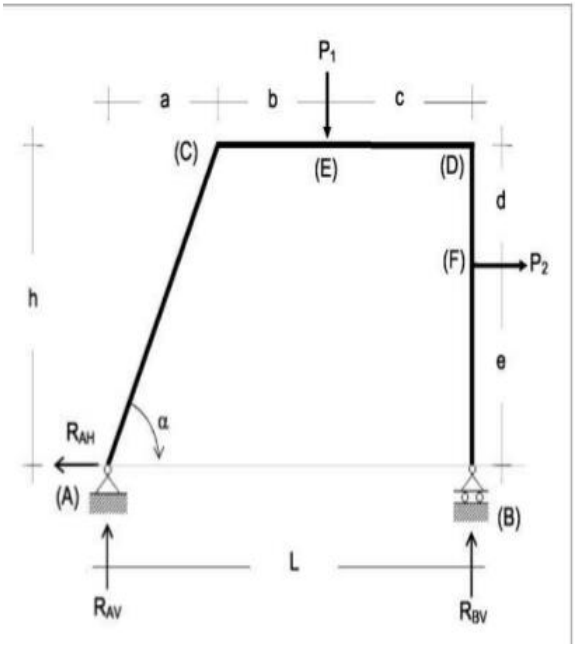
PORTAL TIDAK SIMETRIS STATIS TERTENTU

A Kolom miring sebelah, memikul muatan terpusat vertikal dan horisontal.



Diketahui : Konstruksi seperti tergambar.

L=10m, h=5m, a=2m, b=2m, c=6m, d=2m, e=3m. P_1 = 5 ton, P2 = 2 ton.

Diminta : Hitung dan gambarkan M, D dan N pada seluruh bentang

PENYELESAIAN

a. Reaksi Perletakan.

∑MB = 0,
RAV . L— RAH . 0 — P1 . c + P2 . e= 0
RAV = P1 . c/L — P2 . e/L = 5 . 6/10 — 2 . 3/10 = 3 — 0,6
RAV = + 2,4 ton (keatas).

∑MA = 0,
RBV . L + P 1 . (a + b) + P2 . e = 0
RBV = P1 . (a+b)/L + P2 . e/L = 5 . (2 + 2)/10 + 2 . 3/10 = 2 + 0,6
RBV = + 2,6 ton (keatas).

∑H = 0,
RAH+ P2 = 0
RAH = P2 = + 2 ton (kekiri).

Kontrol :
∑V = 0,
RAV + RBV — P1 = 0
2,4 + 2,6 - 5 = 0 (memenuhi).

b. Gaya lintang.

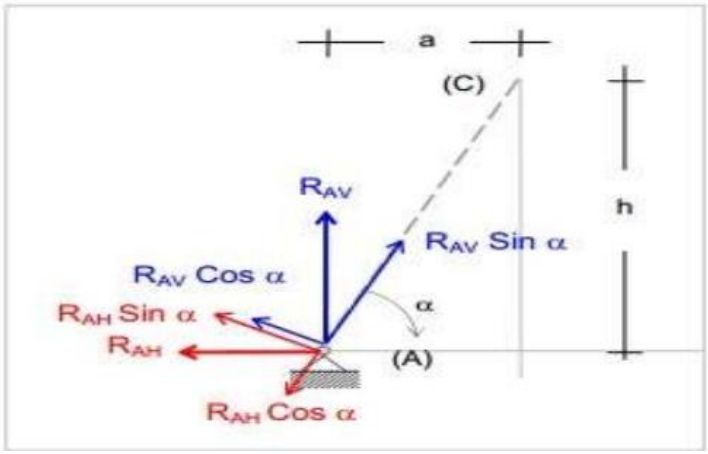
α = arc tan (h/a) = arc tan (5/2) = 68° 11' 55"

DA-C = + RAH sin a + RAV cos a
= 2 . sin(68°11'55") + 2,4 . cos(68°11'55")
= + 1,857 + 0,891
= + 2,748 (ton).

DC-E = + RAV = + 2,4 (ton).

