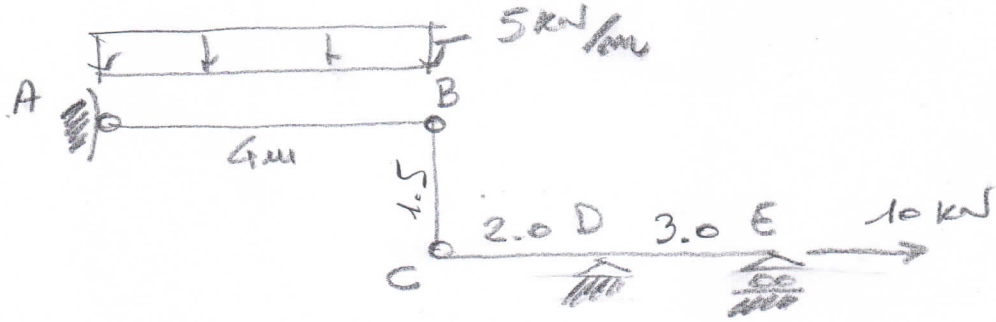
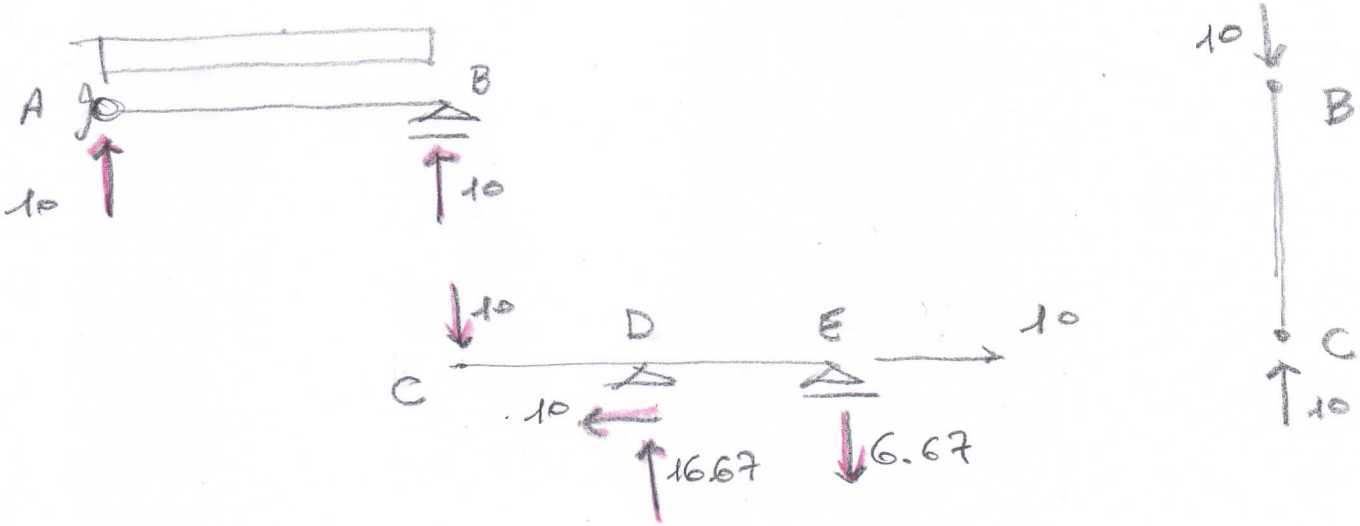
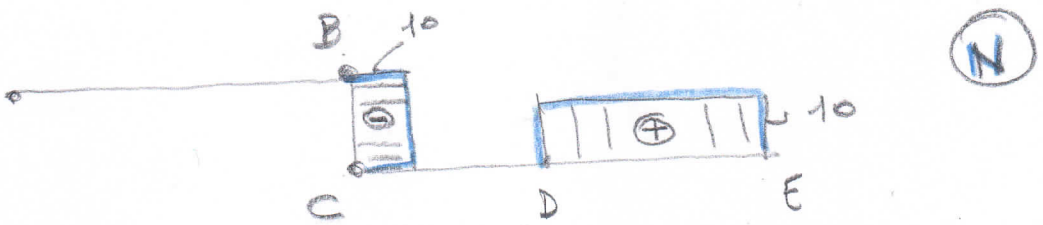
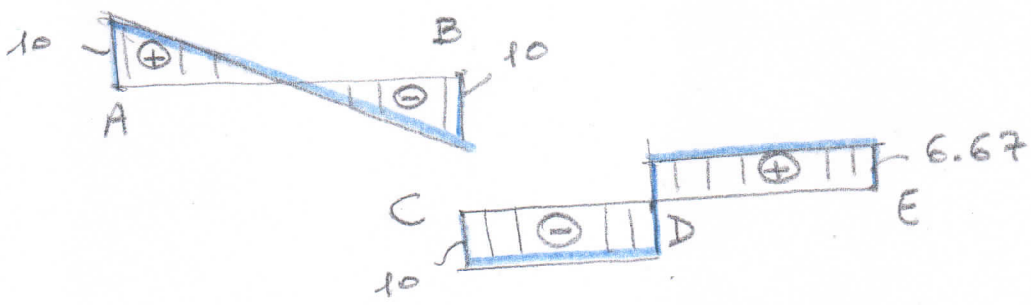


