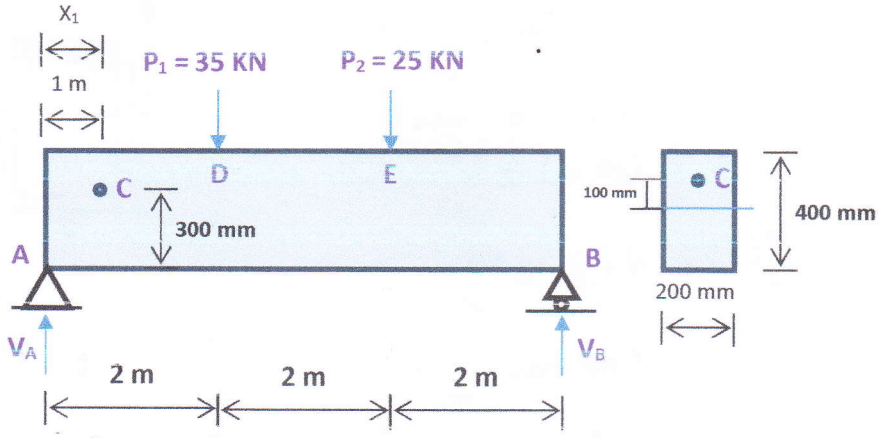
Upload Tugas ke-8

Universitas Bina Darma

Nama Mahasiswa	:	Agus Rudiyanto/ 192710046/ MTS4
Mata Kuliah	:	MEKANIKA TERAPAN (MTS271201)
Dosen	:	Dr. Firdaus, M.T.
Tugas	:	EL. 08

TUGAS 8

Sebuah balok sederhana dengan bentang 6 m, dibebani P_1 dan P_2. Penampang balok adalah persegi panjang dengan b = 200 mm dan h = 400 mm. Hitunglah tegangan normal pada titik C.



Jawab :

Syarat :

$\Sigma M = 0$

$\Sigma V = 0$

$\Sigma H = 0$

Perhitungan Reaksi Perletakan

$\Sigma M_A = 0$

$-V_B . 6 + P_2 . 4 + P_1 . 2 = 0$

$-V_B . 6 + 25 . 4 + 35 . 2 = 0$

$V_B = \frac{170}{6} = \frac{85}{3}$ KN

$\Sigma M_B = 0$

$V_A . 6 - P_1 . 4 - P_2 . 2 = 0$

$V_A . 6 - 35 . 4 - 25 . 2 = 0$

$V_A = \frac{190}{6} = \frac{95}{3}$ KN

$\Sigma V = 0$

$V_A + V_B - P_1 - P_2 = 0$

$\frac{95}{3} + \frac{85}{3} - 35 - 25 = 0$

$60 - 60 = 0$

$0 = 0$ ... OK!

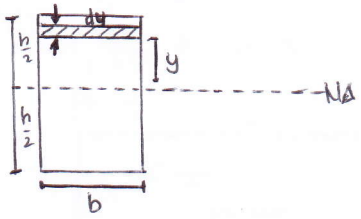
Perhitungan Bidang Momen

$M_{x1} = V_A \cdot x_1 = \frac{95}{3} x_1$

X_1	0	0,5	1	1,5	2
M_{x1}	0	15,833	31,667	47,5	63,333

didapat $M_c = 31,667$ KNm

Perhitungan Momen Inersia Penampang



$$I = \int_{-h/2}^{h/2} y^2 dA$$

dimana : $dA = b.dy$

$$I = \int_{-h/2}^{h/2} y^2 (b.dy)$$

$$I = b \int_{-h/2}^{h/2} y^2 dy = b \cdot \frac{1}{3} y^3 \Big]_{-h/2}^{h/2} = \frac{1}{12} bh^3$$

