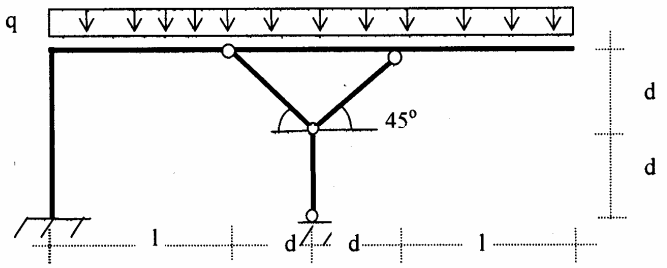
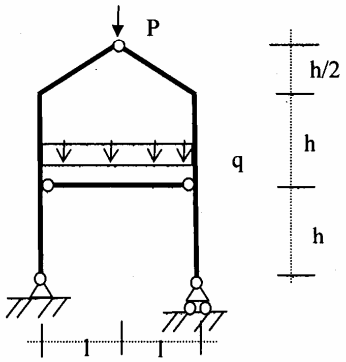
SCIENZA DELLE COSTRUZIONI I 31-03-2010 **A**

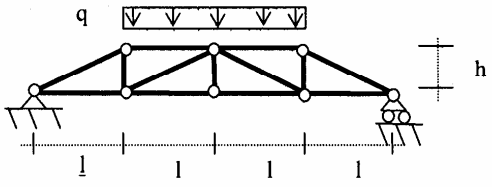
1)Risolvere e disegnare i diagrammi quotati in Kg di N,T,M con l=3m, d=1.5m, q=1000 kg/m.




2) Risolvere la struttura simmetrica in figura e disegnare i diagrammi quotati in Kg di N,T,M con l=2m, h=3m, q=200 kg/m,P=2ql

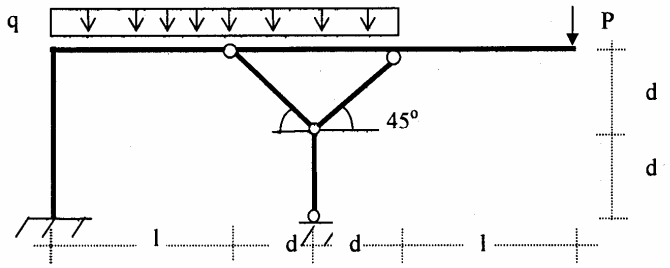



3) Determinare lo stato di sollecitazione primario e secondario della reticolare in figura dove l=1.5 m, h=1m q=100kg/m; si ricorda che occorre stilare la tabella degli sforzi primari col loro valore in Kg.

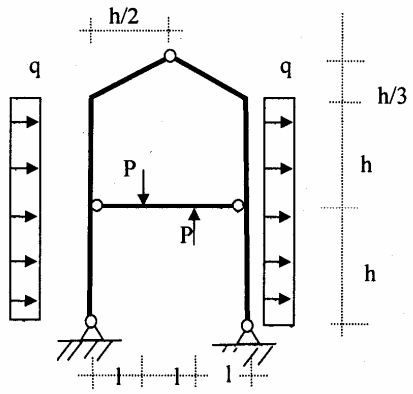


SCIENZA DELLE COSTRUZIONI I 31-03-2010 **B**

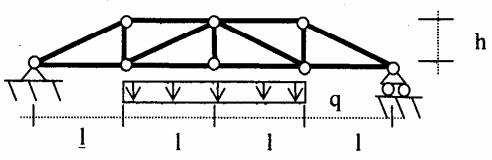
1)Risolvere e disegnare i diagrammi quotati in Kg di N,T,M con l=3m, d=1.5m, q=1000 kg/m, P=ql




2) Risolvere la struttura antisimmetrica in figura e disegnare i diagrammi quotati in Kg di N,T,M con l=1m, h=3m, q=200 kg/m,P=ql



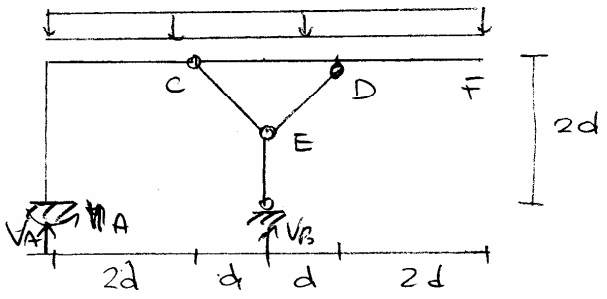

3) Determinare lo stato di sollecitazione primario e secondario della reticolare in figura dove l=1.5 m, h=1m q=100kg/m; si ricorda che occorre stilare la tabella degli sforzi primari col loro valore in Kg.