DE-D = + RAV —P1 = 2,4 - 5 = -2,6 (ton)
= -RBV.

DD-F = -RAH
= -2 (ton).



c. Momen.

MA = 0

Mc = ± RAH . h + RAV . a
= 2 . 5 + 2,4 . 2 = + 14,8 (t.m').

ME = RAH . h + RAV. (a + b)
=2 . 5 +2,4 . (2 +2) =+ 19,6 (t.m').

MD = RAH . h + RAV . L — P_1 . c
= 2 . 5 + 2,4 . 10 — 5. 6 = + 4 (t.m').

Atau,

MD = ± P2 . d = + 2 .2 = + 4 (t.m').

MF =RAH. e + RAV .L — P_1 . c = 2 . 3 + 2,4 . 10 — 5. 6 = 0

MB = 0

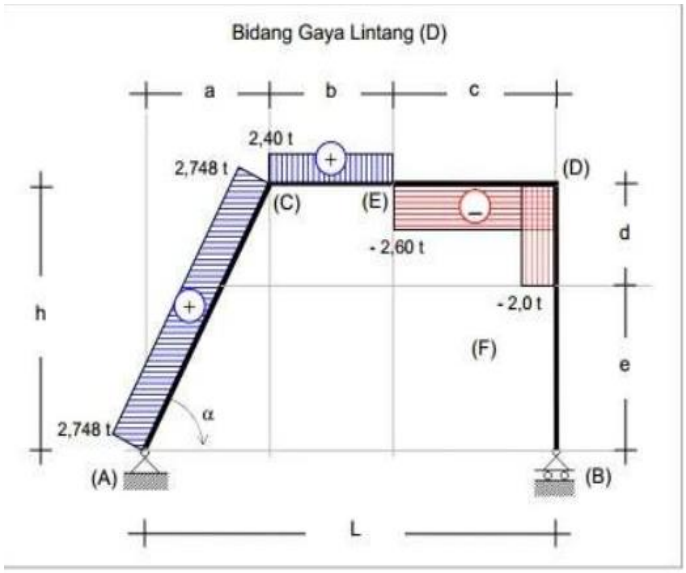
d. Gaya Normal.

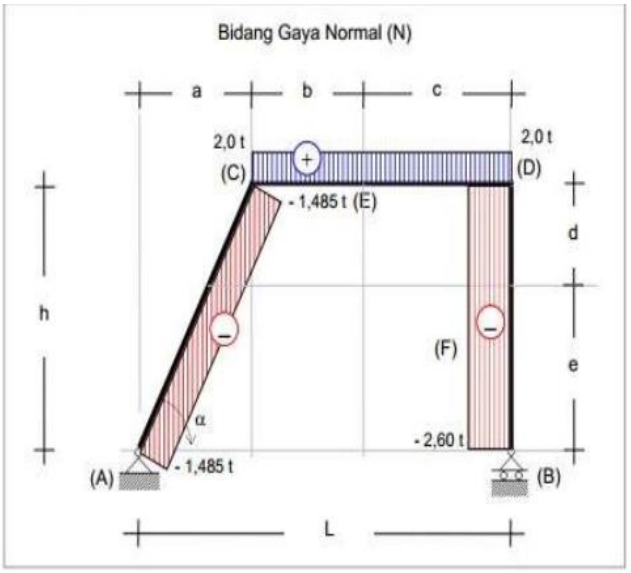
a = 68° 11' 55"

