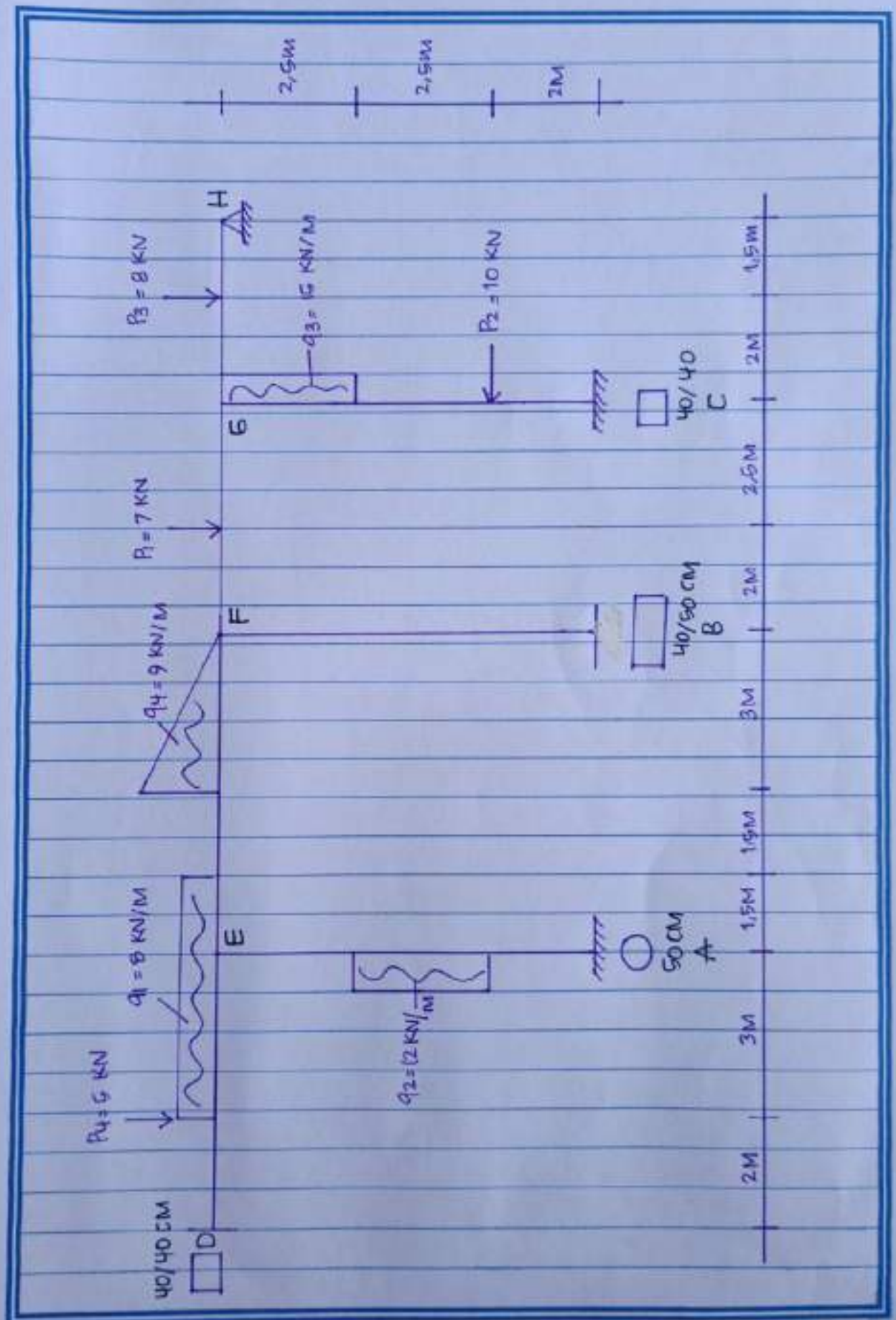




Sari Utama Dewi, S.T., M.T.

I. MOMEN INERSIA

DIMENSI KOLOM PERSEGI (40/40 cm)

$$b = 40 \text{ cm}$$

$$h = 40 \text{ cm}$$

$$I_p = \frac{1}{12} \cdot 40 \cdot 40^3 = 213333,3333 \text{ cm}^4 = 2,133 \cdot 10^{-5} \text{ m}^4$$

DIMENSI BALOK (40/50 cm)

$$b = 50 \text{ cm}$$

$$h = 40 \text{ cm}$$

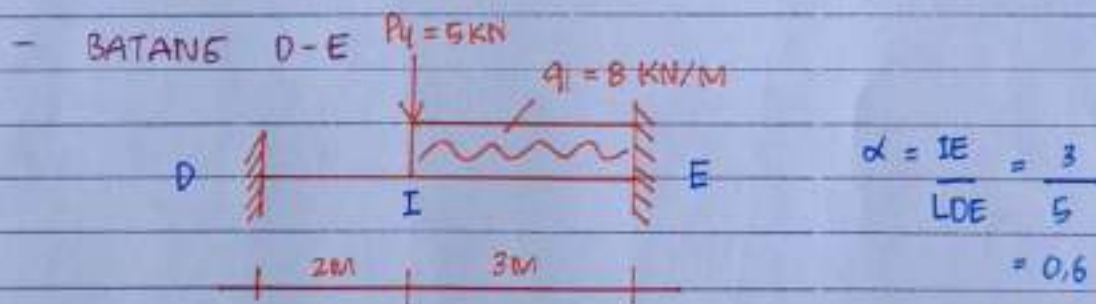
$$I_b = \frac{1}{12} \cdot 50 \cdot 40^3 = 266666,6667 \text{ cm}^4 = 2,667 \cdot 10^{-3} \text{ m}^4$$

DIMENSI KOLOM BUNDAR (50 cm)

$$D = 50 \text{ cm}$$

$$I_s = \frac{1}{64} \cdot \pi \cdot D^4 = \frac{1}{64} \cdot \pi \cdot 50^4 = 306640,625 \text{ cm}^4 \\ = 3,066 \cdot 10^{-3} \text{ m}^4$$

