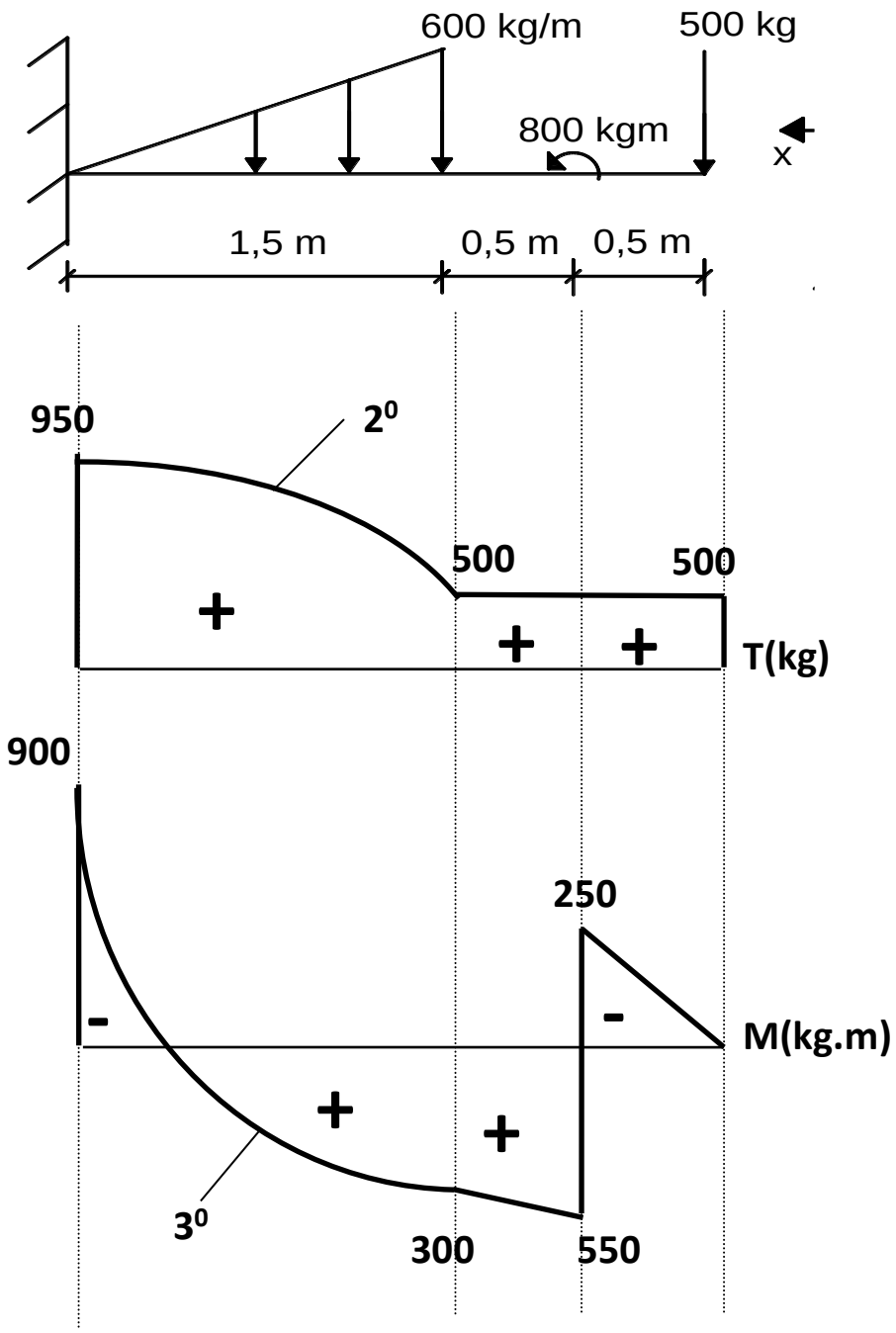
$\Sigma F_x = 0$; $R_{Ax} = 0$

$(\uparrow)\ \Sigma F_y = 0$; $R_{Ay} - (600^{kg}.1{,}5^{m}.0{,}5) - 500^{kg} = 0$;