$$I = \frac{1}{12} . 200 . 400^3$$

$$= 10,67 . 10^8 \text{ mm}^4$$

Perhitungan tegangan pada titik C

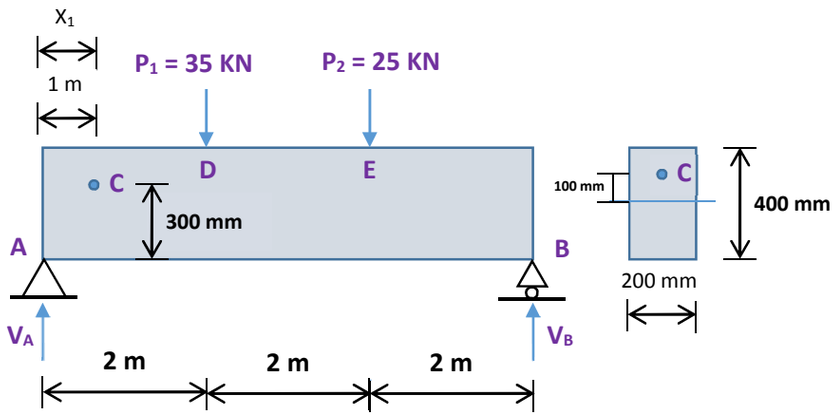
$$\sigma_c = \frac{M_c . C}{I}$$

$$\sigma_c = \frac{31,667 . 10^6 . 100}{10,67 . 10^8} = 2,968 \text{ MPa}$$

NAMA : ANDI SUPRIYADI
NIM : 192710035
ANGKATAN : MTS-4

TUGAS : 8

Sebuah balok sederhana dengan bentang 6 m, dibebani P_1 dan P_2. Penampang balok adalah persegi panjang dengan b = 200 mm dan h = 400 mm. Hitunglah tegangan normal pada titik C.



Jawab :

$$\sum M_A = 0$$

$$P_1 . 2\,m + P_2 . 4\,m - V_B . 6\,M = 0 \rightarrow V_B . 6\,m = 35\,KN\,.2\,m + 25\,KN.4\,m$$

$$V_B = \frac{70\,KN.m + 100\,KN.m}{6\,m} \rightarrow V_B = 28{,}33\,KN$$

$$\sum M_B = 0$$

$$V_A . 6\,m - P_1 . 4\,m - P_2 . 2\,m = 0 \rightarrow V_A . 6\,m - 35\,KN\,.4\,m - 25\,KN.2\,m = 0$$

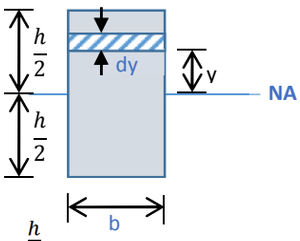
$$V_A . 6\,m = 35\,KN\,.4\,m + 25\,KN.2\,m \rightarrow V_A = \frac{140\,KN.m + 50\,KN.m}{6\,m} \rightarrow V_A = 31{,}67\,KN$$

$$Kontrol : \sum V = 0$$

$$V_A + V_B - 35\,KN - 25\,KN = 0 \rightarrow 31{,}67 + 23{,}33\,KN - 35\,KN - 25\,KN = 0 \rightarrow 0 = 0\ (ok)$$

$$M_{x1} = V_A . x_1 = 31{,}67\,KN.x_1$$

$$Momen\ di\ titik\ c\ dengan\ x_1 = 1\,m \rightarrow M_c = 31{,}67\,KN.1\,m \rightarrow M_c = 31{,}67\,KN.m$$



$$I = \int_{-\frac{h}{2}}^{\frac{h}{2}} y^2\, dA, dimana : dA = b.dy \rightarrow I = \int_{-\frac{h}{2}}^{\frac{h}{2}} y^2\, b.dy$$

$$I = b \int_{-\frac{h}{2}}^{\frac{h}{2}} y^2\, dy = b.[\frac{1}{3}y^3]_{-\frac{h}{2}}^{\frac{h}{2}} = \frac{1}{12}bh^3$$

$$I = \frac{1}{12}.200\ mm.(400\ mm)^3 = 10{,}67.10^8\ mm^4$$

Perhitungan tegangan pada titik C

$$\sigma_c = \frac{M_c.c}{I} = \frac{31{,}67\ KN.m\ x\ 100\ mm}{10{,}67.10^8\ mm^4} = \frac{31{,}67.10^6\ N.mm\ x\ 100\ mm}{10{,}67.10^8\ mm^4} = 2{,}97\ MPa$$

Nama : FIRMAN NURAHMAN

NIM : 19271004 2.