II. MOMEN PRIMER

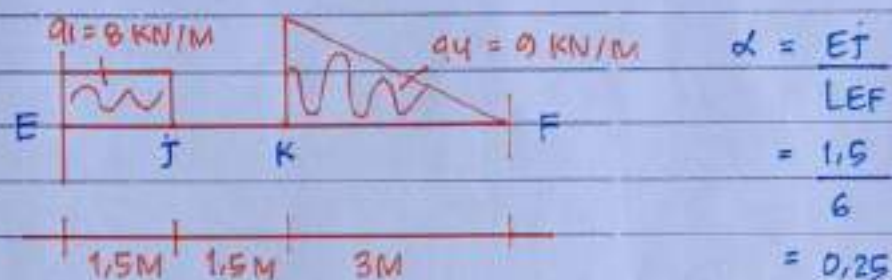


$$\begin{aligned} M_{PDE} &= \frac{P_4 \cdot D I (IE)^2}{(L_{DE})^2} + \frac{q_1 \cdot IE \cdot L_{DE} \cdot \alpha^2 (4 - \alpha)}{12} \\ &= \frac{5 \cdot 2 \cdot 3^2}{5^2} + \frac{8 \cdot 3 \cdot 5 \cdot 0,6^2 (4 - 0,6)}{12} \\ &= 3,6 + 12,24 \\ &= 15,84 \text{ kNm} \end{aligned}$$

Sari Utama Dewi, S.T., M.T.

$$\begin{aligned}
 MPED &= - \frac{P_4 \cdot IE \cdot D_1^2}{(LDE)^2} - \frac{q_1 \cdot IE \cdot LDE \cdot \alpha (3\alpha^2 - 8\alpha + 6)}{12} \\
 &= - \frac{5 \cdot 3 \cdot 2^2}{6^2} - \frac{8 \cdot 3 \cdot 5 \cdot 0,6 (3 \cdot 0,6^2 - 8 \cdot 0,6 + 6)}{12} \\
 &= - 2,4 - 13,68 \\
 &= - 16,08 \text{ KNM}
 \end{aligned}$$

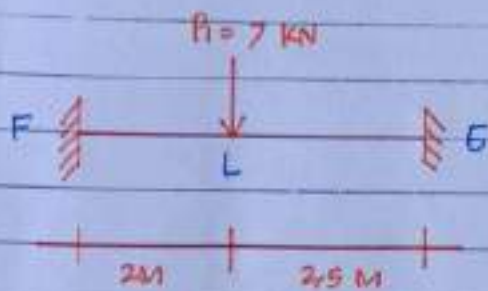
- BATANG E - F



$$\begin{aligned}
 MPEF &= \frac{q_1 \cdot EJ \cdot LEF \cdot \alpha (3\alpha^2 - 8\alpha + 6)}{12} + \frac{q_4 \cdot KF^3 (5LEF - 4KF)}{20 LEF^2} \\
 &= \frac{8 \cdot 1,5 \cdot 6 \cdot 0,25 (3 \cdot 0,25^2 - 8 \cdot 0,25 + 6)}{12} + \frac{9 \cdot 3^3 (5 \cdot 6 - 4 \cdot 3)}{20 \cdot 6^2} \\
 &= 6,281 + 6,075 = 12,356 \text{ KNM}
 \end{aligned}$$

$$\begin{aligned}
 MPFE &= - \frac{q_1 \cdot EJ \cdot LEF \cdot \alpha^2 (4 - \alpha)}{12} - \frac{q_4 \cdot KF^3 (10 LEF^2 - 5 \cdot KF \cdot LEF + 8 \cdot KF^2)}{30 LEF^2} \\
 &= - \frac{8 \cdot 1,5 \cdot 6 \cdot 0,25^2 (4 - 0,25)}{12} - \frac{9 \cdot 3 (10 \cdot 6^2 - 5 \cdot 3 \cdot 6 + 8 \cdot 3^2)}{30 \cdot 6^2} \\
 &= - 1,406 - 25,65 \\
 &= - 27,056 \text{ KNM}
 \end{aligned}$$

- BATANG F - E



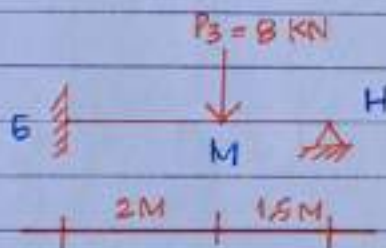
$$M_{FE} = \frac{P_1 \cdot FL \cdot LE^2}{LE^3}$$

$$= \frac{7 \cdot 2 \cdot 2.5^2}{4.5^3} = 4.321 \text{ kNm}$$

$$M_{EF} = - \frac{P_1 \cdot LE \cdot FL^2}{LE^3}$$

$$= - \frac{7 \cdot 2.5 \cdot 2^2}{4.5^3} = -3.457 \text{ kNm}$$

- BATANG B - H

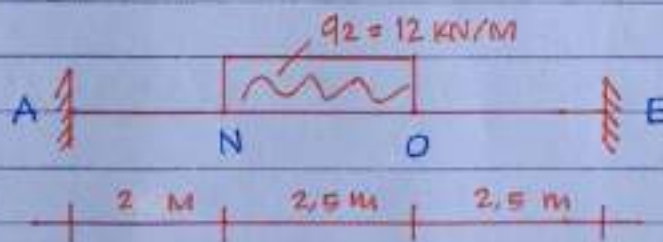


$$M_{BH} = \frac{P_3 \cdot MH (L_{BH}^2 - MH^2)}{2 \cdot L_{BH}^3}$$

$$= \frac{8 \cdot 1.5 (3.5^2 - 1.5^2)}{2 \cdot 3.5^3}$$

$$= 4.898 \text{ kNm}$$

- BATANG A - E



$$M_{AE} = \frac{q_2}{L_{AE}^2} \left[\frac{1}{2} L_{AE}^2 (AO^2 - AN^2) - \frac{2}{3} L_{AE} (AO^3 - AN^3) + \frac{1}{4} (AO^4 - AN^4) \right]$$