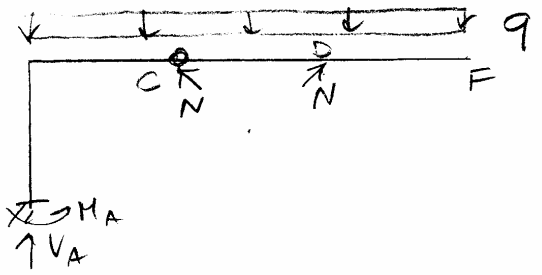


SdC I 31/03/2010

Ⓐ

1)

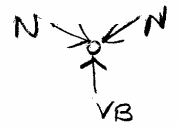



$d = 1{,}5\,m$

$q = 1000\,kg/m$

NODO (E)




$N = \frac{V_B}{\sqrt{2}} = V_B\frac{\sqrt{2}}{2}$

↺ tratto CF

$N\frac{\sqrt{2}}{2}\,2d = 4qd \cdot 8d$

$N = \frac{8}{\sqrt{2}}qd = \frac{8\sqrt{2}}{2}qd = 4\sqrt{2}qd$

$= 8485{,}28\,kg$

↑ globale

$V_A = -2N\frac{\sqrt{2}}{2} + 6qd =$

$= -8qd + 6qd = -2qd$

$= -3000\,kg$

↺ tratto AC

$M_A - V_A 2d + 2qd^2 = 0$

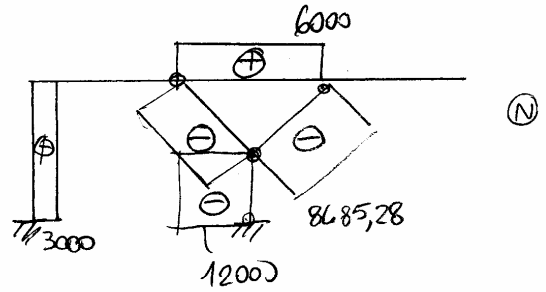
$M_A = -4qd^2 = 2qd^2 = 6qd^2$

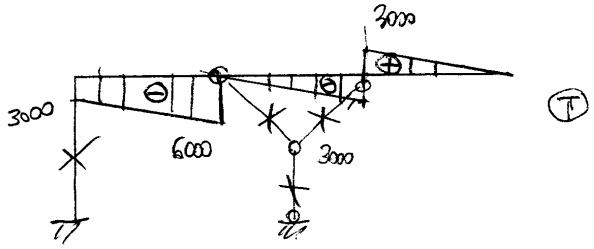
$= -13\,500\,kgm$

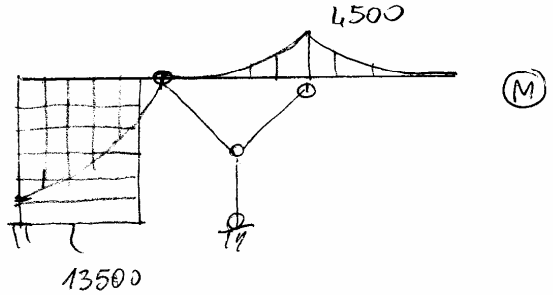
check