TUGAS : 8. MEKANIKA TERAPAN.

$\Sigma V = 0.$

$VA + VB - P_1 - P_2 = 0$

$31.67 + 28,33 - 35 - 25 = 0.$

$60 - 60 = 0$

$0 = 0$ Seimbang Ok.

Perhitungan Bidang Momen.

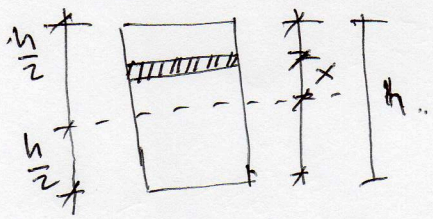
$Mx_1 = VA \cdot x_1$

$= \frac{95}{3} \cdot x_1.$

x_1	0	0,5	1	1,5	2.
Mx_1	0	15.83	31.67	47.5	63.33.

Didapat Momen Titik C, Mc. = 31.67 KN.M.

Perhitungan Momen Inersia Penampan.



$$I = \int_{h/2}^{h/2} y^2 \cdot dA.$$

Dimana. : $dA = b. dy.$

$$I = \int_{h/2}^{h/2} y^2 (b. dy).$$

$$I = \int_{h/2}^{h/2} y^2. dy = h. \frac{1}{3} y^3 \Big]_{h/2}^{h/2} = \frac{1}{12} b.h^3.$$

$$I = \frac{1}{12} \cdot 200 \cdot 400^3 = 10.67 \times 10^3 . MM^4.$$

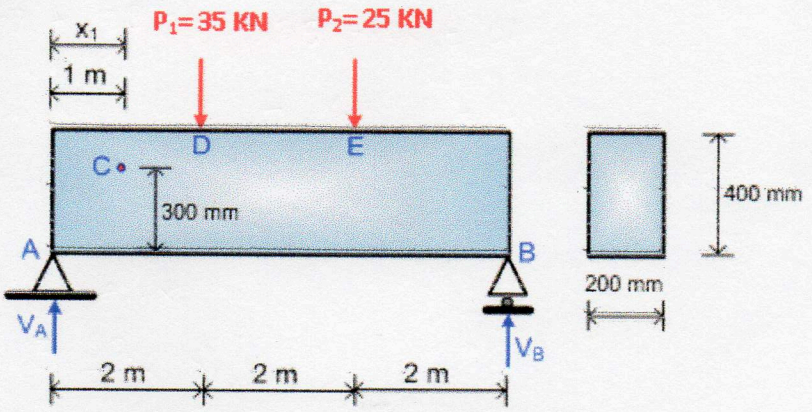
Perhitungan Tegangan pada Titik C.

$$\sigma_c = \frac{MA.C}{I} = \frac{31.67 . 10^6 . 100.}{10.67 . 10^8} = 2,97 \text{ MPA}$$

Nama : Firman Nurahman.
NIM : 1927100 42.
TUGAS : 8. MEKANIKA TERAPAN.

Tugas Pertemuan ke-8

Sebuah balok sederhana dengan bentang 6 m, dibebani P_1 dan P_2. Penampang balok adalah persegi panjang dengan b = 200 mm dan h = 400 mm. Hitunglah tegangan normal pada titik C.



Penyelesaian :

Syarat keseimbangan. :

$\Sigma M = 0.$

$\Sigma V = 0.$

$\Sigma H = 0$

* PERHITUNGAN Reaksi perletakan.

$\Sigma HA = 0.$

$HA \rightarrow 0 = 0 \ (\rightarrow)$

$\Sigma MA = 0.$

$-VB \cdot 6 + P2 \cdot 4 + P1 \cdot 2 = 0$

$-VB \cdot 6 + 25 \cdot 4 + 35 \cdot 2 = 0.$

$+VB = \frac{100 + 70}{6} = \frac{170}{6} = \frac{85}{3}$ KN $(\uparrow) \approx 28,33$ KN.