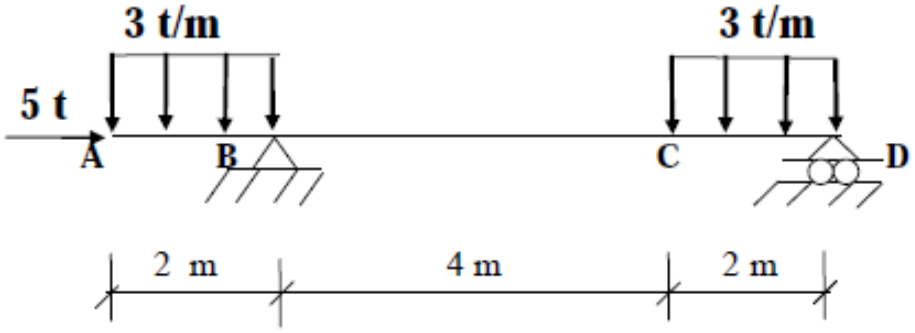
$R_{Ay} = 950^{kg}\ (\uparrow)$

$(\circlearrowleft)\ \Sigma M_A = 0$; $M_A - 500^{kg}.\ 2{,}5^{m} - (600^{kg}.1{,}5^{m}.0{,}5).1^{m} = 0$;

$M_A = 900^{kgm}$

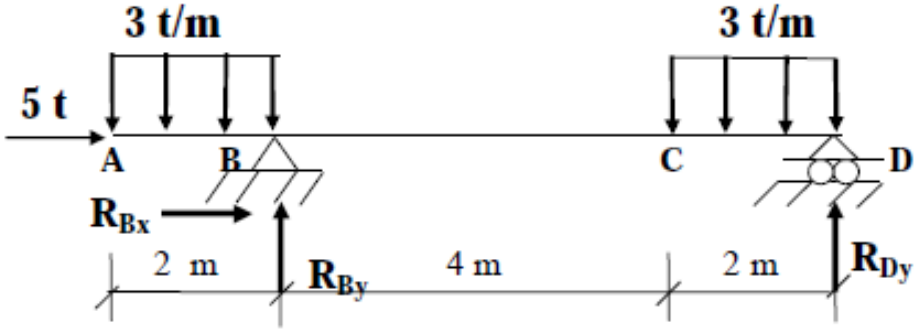

600 kg/m
500 kg
800 kgm
x
1,5 m
0,5 m
0,5 m
950
2⁰
500
500
+
+
+
T(kg)
900
250
-
-
M(kg.m)
+
+
3⁰
300
550

4. Açıklık ve yükleme durumu şekilde verilen kirişin normal kuvvet (N), kesme kuvveti (T) ve eğilme momenti (M) diyagramlarını çiziniz.



Mesnet reaksiyonları belirlenir:

$$\Sigma F_x = 0\,,\quad \Sigma F_y = 0\,,\quad \Sigma M_B = 0$$



$\Sigma F_x = 0$; R_{Bx} = -5 (yönü seçilen pozitif yönün tersi yönde !)

$R_{Bx} = 5^t (\longleftarrow)$

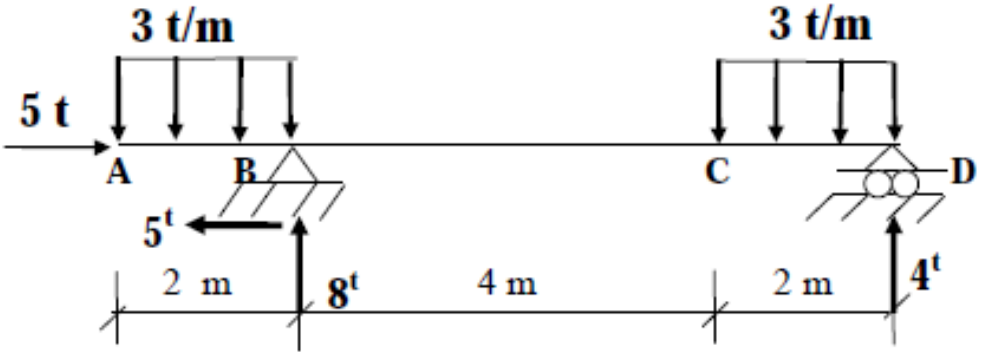
$(\circlearrowleft)\ \Sigma M_B = 0$; $R_{Dy} \cdot 6^m + 3^{t/m} \cdot 2^m \cdot 1^m - 3^{t/m} \cdot 2^m \cdot 5^m = 0$;