B ↺ globale

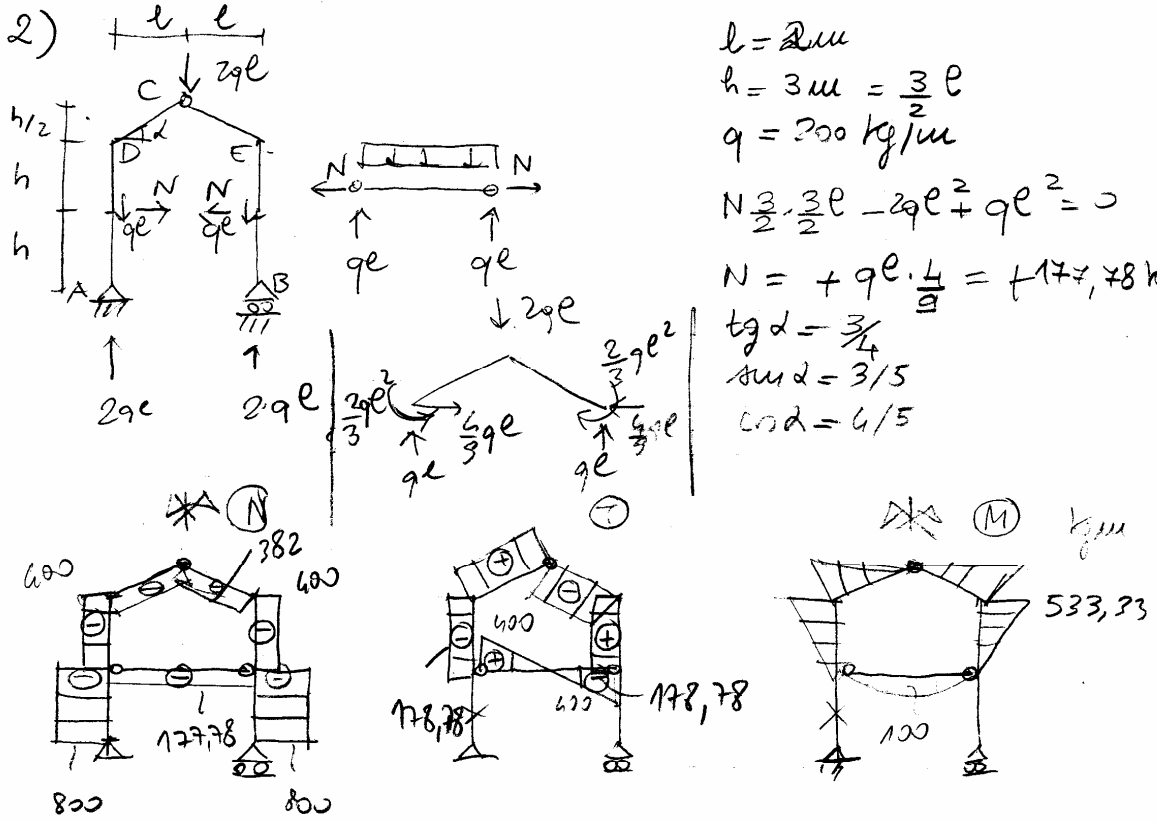
$+2qd \cdot 3d = 6qd^2$ ok



2)




$\ell = 2m$

$h = 3m = \frac{3}{2}\ell$

$q = 200\ kg/m$

$N\frac{3}{2}\cdot\frac{3}{2}\ell - 2q\ell^2 + q\ell^2 = 0$

$N = +q\ell\cdot\frac{4}{3} = +177{,}78\ kg$

$tg\alpha = 3/4$

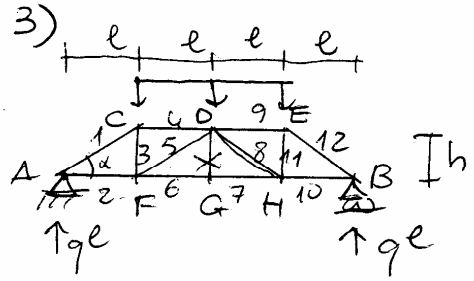
$\sin\alpha = 3/5$

$\cos\alpha = 4/5$

$N(s) = -q\ell\sin\alpha - \frac{4}{3}q\ell\cos\alpha = -\frac{3}{5}q\ell - \frac{4}{3}\cdot\frac{4}{5}q\ell = -\frac{43}{45}q\ell = -382{,}22\ kg$

$T(s) = \frac{q\ell}{8}\cos\alpha - \frac{4q\ell}{3}\sin\alpha = q\ell\cdot\frac{4}{5} - \frac{4}{3}q\ell\frac{3}{5} = \frac{8}{15}q\ell = 213{,}33\ kg$

3)