Sari Utama Dewi, S.T., M.T.

$$= \frac{12}{7^2} \left[\frac{1}{2} \cdot 7^2 (4,5^2 - 2^2) - \frac{2}{3} \cdot 7 (4,5^3 - 2^3) + \frac{1}{4} (4,5^4 - 2^4) \right]$$

$$= 0,245 [24,5 (16,25) - 4,667 (83,125) + 0,25 (304,063)]$$

$$= 26,631 \text{ KNM}$$

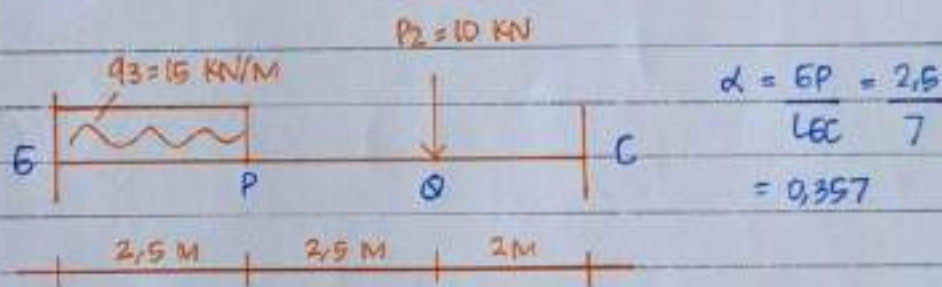
$$MPEA = - \frac{q_2}{LAE^2} \left[\frac{1}{3} LAE (AO^3 - AN^3) - \frac{1}{4} (AO^4 - AN^4) \right]$$

$$= - \frac{12}{7^2} \left[\frac{1}{3} \cdot 7 (4,5^3 - 2^3) - \frac{1}{4} (4,5^4 - 2^4) \right]$$

$$= -0,245 [2,333 (83,125) - 0,25 (304,063)]$$

$$= -23,377 \text{ KNM}$$

✶ BATANG 6 - C



$$MP_{6C} = \frac{q_3 \cdot 6P \cdot L_{6C} \cdot \alpha}{12} (3\alpha^2 - 8\alpha + 6) + \frac{P_2 \cdot 6Q \cdot Q_C^2}{L_{6C}^2}$$

$$= \frac{15 \cdot 2,5 \cdot 7 \cdot 0,357}{12} (3 \cdot 0,357^2 - 8 \cdot 0,357 + 6) + \frac{10 \cdot 5 \cdot 2^2}{7^2}$$

$$= 27,539 + 4,082 = 31,621 \text{ KNM}$$

$$MPC_6 = - \frac{q_3 \cdot 6P \cdot L_{6C} \cdot \alpha^2 (4 - \alpha)}{12} - \frac{P_2 \cdot Q_C \cdot 6Q^2}{L_{6C}^2}$$

$$= - \frac{15 \cdot 2,5 \cdot 7 \cdot 0,357}{12} (4 - 0,357) - \frac{10 \cdot 2 \cdot 6^2}{7^2}$$

$$= -28,449 - 10,204$$

$$= -38,653 \text{ KNM}$$

III. ANGKA KEKAKUAN

$$K_{DE} = \frac{4 E \cdot I_p}{L_{DE}} = \frac{4 \cdot E \cdot 2,133 \cdot 10^{-3}}{5} = 1,706 \cdot 10^{-3} E$$

$$K_{ED} = K_{DE} = 1,706 \cdot 10^{-3} E$$

$$K_{EF} = \frac{4 E \cdot I_p}{L_{EF}} = \frac{4 \cdot E \cdot 2,133 \cdot 10^{-3}}{6} = 1,422 \cdot 10^{-3} E$$

$$K_{FE} = K_{EF} = 1,422 \cdot 10^{-3} E$$

$$K_{FG} = \frac{4 E \cdot I_p}{L_{FG}} = \frac{4 \cdot E \cdot 2,133 \cdot 10^{-3}}{4,5} = 1,896 \cdot 10^{-3} E$$

$$K_{GF} = K_{FG} = 1,896 \cdot 10^{-3} E$$

$$K_{GH} = \frac{3 E \cdot I_p}{L_{GH}} = \frac{3 \cdot E \cdot 2,133 \cdot 10^{-3}}{3,5} = 1,828 \cdot 10^{-3} E$$

$$K_{AE} = \frac{4 E \cdot I_s}{L_{AE}} = \frac{4 \cdot E \cdot 3,066 \cdot 10^{-3}}{7} = 1,752 \cdot 10^{-3} E$$

$$K_{EA} = K_{AE} = 1,752 \cdot 10^{-3} E$$

$$K_{BF} = \frac{4 E \cdot I_b}{L_{BF}} = \frac{4 \cdot E \cdot 2,667 \cdot 10^{-3}}{7} = 1,524 \cdot 10^{-3} E$$

$$K_{FB} = K_{BF} = 1,524 \cdot 10^{-3} E$$

$$K_{CG} = \frac{4 E \cdot I_p}{L_{CG}} = \frac{4 \cdot E \cdot 2,133 \cdot 10^{-3}}{7} = 1,210 \cdot 10^{-3} E$$

$$K_{GC} = K_{CG} = 1,210 \cdot 10^{-3} E$$

IV. ANGKA DISTRIBUSI

✓ TITIK D

$$DF_{DE} = \frac{K_{DE}}{K_{DE}} = \frac{1,706 \cdot 10^{-3} E}{1,706 \cdot 10^{-3} E} = 1$$

✓ TITIK A

$$DF_{AE} = \frac{K_{AE}}{K_{AE}} = \frac{1,752 \cdot 10^{-3} E}{1,752 \cdot 10^{-3} E} = 1$$

Sari Utama Dewi, S.T., M.T.