ES. 1

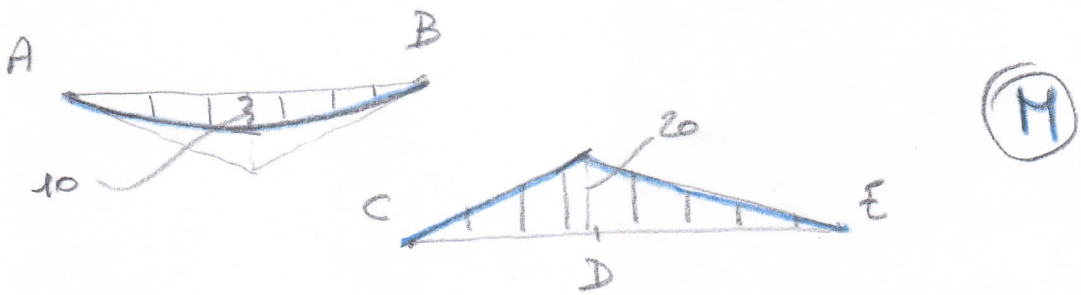




N



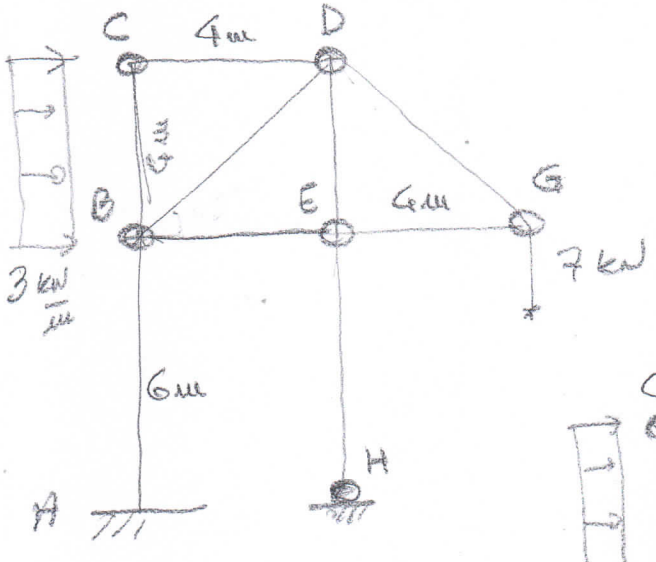
T

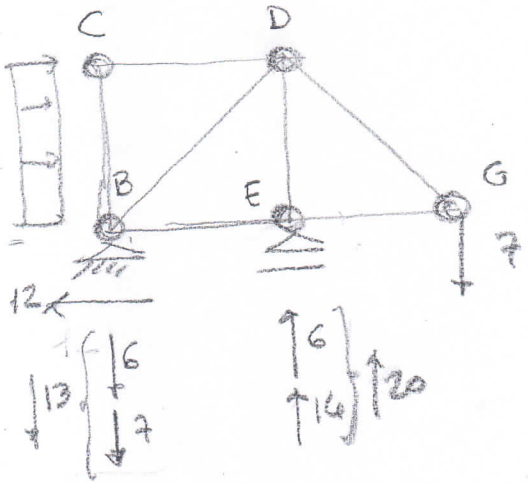


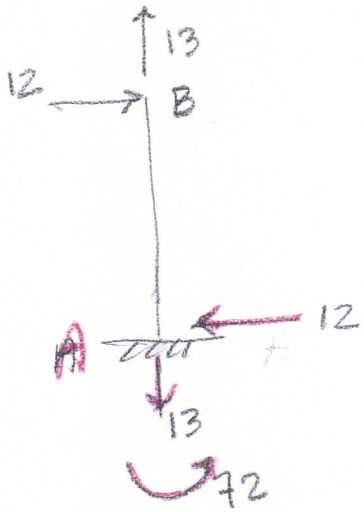
M

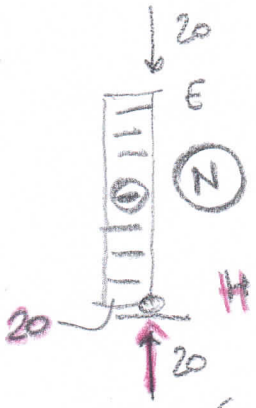
$$M(z)^{CD}_{C=0} = -10\,z$$

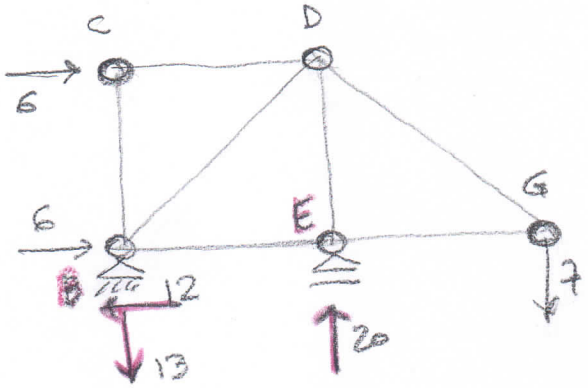
ES. 2

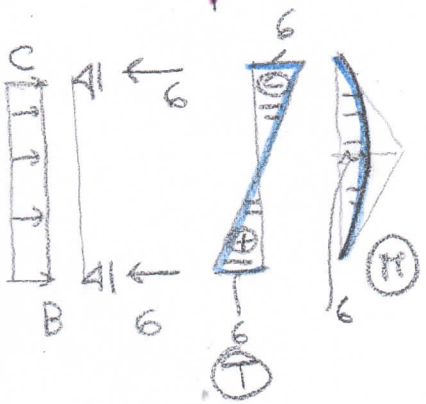










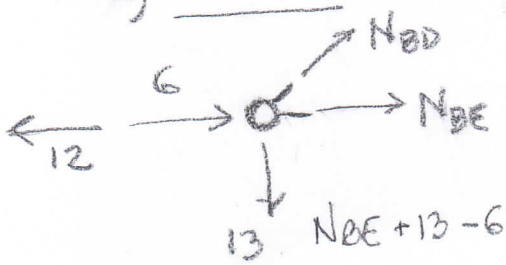


1) Nodo C

$N_{BC} = 0$

$N_{CD} = -6$

2) Nodo B

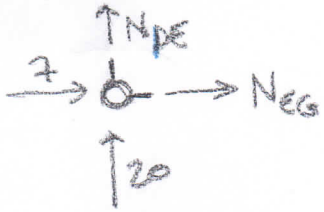