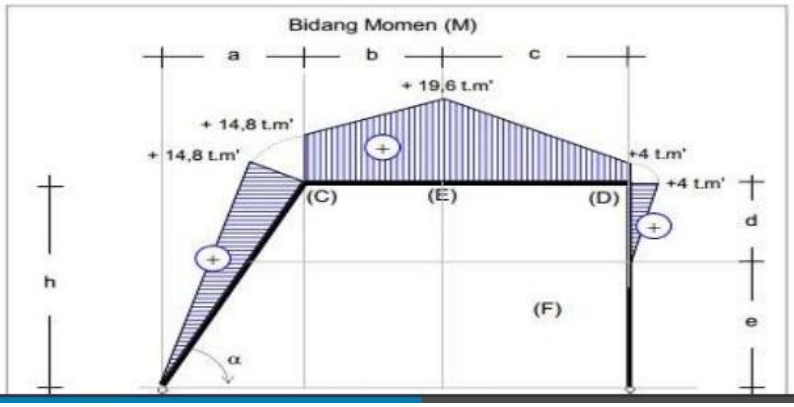
NA-C= + RAH COS a ± RAv sin a
= 2 . cos(68°11 '55") — 2,4 . sin(68°11 '55") = + 0,743-2,228
= — 1,485 ton (tekan).

NC-D= + R_{AH} = + 2 ton (tarik).

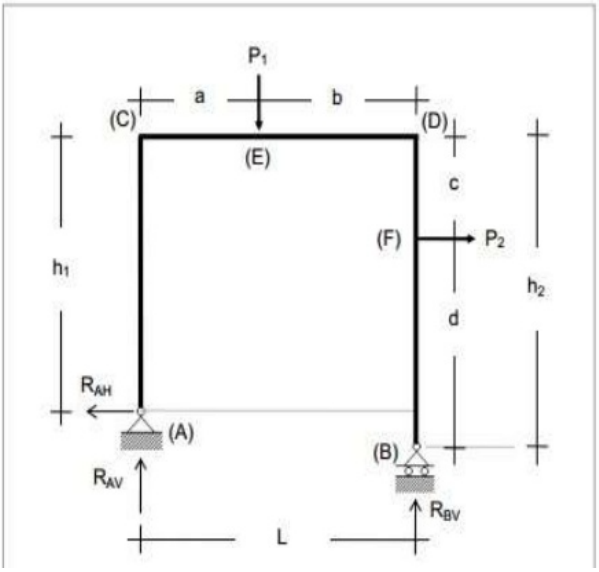
NB-D= — RBV = — 2,6 ton (tekan).


Bidang Gaya Lintang (D)
a
b
c
2,40 t
2,748 t
(C)
(E)
(D)
- 2,60 t
d
h
- 2,0 t
(F)
e
2,748 t
α
(A)
(B)
L


Bidang Gaya Normal (N)
a
b
c
2,0 t
2,0 t
(C)
(D)
- 1,485 t (E)
d
h
(F)
e
α
- 2,60 t
(A)
- 1,485 t
(B)
L


Bidang Momen (M)
a
b
c
+ 19,6 t.m'
+ 14,8 t.m'
+ 14,8 t.m'
+4 t.m'
+4 t.m'
(C)
(E)
(D)
d
h
(F)
e
α

B. Kolom tinggi sebelah, memikul muatan terpusat vertikal dan horisontal.



Diketahui :Konstruksi seperti tergambar.

L= 10 m, hi =5 m, h2 = 6 m, a = 4 m, b = 6 m, c = 2m, d = 4 m. P_1= 5 ton, P2 = 2 ton.

Diminta : Hitung dan gambarkan M, D dan N pada seluruh bentang!

PENYELESAIAN

a. Reaksi Perletakan.

$\sum H = 0,$

$RAH + P2 = 0$

$RAH = + P2 = + 2$ ton (kekiri).

$\sum MB = 0,$

$RAV. L - RAH . (12 - hi) - P1 . b + P2 . d = 0$

$RAV = P1. b/L + RAH . (h2 - 111)/L - P2 . d/L$ (ton).

$= 5 . 6/10 + 2 . (6 - 5)/10 - 2 . 4/10$

$= 3 + 0,2 - 0,8$ RAV

$= + 2,4$ ton (keatas).