$l = 1{,}5m = \frac{3}{2}h$

$h = 1m = \frac{2}{3}l$ ; $q = 100 kg/m$

$V_A = V_B = qe$

$tg\alpha = \frac{2}{3}$

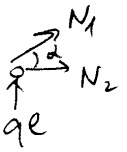
$\sin\alpha = \frac{2/3}{\sqrt{1+4/9}} = \frac{2}{\sqrt{13}}$

$\cos\alpha = 3/\sqrt{13}$

$N_A = 13$

$N_M = 8$

(A)

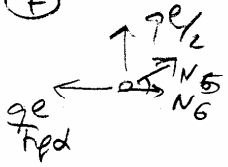



$N_1 = -\frac{qe}{\sin\alpha}$

$N_2 = \frac{qe}{tg\alpha}$

(B) = (A)

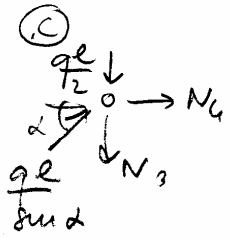
(F)




$N_5 = -\frac{qe}{2\sin\alpha}$

$N_6 = +\frac{qe}{2tg\alpha} + \frac{qe}{tg\alpha} = \frac{3}{2}\frac{qe}{tg\alpha}$

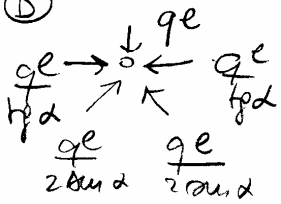
(C)




$N_4 = -\frac{qe}{tg\alpha}$

$N_3 = -q\frac{e}{2} + qe = \frac{qe}{2}$

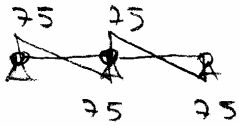
(D)




ok

| | |
|---|---|
| 1 | −270,41 |
| 2 | 225 |
| 3 | 75 |
| 4 | −225 |
| 5 | −135,2 |
| 6 | 337,5 |
| 7 | $= N_6$ |
| 8 | $= N_5$ |
| 9 | $= N_4$ |
| 10 | $= N_2$ |
| 11 | $= N_3$ |
| 12 | $= N_1$ |

SECONDARIO




(T) kg

(H) kgm

281,2

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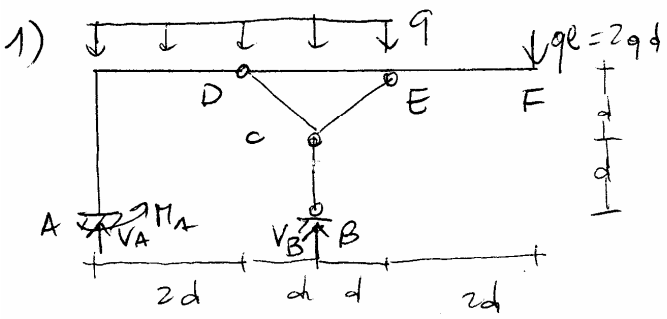
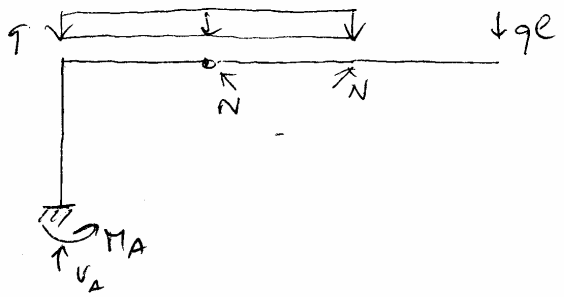
(B)

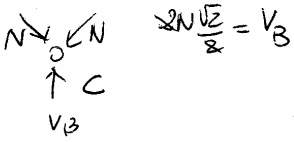
1)




$q = 10000 \text{ kg/m}$

$d = 1{,}5 \text{ m}$ , $\ell = 2d$




$\frac{2N\sqrt{2}}{2} = V_B$

D↻ $N\frac{\sqrt{2}}{2} 2d = q 2d \frac{2}{2} + 2qd \cdot 4$

$N = 5\sqrt{2}\, qd \Rightarrow V_B = 10qd$

↑) $V_A = 4qd - 2.5\sqrt{2}\frac{\sqrt{2}}{2} qd + 2qd = -4qd = -60000 \text{ kg}$