$N_{BD}\frac{\sqrt{2}}{2} - 13 = 0$

$N_{BD} = 13\sqrt{2} = 18.38$

$N_{BE} + 13 - 6 = 0 \Rightarrow N_{BE} = -7$

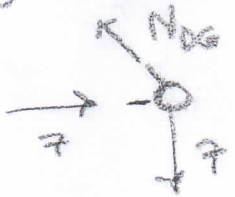
3) Nodo E

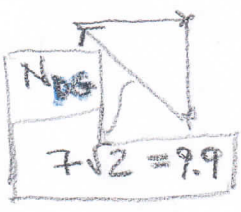


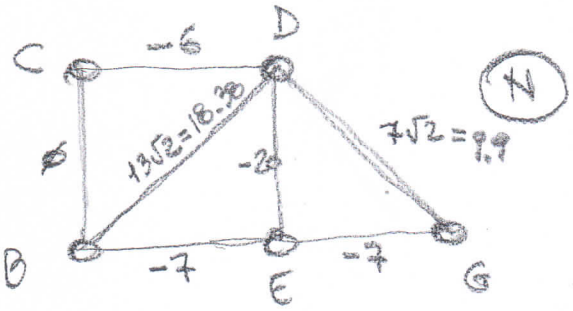
$N_{DE} = -20$

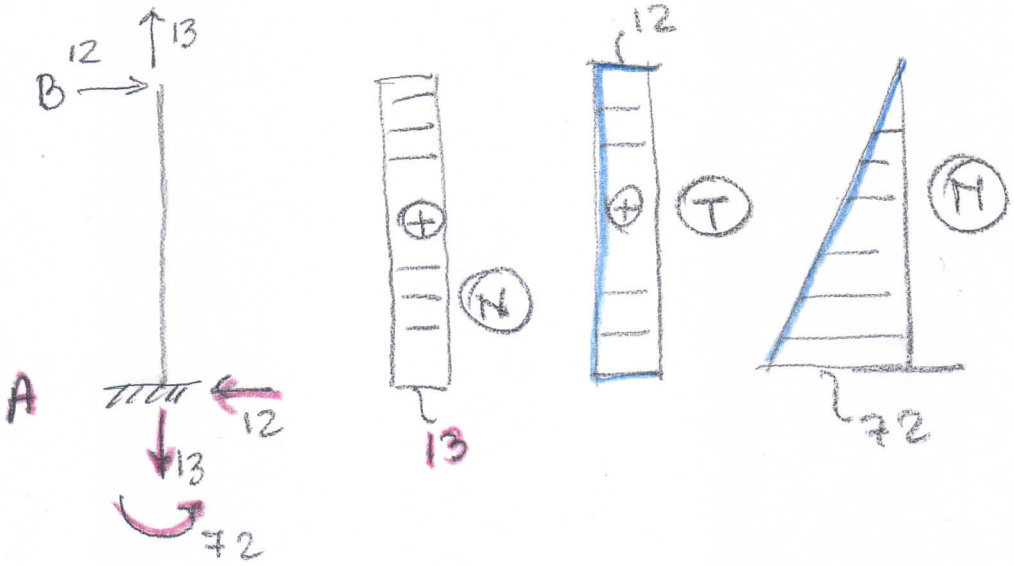
$N_{EG} = -7$

4) Nodo G

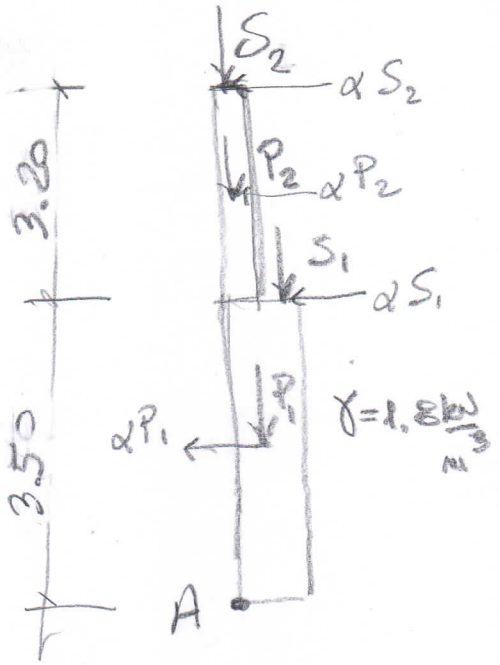





C
D
B
E
G
-6
$13\sqrt{2}=18.38$
-24
$7\sqrt{2}=9.9$
N
-7
-7


B
12
13
A
12
13
72
N
13
12
T