- TITIK D

$$DF_{BF} = \frac{K_{BF}}{K_{BF}} = \frac{1,524 \cdot 10^{-3} E}{1,524 \cdot 10^{-3} E} = 1$$

- TITIK C

$$DF_{CB} = \frac{K_{CB}}{K_{CB}} = \frac{1,219 \cdot 10^{-3} E}{1,219 \cdot 10^{-3} E} = 1$$

- TITIK E

$$DF_{ED} = \frac{K_{ED}}{K_{ED} + K_{EA} + K_{EF}} = \frac{1,706 \cdot 10^{-3} E}{1,706 \cdot 10^{-3} E + 1,752 \cdot 10^{-3} E + 1,422 \cdot 10^{-3} E} = 0,35$$

$$DF_{EA} = \frac{K_{EA}}{K_{ED} + K_{EA} + K_{EF}} = \frac{1,752 \cdot 10^{-3} E}{1,706 \cdot 10^{-3} E + 1,752 \cdot 10^{-3} E + 1,422 \cdot 10^{-3} E} = 0,359$$

$$DF_{EF} = \frac{K_{EF}}{K_{ED} + K_{EA} + K_{EF}} = \frac{1,422 \cdot 10^{-3} E}{1,706 \cdot 10^{-3} E + 1,752 \cdot 10^{-3} E + 1,422 \cdot 10^{-3} E} = 0,291$$

- TITIK F

$$DF_{FE} = \frac{K_{FE}}{K_{FE} + K_{FB} + K_{FC}} = \frac{1,422 \cdot 10^{-3} E}{1,422 \cdot 10^{-3} E + 1,524 \cdot 10^{-3} E + 1,896 \cdot 10^{-3} E} = 0,294$$

$$DF_{FB} = \frac{K_{FB}}{K_{FE} + K_{FB} + K_{FC}}$$

$$= \frac{1,524 \cdot 10^{-3} E}{1,422 \cdot 10^{-3} E + 1,524 \cdot 10^{-3} E + 1,806 \cdot 10^{-3} E} = 0,315$$

$$\begin{aligned} DF_{F6} &= \frac{K_{F6}}{K_{FE} + K_{FB} + K_{F6}} \\ &= \frac{1,806 \cdot 10^{-3} E}{1,422 \cdot 10^{-3} E + 1,524 \cdot 10^{-3} E + 1,806 \cdot 10^{-3} E} = 0,39 \end{aligned}$$

- TITIK 6

$$\begin{aligned} DF_{6F} &= \frac{K_{6F}}{K_{6F} + K_{6C} + K_{6H}} \\ &= \frac{1,806 \cdot 10^{-3} E}{1,806 \cdot 10^{-3} E + 1,219 \cdot 10^{-3} E + 1,828 \cdot 10^{-3} E} = 0,384 \end{aligned}$$

$$\begin{aligned} DF_{6C} &= \frac{K_{6C}}{K_{6F} + K_{6C} + K_{6H}} \\ &= \frac{1,219 \cdot 10^{-3} E}{1,806 \cdot 10^{-3} E + 1,219 \cdot 10^{-3} E + 1,828 \cdot 10^{-3} E} = 0,247 \end{aligned}$$

$$\begin{aligned} DF_{6H} &= \frac{K_{6H}}{K_{6F} + K_{6C} + K_{6H}} \\ &= \frac{1,828 \cdot 10^{-3} E}{1,806 \cdot 10^{-3} E + 1,219 \cdot 10^{-3} E + 1,828 \cdot 10^{-3} E} = 0,369 \end{aligned}$$

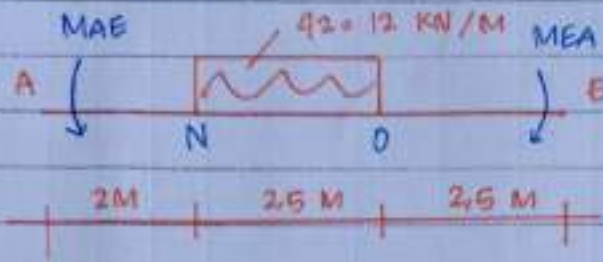
V. TABEL CROSS

JOINT MEMBER	-27,101			-22,735			33,062		
	A	D	E	F	G	H	I	J	K
DE	AE	DE	ED	EA	EF	FE	FB	FG	GH
1	1	1	0,35	0,350	0,291	0,294	0,345	0,384	0,369
26,631	15,84	-16,08	-23,377	12,356	-27,086		4,321	-3,457	4,898
							-6,348	-12,696	-12,2
							11,371	5,686	-8,166
4,097	3,005	7,989	8,104	6,642	8,321		-1,092	-2,183	-2,008
									-1,404
0,059	0,058	0,115	0,118	0,005	0,048		0,084	0,167	0,161
							-0,051	-0,026	0,108
0,003		0,007	0,007	0,006	0,003		0,005	0,01	0,009
							-0,002	-0,002	0,006
0,000		0,000	0,000	0,000			0,001	0,001	0,000
30,791	10,805	-7,969	-15,058	23,027	-15,830	8,445	7,415	-12,936	-9,210
									22,165
									-43,381
									4,208

Sari Utama Dewi, S.T., M.T.

VI. PERHITUNGAN GAYA-GAYA DALAM

- BATANG A-E



Reaksi Perletakan :

$$\sum M_E = 0$$

$$R_{AV} \cdot 7 - M_{AE} - 12 \cdot 2,5 \left(\frac{1}{2} \cdot 2,5 + 2,5 \right) + M_{EA} = 0$$

$$R_{AV} \cdot 7 - 30,791 - 112,5 + 15,058 = 0$$

$$R_{AV} = 18,319 \text{ kN } (\uparrow)$$

$$\sum M_A = 0$$

$$-R_{EV} \cdot 7 + M_{EA} + 12 \cdot 2,5 \left(\frac{1}{2} \cdot 2,5 + 2 \right) - M_{AE} = 0$$

$$-R_{EV} \cdot 7 + 15,058 + 97,5 - 30,791 = 0$$

$$R_{EV} = 11,681 \text{ kN } (\uparrow)$$

Checking :

$$\sum V = 0$$

$$R_{AV} + R_{EV} = Q$$

$$18,319 + 11,681 = 12 \cdot 2,5$$

$$30 \text{ kN} = 30 \text{ kN} \dots \text{OKE !}$$

GAYA LINTANG (SHEAR)

$$D_A = R_{AV} = 18,319 \text{ kN}$$

$$D_N = D_A = 18,319 \text{ kN}$$

$$D_O = D_N - Q = 18,319 - 12 \cdot 2,5 = -11,681 \text{ kN}$$

$$D_{EKIRI} = D_O = -11,681 \text{ kN}$$

$$D_E = D_{EKIRI} + R_{EV} = -11,681 + 11,681 = 0$$

Sari Utama Dewi, S.T., M.T.