A↻ $M_A + V_B 3d = 8qd^2 + 12qd^2$

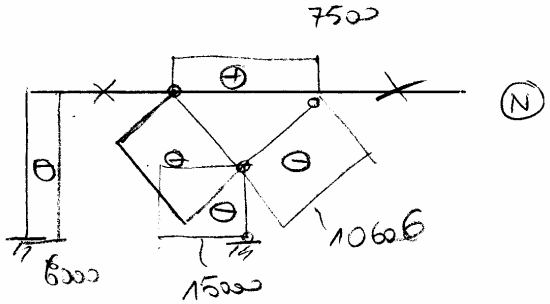
$M_A = -10qd^2 = -225000 \text{ kgm}$

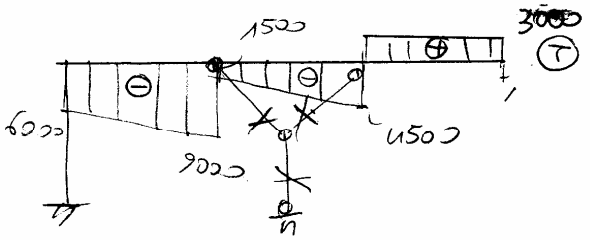
check

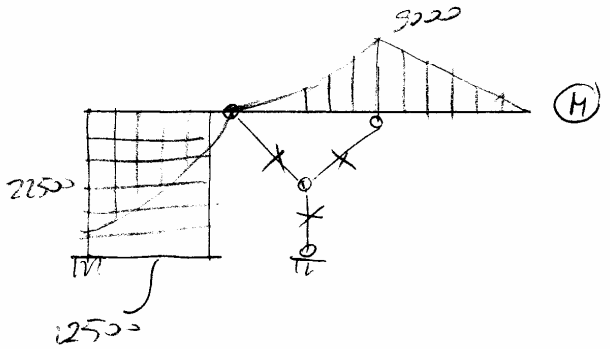
B↻ $+12qd^2 - 10qd^2 + 4qd^2 - 6qd^2 = 0$

$N = 10606 \text{ kg}$

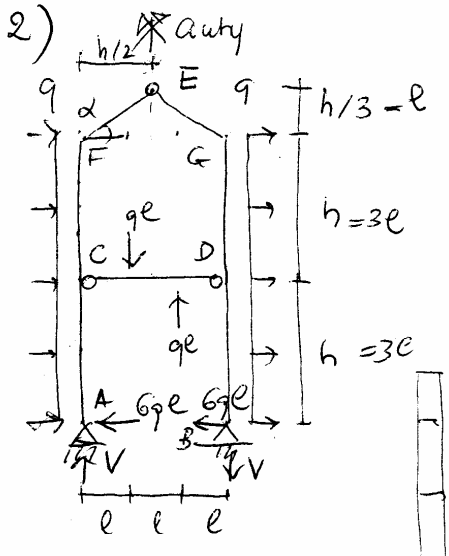
$V_B = 15000 \text{ kg}$



2)




$q = 200\ kg/m$

$h = 3m\ ;\ \ell = 1m$

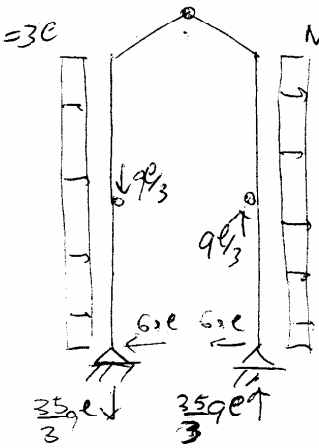
$h = 3\ell$

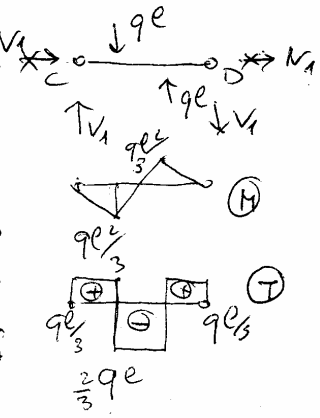
$\sin\alpha = 2/\sqrt{13}$

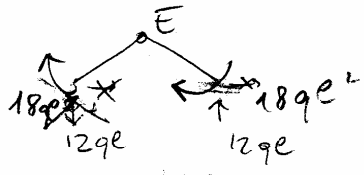
$\operatorname{tg}\alpha = (3/2)^{-1} = \frac{2}{3}\ ;\ \cos\alpha = 3/\sqrt{13}$