$\sum MA = 0,$

$RBV . L + P1. a + P2 . (hi - C) = 0$

$RBV = P1 . a/L + P2 . (hi - c)/L$

$=5 . 4/10 + 2 . (5 - 2)/10 = 2 + 0,6$ RBV

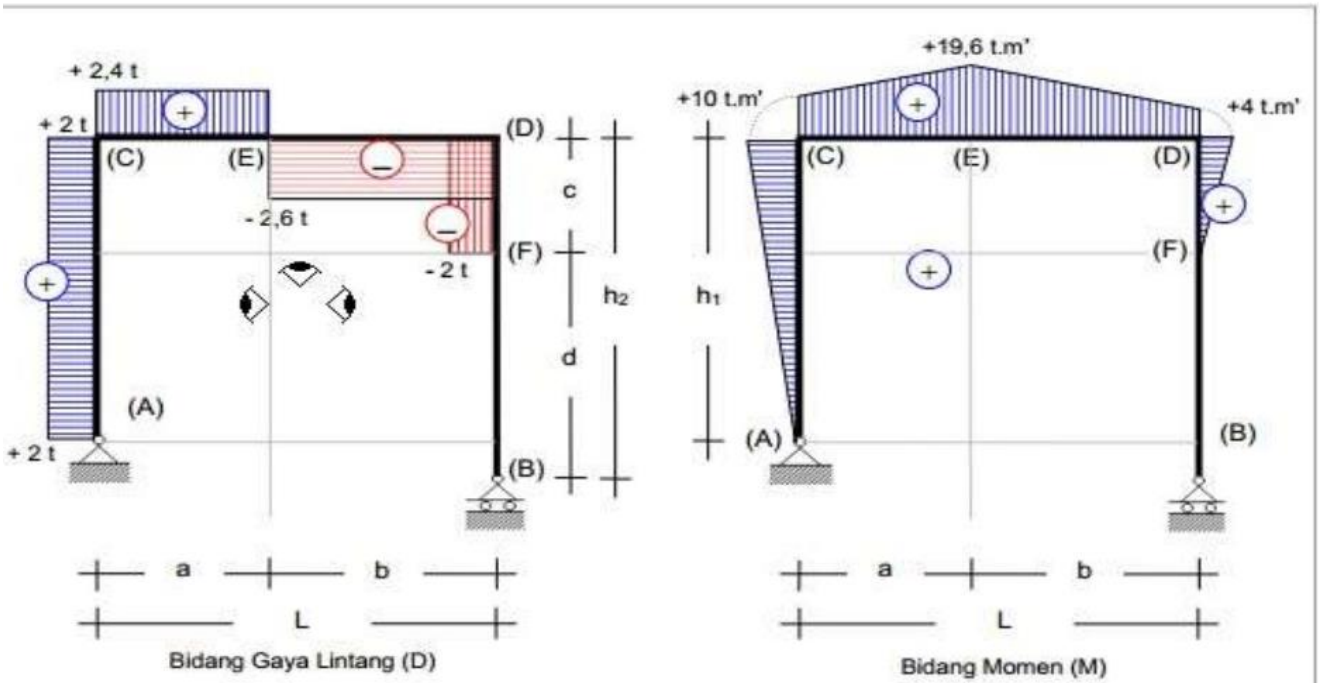
$= + 2,6$ ton (keatas)