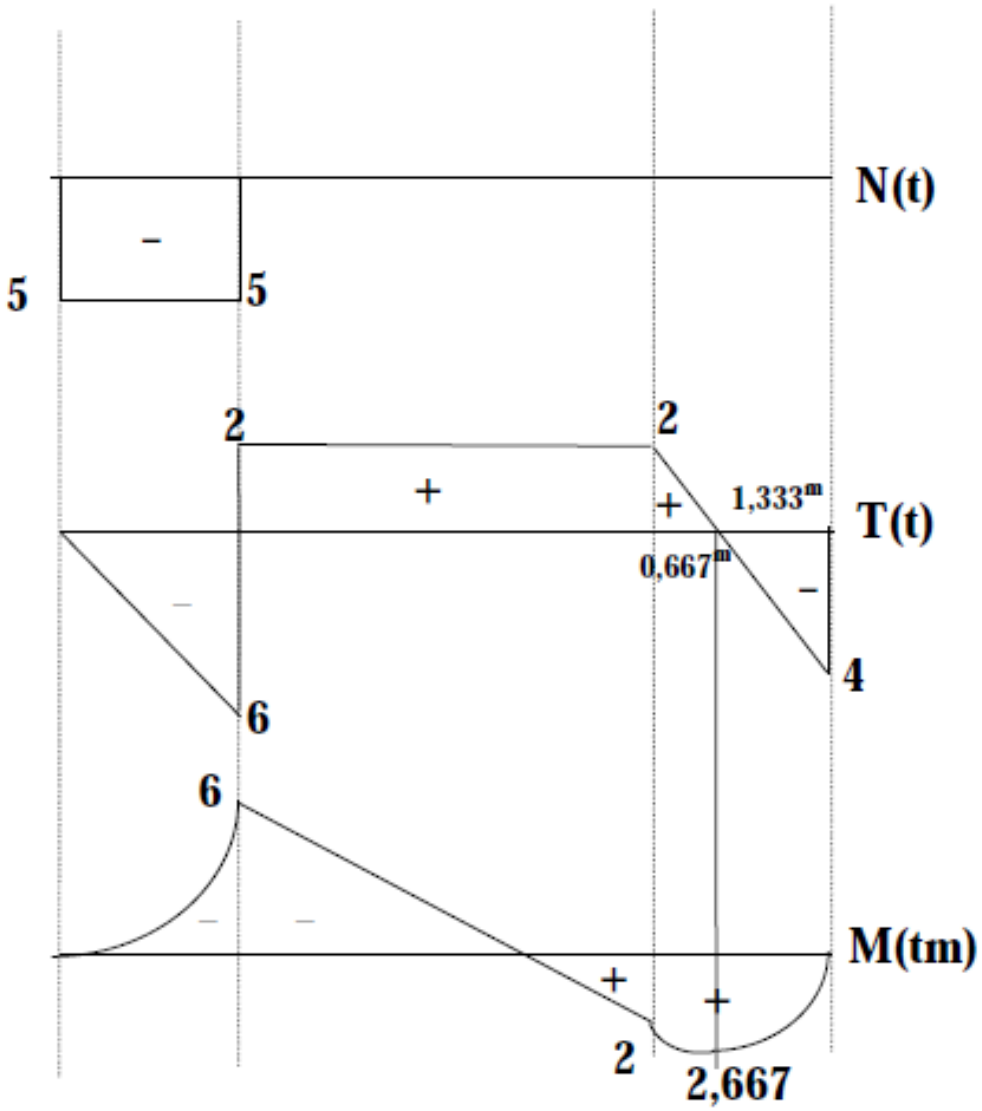
$R_{Dy} = 4^t (\uparrow)$;

$(\uparrow)\ \Sigma F_y = 0$; $R_{By} + R_{Dy} - 3.2 - 3.2 = 0$;