SAYA MOMEN

$$M_A = -30,701 \text{ KNM}$$

$$M_N = 18,310 \cdot 2 - 30,701 = 5,847 \text{ KNM}$$

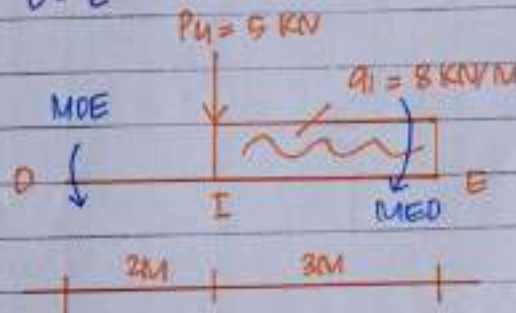
$$M_D = 18,310 \cdot 4,5 - 30,701 - 12 \cdot 2,5 \left(\frac{1}{2} \cdot 2,5 \right) = 14,145 \text{ KNM}$$

$$M_E = -11,681 \text{ KNM}$$

$$x = \frac{DN}{q_2} = \frac{18,310}{12} = 1,5 \text{ m dari titik N}$$

$$\begin{aligned} M_{\text{MAX}} &= 18,310 \cdot (2 + 1,5) - 12 \cdot 1,5 \left(\frac{1}{2} \cdot 1,5 \right) - 30,701 \\ &= 18,700 \text{ KNM} \end{aligned}$$

- BATANG D-E



REAKSI PERLETAKAN

$$\sum M_E = 0$$

$$RDV \cdot 5 - 5 \cdot 3 - 8 \cdot 3 \left(\frac{1}{2} \cdot 3 \right) - MDE + MED = 0$$

$$RDV \cdot 5 - 15 - 36 - 10,805 + 7,969 = 0$$

$$RDV = 12,586 \text{ KN } (\uparrow)$$

$$\sum MD = 0$$

$$-REV \cdot 5 + MED + 8 \cdot 3 \left(\frac{1}{2} \cdot 3 + 2 \right) + 5 \cdot 2 - MDE = 0$$

$$-REV \cdot 5 + 7,969 + 84 + 10 - 10,805 = 0$$

$$REV = 16,416 \text{ KN } (\uparrow)$$

CHECKING

$$12,586 + 16,416 = 5 + 8 \cdot 3$$

$$29 \text{ KN} = 29 \text{ KN} \dots \text{ OKE!}$$

Sari Utama Dewi, S.T., M.T.

GAYA LINTANG

$$D_A = R_DV = 12,585 \text{ KN}$$

$$D_I \text{ KIRI} = D_A = 12,585 \text{ KN}$$

$$D_I = D_I \text{ KIRI} - P_4 = 12,585 - 5 = 7,585 \text{ KN}$$

$$D_E \text{ KIRI} = D_I - Q = 7,585 - 8.3 = -16,415 \text{ KN}$$

$$D_E = D_E \text{ KIRI} + R_{EV} = -16,415 + 16,415 = 0$$

GAYA MOMEN

$$M_A = M_{DE} = -19,895 \text{ KNM}$$

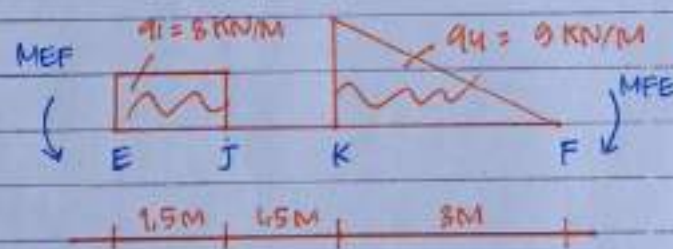
$$M_I = 12,585 \cdot 2 - 19,895 = 5,275 \text{ KNM}$$

$$M_E = M_{ED} = -7,969 \text{ KNM}$$

$$x = \frac{D_I}{q_1} = \frac{7,585}{8} = 0,95 \text{ M DARI TITIK I}$$

$$\begin{aligned} M_{\text{MAX}} &= 12,585 (2 + 0,95) - 5 \cdot 0,95 - 8 \cdot 0,95 \left(\frac{1}{2} \cdot 0,95 \right) - 19,895 \\ &= 8,871 \text{ KNM} \end{aligned}$$

- BATANG E - F



REAKSI PERLETAKAN

$$\sum M_F = 0$$

$$R_{EV} \cdot 6 - M_{EF} - 8 \cdot 1,5 \left(\frac{1}{2} \cdot 1,5 + 4,5 \right) - \frac{1}{2} \cdot 9 \cdot 3 \left(\frac{3}{2} \cdot 3 \right) + M_{FE}$$

$$R_{EV} \cdot 6 - 23,027 - 63 - 27 + 19,830 = 0$$

$$R_{EV} = 16,2 \text{ KN (T)}$$

$$\Sigma M_E = 0$$

$$- R_{FV} \cdot 6 + M_{FE} + \frac{1}{2} \cdot 9 \cdot 3 \left(\frac{1}{3} \cdot 3 + 3 \right) + 8 \cdot 1,5 \left(\frac{1}{2} \cdot 1,5 \right) - M_{EF} = 0$$