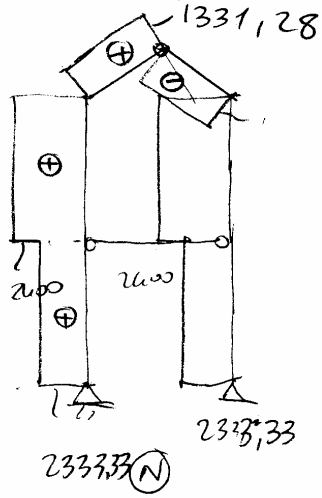
$A\ \sum\ -V3\ell - 6q\ell \cdot 2 \cdot 3\ell + q\ell^2 = 0$

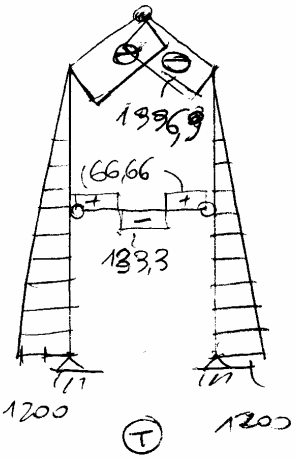
$V = -\frac{35}{3}q\ell = -2333{,}33\ kg$

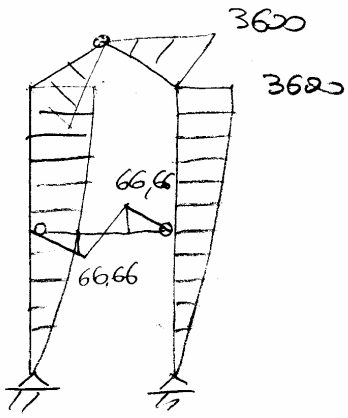


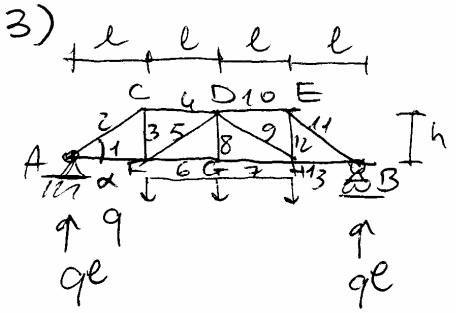



3)




$l = 1{,}5\,m = \frac{3}{2}h$

$h = 1\,m$

$q = 100\,kg/m$

$tg\,\alpha = 2/3$

$\cos\alpha = 3/\sqrt{13}$

$\sin\alpha = 2/\sqrt{13}$

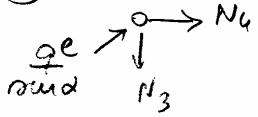
Ⓐ


$N_2 = -\frac{qe}{\sin\alpha}$

$N_1 = \frac{qe}{tg\,\alpha}$

Ⓑ solum

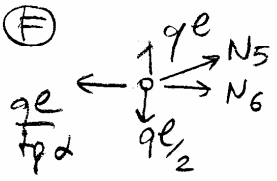
Ⓒ




$N_4 = -\frac{qe}{tg\,\alpha}$

$N_3 = qe$

Ⓕ

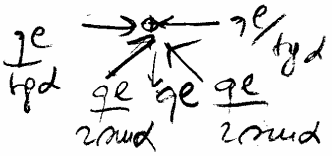



$N_5 = -\frac{qe}{2\sin\alpha}$

$N_6 = \frac{qe}{2\,tg\,\alpha} + \frac{qe}{tg\,\alpha} = \frac{3}{2}\frac{qe}{tg\,\alpha}$

$N_8 = qe$

Ⓓ




ok

| | |
|---|---|
| 1 | 225 |
| 2 | −270,41 |
| 3 | 150 |
| 4 | −270,41 |
| 5 | −135,2 |
| 6 | 337,5 |
| 7 | 337,5 |
| 8 | 150 |
| 9 | $= N_5$ |
| 10 | $= N_4$ |
| 11 | $= N_2$ |
| 12 | $= N_3$ |
| 13 | $= N_1$ |

SECONDARIO