$\Sigma MB = 0.$

$+VA \cdot 6 - P_1 \cdot 4 - P2 \cdot 2 + HA \cdot 0 = 0$

$+VA \cdot 6 - 35 \cdot 4 - 25 \cdot 2 = 0.$

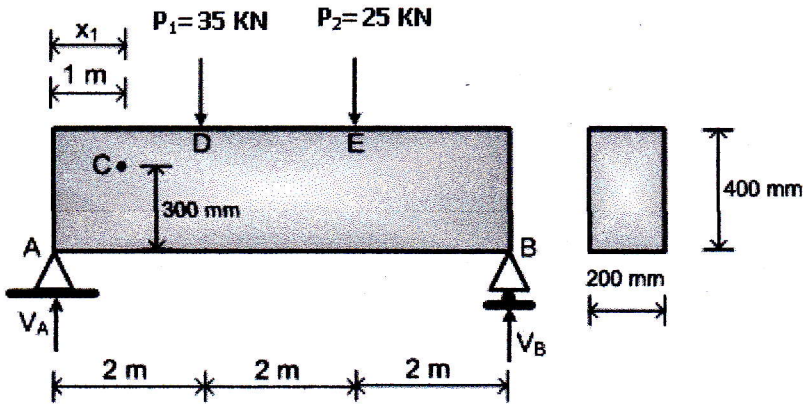
$+VA\ 6 - 140 - 50 = 0$

$+VA = \frac{140 + 50}{6} = \frac{190}{6} = \frac{95}{3}$ KN $(\uparrow) \approx 31.67$ KN.

NAMA : Rahman Sahri
NIM : 19271004 4
TUGAS : 8. (delapan).

Tugas Pertemuan ke-8

Sebuah balok sederhana dengan bentang 6 m, dibebani P_1 dan P_2. Penampang balok adalah persegi panjang dengan b = 200 mm dan h = 400 mm. Hitunglah tegangan normal pada titik C.



penyelesaian.

syarat keseimbangan.

$\Sigma M = 0$

$\Sigma V = 0$

$\Sigma H = 0$

•> perhitungan reaksi perletakan

$\Sigma HA = 0$

$HA - 0 = 0 (\rightarrow)$.

$\Sigma MA = 0$

$- VB.6 + P2.4 + P1.2 = 0$

$- VB.6 + 25.4 + 35.2 = 0$

$+ VB = \frac{100 + 70}{6} = \frac{170}{6} = \frac{85}{3}$ KN(↑) $\approx 28,33$ KN.

$\Sigma MB = 0$

$+ VA.6 - P1.4 - P2.2 + HA.0 = 0$

$+ VA.6 - 35.4 - 25.2 = 0$

$+ VA.6 - 140 - 50 = 0$

$+ VA = \frac{140 + 50}{6} = \frac{190}{6} = \frac{95}{3}$ KN(↑) $\approx 31,67$ KN.

$\Sigma V = 0$

$VA + VB - P1 - P2 = 0$

$31,67 + 28,33 - 35 - 25 = 0$

$60 - 60 = 0$

NAMA : Rahman Sahri
NIM : 19277004 4.
Tugas : 8 (Delapan)

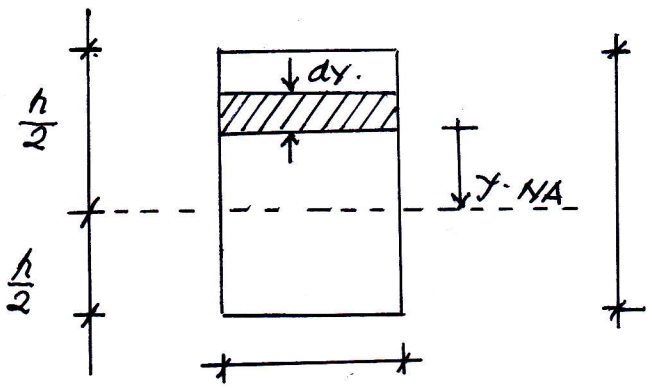
perhitungan BIDANG MOMEN.

$$M_{x1} = V_A . x_1$$
$$= \frac{95}{3} x_1$$

x_1	0	0,5	1	1,5	2
M_{x1}	0	15,83	31,67	47,5	63,33

Didapat Momen titik C = 31,67 KN.M.

perhitungan momen INERSIA penampang.