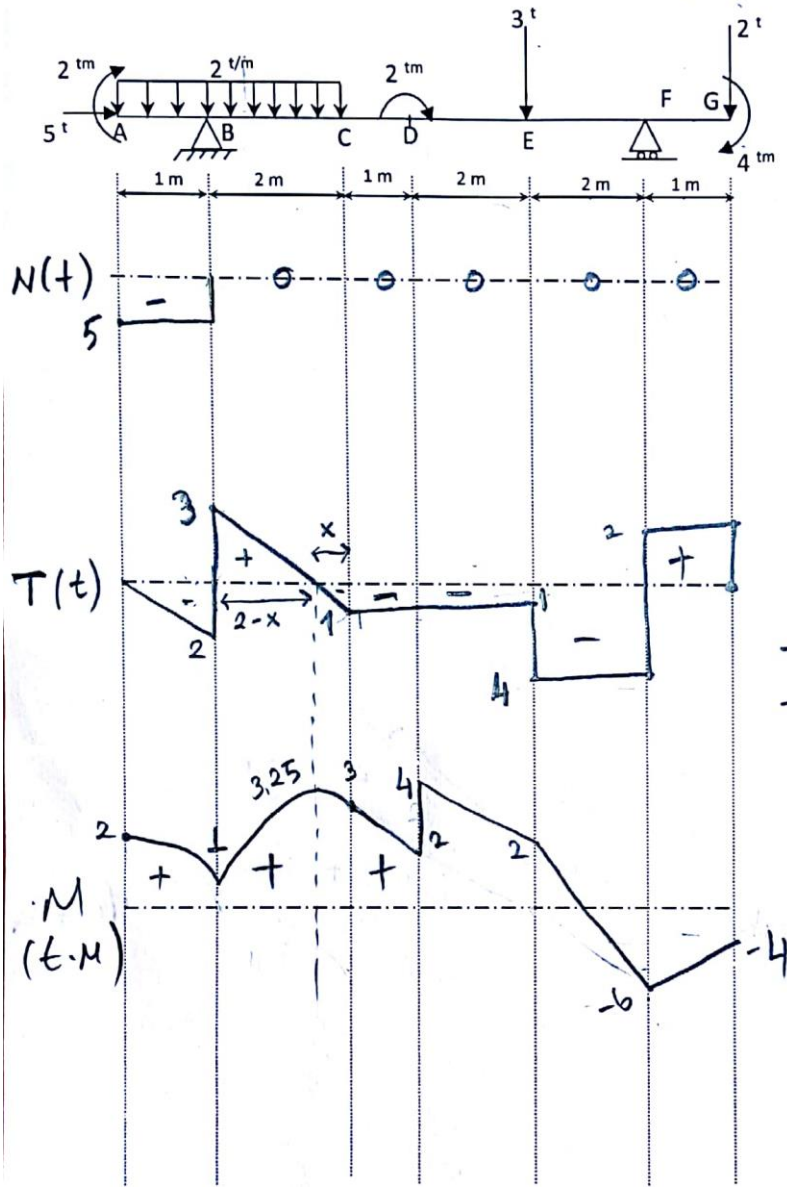
$R_{By} + 4 - 6 - 6 = 0$

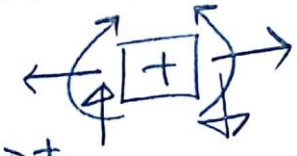
$R_{By} = 8^t (\uparrow)$


3 t/m
3 t/m
5 t
A
B
C
D
5t
2 m
8t
4 m
2 m
4t


N(t)
5
5
T(t)
2
2
1,333m
0,667m
6
4
M(tm)
6
2
2,667

25 p a) Normal Kuvvet, Kesme Kuvvet ve Eğilme Momenti diyagramını çiziniz.





$\rightarrow^{+} \quad \sum F_x = 0$

$5 + B_x = 0 \quad B_x = 5^{+} \ (\leftarrow)$

$\uparrow^{+} \quad \sum F_y = 0$

$-(2)(3) - 3 - 2 + B_y + F_y = 0$

$B_y + F_y = 11^{+}$

$\circlearrowleft \quad M_B = 0$

$-(2)(3)(0.5) - 2 - 2 - (3)(5) - (2)(8)$

$-4 + F_y(7) = 0$

$F_y = 6^{+} \uparrow$

$B_y = 5^{+} \uparrow$

$\frac{x}{2-x} = \frac{1}{3} \quad x = 0.5^{M}$