$$- R_{FV} \cdot 6 + 15,830 + 54 + 9 - 23,027 = 0$$

$$R_{FV} = 25,5 \text{ KN}$$

CHECKING

$$R_{EV} + R_{FV} = Q_1 + Q_4$$

$$16,2 + 9,3 = (8 \cdot 1,5) + \left(\frac{1}{2} \cdot 9 \cdot 3 \right)$$

$$25,5 \text{ KN} = 25,5 \text{ KN} \dots \text{ OKE}$$

GAYA LINTANG

$$D_E = R_{EV} = 16,2 \text{ KN}$$

$$D_J = D_E - Q_1 = 16,2 - 8 \cdot 1,5 = 4,2 \text{ KN}$$

$$D_K = D_J = 4,2 \text{ KN}$$

$$D_{FKIRI} = D_K - Q_4 = 4,2 - \left(\frac{1}{2} \cdot 9 \cdot 3 \right) = -9,3 \text{ KN}$$

$$D_F = D_{FKIRI} + R_{FV} = -9,3 + 9,3 = 0$$

GAYA MOMEN

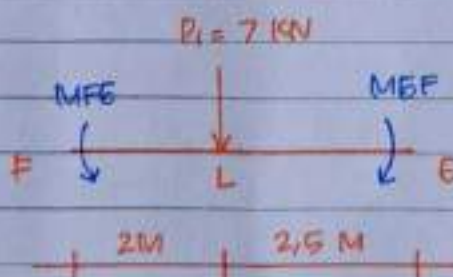
$$M_E = M_{EF} = -23,027 \text{ KNM}$$

$$M_J = 16,2 \cdot 1,5 - 8 \cdot 1,5 \left(\frac{1}{2} \cdot 1,5 \right) - 23,027 = -7,727 \text{ KNM}$$

$$M_K = 16,2 \cdot 3 - 8 \cdot 1,5 \left(\frac{1}{2} \cdot 1,5 + 1,5 \right) - 23,027 = -1,427 \text{ KNM}$$

$$M_F = M_{FE} = -15,830 \text{ KNM}$$

- BATANG F-E



Sari Utama Dewi, S.T., M.T.

REAKSI PERLETAKAN

$$\sum M_G = 0$$

$$R_{FV} \cdot 4,5 - M_{FE} - 7 \cdot 2,5 + M_{GF} = 0$$

$$R_{FV} \cdot 4,5 - 7,415 - 17,5 + 12,936 = 0$$

$$R_{FV} = 2,662 \text{ KN } (\uparrow)$$

$$\sum M_F = 0$$

$$R_{FV} \cdot 4,5 + M_{GF} + 7 \cdot 2 - M_{FE} = 0$$

$$R_{FV} \cdot 4,5 + 12,936 + 14 - 7,415 = 0$$

$$R_{FV} = 4,338 \text{ KN } (\uparrow)$$

CHECKING

$$R_{FV} + R_{GV} = P$$

$$2,662 + 4,338 = 7$$

$$7 \text{ KN} = 7 \text{ KN} \dots \text{ oke!}$$

GAYA LINTANG

$$D_F = 2,662 \text{ KN}$$

$$D_{LKIRI} = D_F = 2,662 \text{ KN}$$

$$D_L = D_{LKIRI} - P_1 = 2,662 - 7 = -4,338 \text{ KN}$$

$$D_{GKIRI} = D_L = -4,338 \text{ KN}$$

$$D_G = D_{GKIRI} + R_{GV} = -4,338 + 4,338 = 0$$

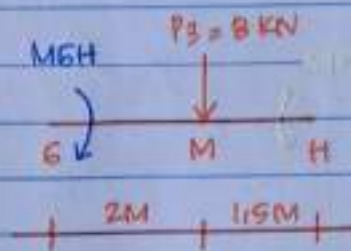
GAYA MOMEN

$$M_F = M_{FE} = -7,415 \text{ KNM}$$

$$M_L = 2,662 \cdot 2 - 7,415 = -2,091 \text{ KNM}$$

$$M_G = M_{GF} = -12,936 \text{ KNM}$$

- BATANG B-H



REAKSI PERLETAKAN

$$\sum M_H = 0$$
$$R_{EV} \cdot 3,5 + M_{BH} - 8 \cdot 1,5 = 0$$

$$R_{EV} \cdot 3,5 + 9,229 - 12 = 0$$

$$R_{EV} = 0,792 \text{ kN } (\uparrow)$$

$$\sum M_B = 0$$

$$-R_{HV} \cdot 3,5 + 8 \cdot 2 + M_{BH} = 0$$

$$-R_{HV} \cdot 3,5 + 16 + 9,229 = 0$$

$$R_{HV} = 7,208 \text{ kN } (\uparrow)$$

GAYA LINTANG

$$D_B = R_{EV} = 0,792 \text{ kN}$$

$$D_{M \text{ KIRI}} = D_B = 0,792 \text{ kN}$$

$$D_M = D_{M \text{ KIRI}} - P_3 = 0,792 - 8 = -7,208 \text{ kN}$$

$$D_{H \text{ KIRI}} = D_M = -7,208 \text{ kN}$$

$$D_H = D_{H \text{ KIRI}} + R_{HV} = -7,208 + 7,208 = 0$$

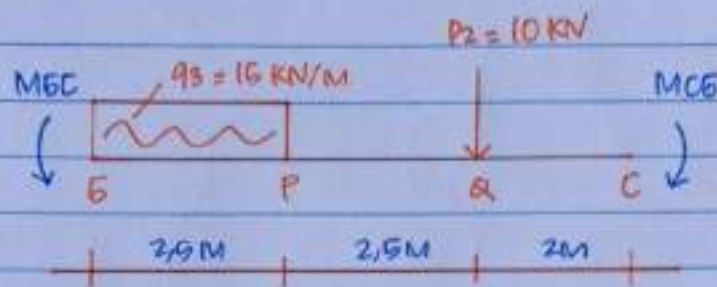
GAYA MOMEN

$$M_B = 9,229 \text{ kNm}$$

$$M_M = 0,792 \cdot 2 + 9,229 = 10,813 \text{ kNm}$$

$$M_H = 0$$

- BATANG B - C



REAKSI PERLETAKAN

$$\sum M_C = 0$$

$$R_{BV} \cdot 7 - M_{BC} - 15 \cdot 2,5 \left(\frac{1}{2} \cdot 2,5 + 4,5 \right) - 10 \cdot 2 + M_{CB} = 0$$