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Dimana : $dA = b . dy.$

$$I. = \int_{\frac{h}{2}}^{h/2} y^2 (b . dy).$$

$$I = b \int_{\frac{h}{2}}^{h/2} y^2 . dy = h \frac{1}{3} \Big]_{h/2}^{h/2} = \frac{1}{12} bh^3$$

$$I. = \frac{1}{12} 2000 . 400^3 = 10,67 \times 10^6 \, mm.^4$$

perhitungan pada titik C

$$\sigma c = \frac{M_x . C}{I} = \frac{31,67 . 10^6 . 100}{10,67 . 70} = 2,97 . Mpa.$$

TUGAS-8

MEKANIKA TERAPAN (MTS 271201)

Oleh :

Nama **: Saeman**

NIM **: 192710038**

Dosen Program **: Dr. Firdaus, ST., M.T**

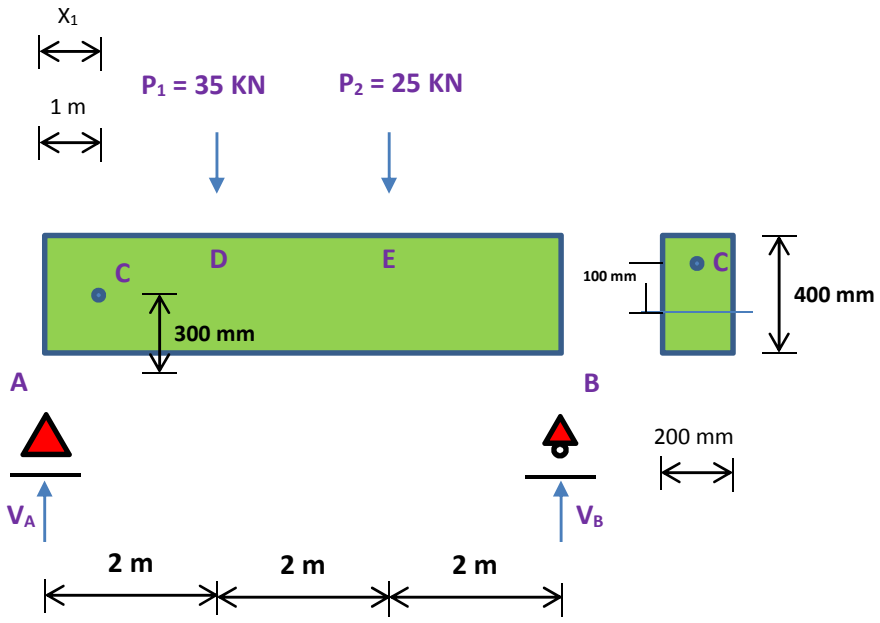
PROGRAM PASCASARJANA MAGISTER TEKNIK SIPIL

UNIVERSITAS BINA DARMA

2020

Tugas- 8

Sebuah balok sederhana dengan bentang 6 m, dibebani P_1 dan P_2. Penampang balok adalah persegi panjang dengan b = 200 mm dan h = 400 mm. Hitunglah tegangan normal pada titik C.



Jawab :

$$\sum M_A = 0$$

$$P_1 . 2\ m + P_2 . 4\ m - V_B . 6\ M = 0 \rightarrow V_B . 6\ m = 35\ KN\ .2\ m + 25\ KN . 4\ m$$

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$$V_A . 6\ m = 35\ KN\ .4\ m + 25\ KN . 2\ m \rightarrow V_A = \frac{140\ KN.m + 50\ KN.m}{6\ m} \rightarrow V_A = 31{,}67\ KN$$

$$Kontrol : \sum V = 0$$

$$V_A + V_B - 35\ KN - 25\ KN = 0 \rightarrow 31{,}67 + 23{,}33\ KN - 35\ KN - 25\ KN = 0 \rightarrow 0 = 0\ (ok)$$

$$M_{x1} = V_A \,.\, x_1 = 31{,}67\ KN.\, x_1$$

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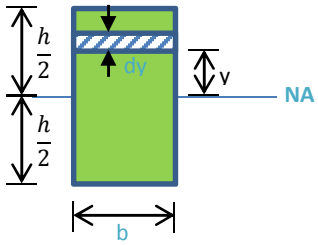

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