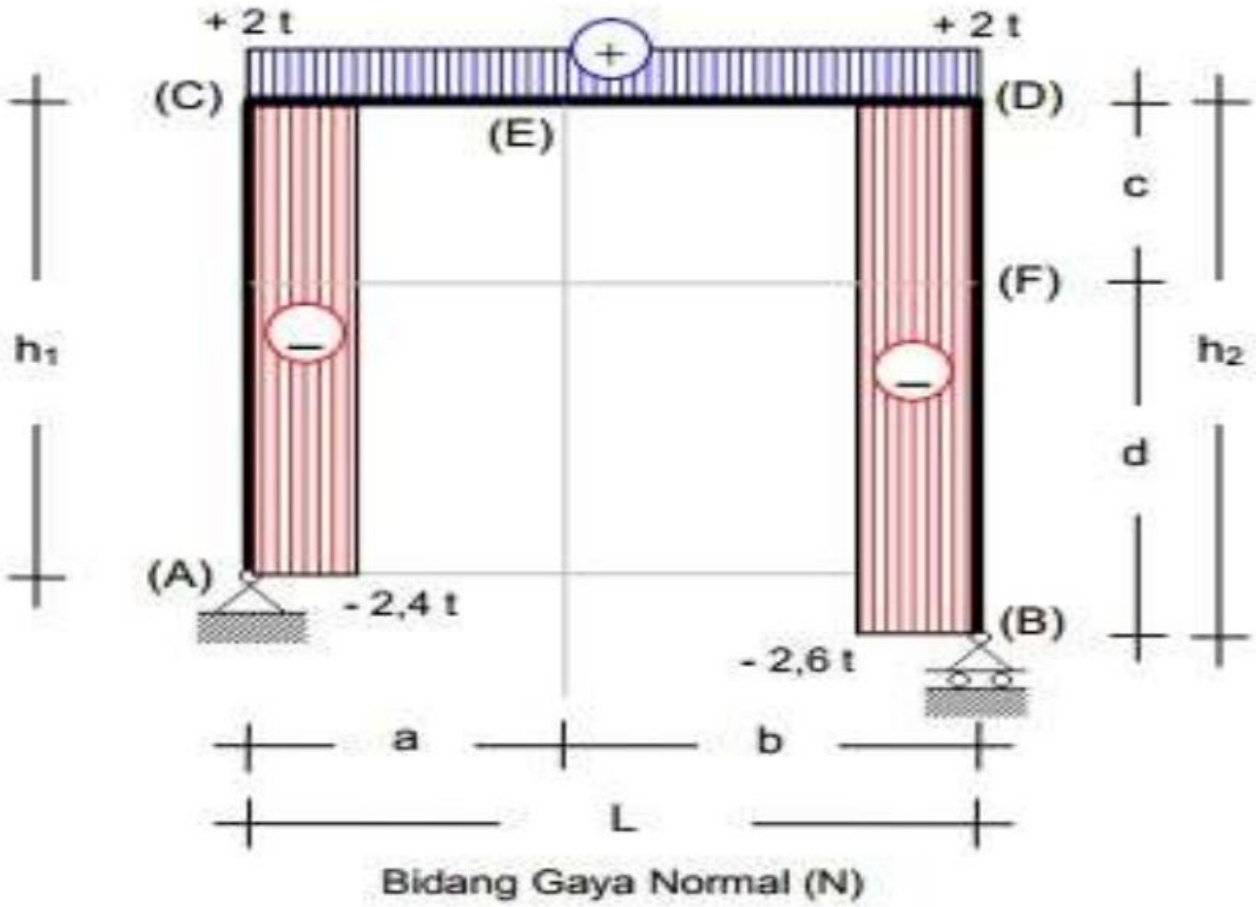
Kontrol :
$\sum V = 0$,
RAY + RBV — P1 =0
2,4 + 2,6 — 5 = 0 .....(memenuhi).

b. Gaya lintang.
DA-C = + R_{AH} = + 2 ton.
DC-E = + RAV = ± 2,4 ton.
DE-D = + RAV — P1 = ± 2,4 — 5 = — 2,6 ton. DD-F = — R_{AH} = — 2 ton, atau
DD-F = — P2 = — 2 ton.

c. Momen.
MA = 0
Mc =+R.h=+2.5=+10t.m'.
ME = + RAV . a + RAH h + 2,4 . 4 + 2 . 5
= 19,6 t.m'.
MD = + RAV .L + RAH .h — P1.b
=2,4 .10+2 .5-5 .6
= 24 + 10 — 30
MD =+ 4 t.m'.
Atau,
M_D =+P_2. c=+2 . 2 =+4 t.m'.
M_F = + $_{RAV}$. L + RA_H . (hi — c) — P_1 . b (t.m') (dari kiri)
= + 2,4 . 10+2 . (5 — 2) — 5 . 6
= 24 + 6 — 30

d. Gaya Normal.
NA-C = RAV = -2,4 ton (tekan).
NC-D = + RAH = + 2 ton (tarik).
NB-D = — RBV = -2,6 ton (tekan).





Bidang Gaya Normal (N)