$$R_{BV} \cdot 7 - 22,165 - 215,625 - 20 + 43,381 = 0$$

$$R_{BV} = 30,63 \text{ KN } (\uparrow)$$

$$\sum M_B = 0$$

$$-R_{CV} \cdot 7 + M_{CB} + 10 \cdot 5 + 15 \cdot 2,5 \left(\frac{1}{2} \cdot 2,5 \right) - M_{BC} = 0$$

$$-R_{CV} \cdot 7 + 43,381 + 50 + 46,875 - 22,165 = 0$$

$$R_{CV} = 16,87 \text{ KN } (\uparrow)$$

GAYA LINTANG

$$D_B = 30,63 \text{ KN}$$

$$D_P = D_B - Q_3 = 30,63 - 15 \cdot 2,5 = -6,87 \text{ KN}$$

$$D_{Q \text{ KIRI}} = D_P = -6,87 \text{ KN}$$

$$D_Q = D_{Q \text{ KIRI}} - P = -6,87 - 10 = -16,87 \text{ KN}$$

$$D_{C \text{ KIRI}} = D_Q = -16,37 \text{ KN}$$

$$D_C = D_{C \text{ KIRI}} + R_{CV} = -16,37 + 16,37 = 0$$

GAYA MOMEN

$$M_B = -22,165 \text{ KNM}$$

$$M_P = 30,63 \cdot 2,5 - 15 \cdot 2,5 \left(\frac{1}{2} \cdot 2,5 \right) - 22,165 = 7,535 \text{ KNM}$$

$$M_Q = 30,63 \cdot 5 - 15 \cdot 2,5 \left(\frac{1}{2} \cdot 2,5 + 2,5 \right) - 22,165 = -9,64 \text{ KNM}$$

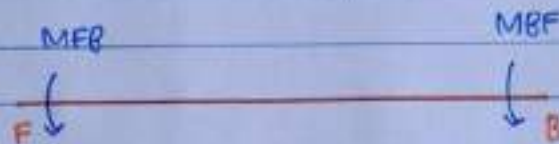
$$M_C = -43,381 \text{ KNM}$$

$$x = \frac{D_5}{q_3} = \frac{30,63}{15} = 2,04 \text{ m DARI TITIK 5}$$

$$M_{MAX} = 30,63 \cdot 2,04 - 15 \cdot 2,04 \left(\frac{1}{2} \cdot 2,04 \right) - 22,165$$

$$= 9,108 \text{ KNM}$$

- BATANG F-B



REAKSI PERLETAKAN

$$\sum M_B = 0$$

$$RFV \cdot 7 - M_{FB} - MBF = 0$$

$$RFV \cdot 7 - 8,415 - 4,208 = 0$$

$$RFV = 1,803 \text{ KN (}\uparrow\text{)}$$

$$\sum M_F = 0$$

$$-RBV \cdot 7 - MBF - M_{FB} = 0$$

$$-RBV \cdot 7 - 4,208 - 8,415 = 0$$

$$RBV = -6,803 \text{ KN (}\downarrow\text{)}$$

CHECKING : $\sum V = 0$

$$RFV + RBV = 0$$

$$1,803 - 6,803 = 0$$

$$0 = 0 \dots \text{oke!}$$

GAYA UNTANG

$$DF = RFV = 1,803 \text{ KN}$$

$$DB \text{ KIRI} = DF = 1,803 \text{ KN}$$

$$DB = DB \text{ KIRI} + RBV = 1,803 - 6,803 = 0$$

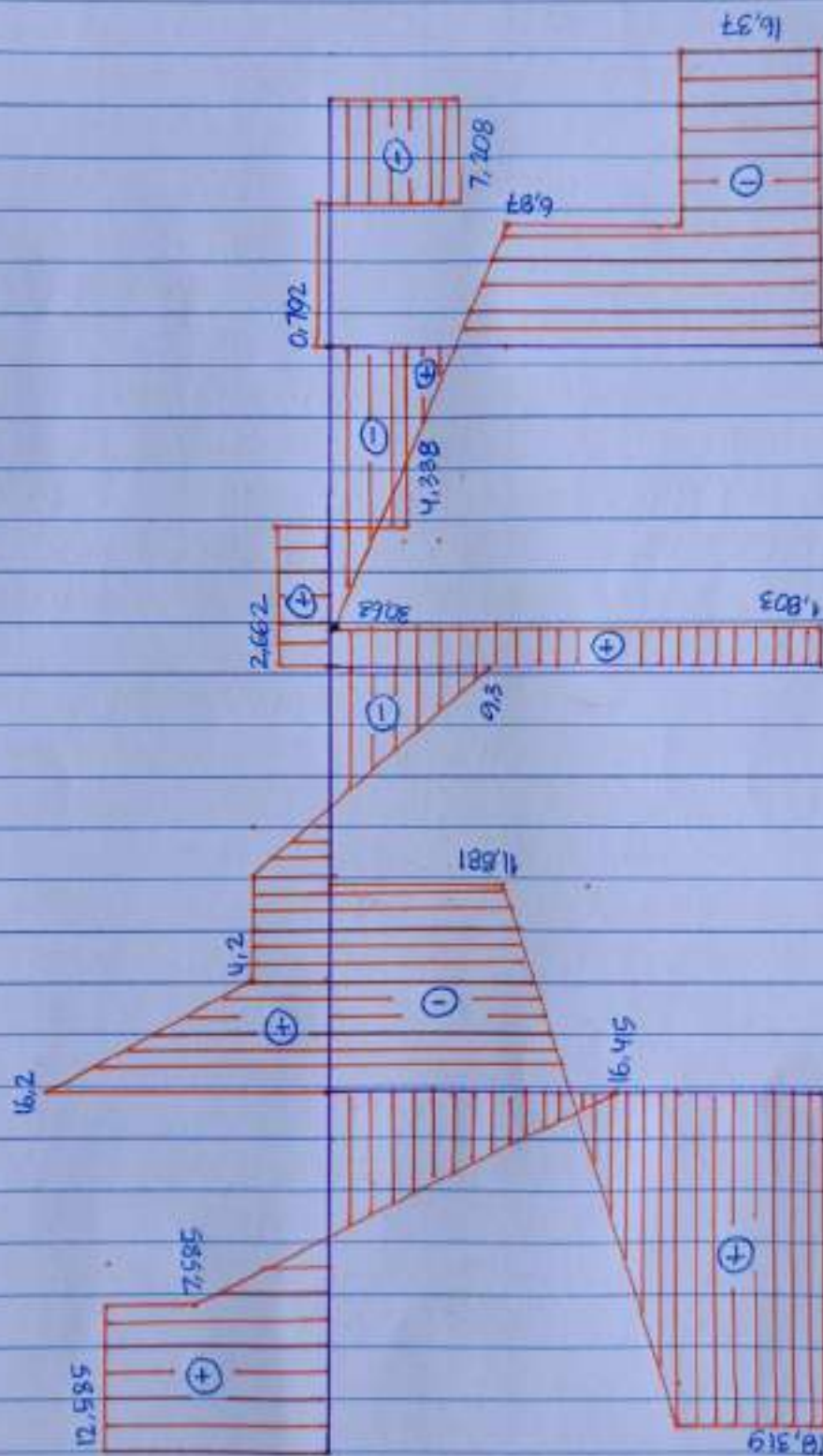
GAYA MOMEN

$$MF = -8,415 \text{ KNM}$$

$$MB = 4,208 \text{ KNM}$$

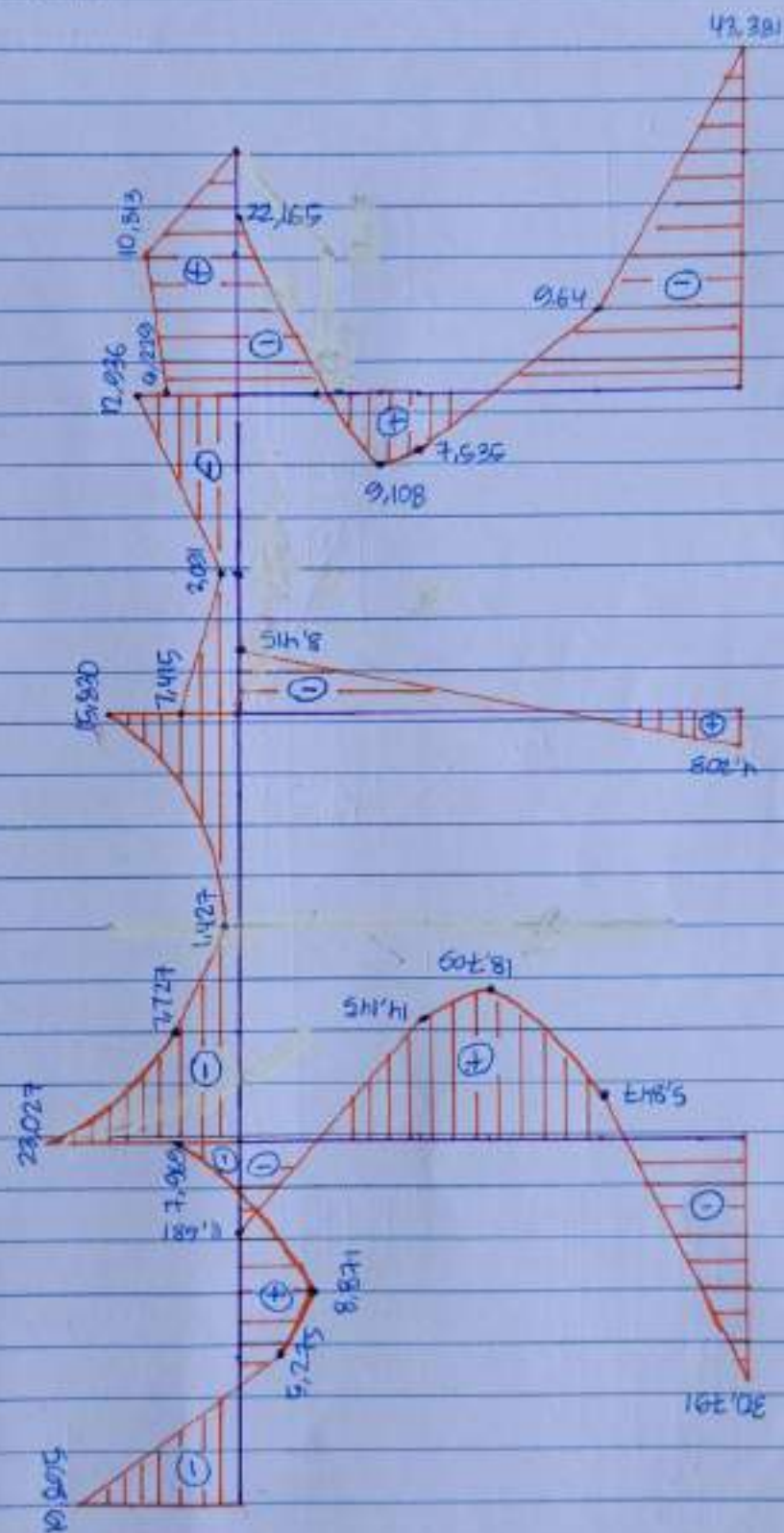
VII. PEMBEBARAN BAYA DALAM

- BAYA LINTANG



Sari Utama Dewi, S.T., M.T.

- GAYA MOMEN



Sari Utama Dewi, S.T., M.T.