12
N
72

ES.3



$P_1 = 18 \times 0.25 \times 3.5 = 15.75$ kN

$P_2 = 18 \times 0.15 \times 3.2 = 8.64$ kN

$S_1 = 5 \times \frac{4}{2} = 10$ kN

$S_2 = 3.5 \frac{4}{2} = 7$ kN

$$15.75 \times \frac{0.25}{2} + 10 \times (.25 - .03) + 8.64 \times \frac{0.15}{2} + 7 \times (.15 - .03) =$$

$$= \alpha \left[15.75 \times \frac{3.5}{2} + 10 \times 3.5 + 8.64 \times 5.1 + 7 \times 6.7 \right] \Rightarrow$$

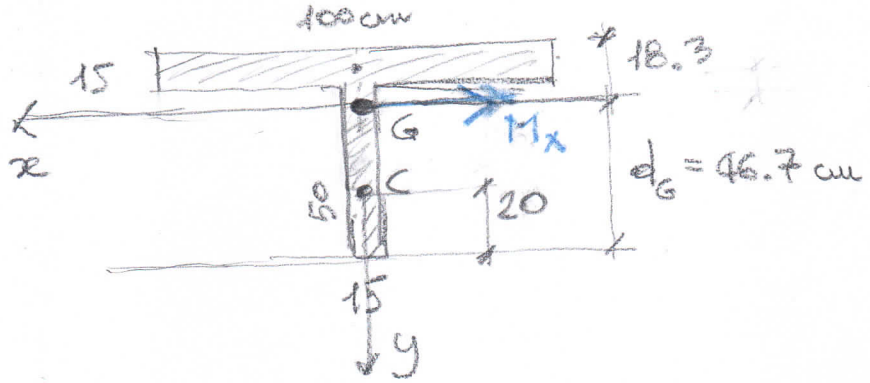
$$\Rightarrow 5.66 = 153.53\ \alpha \quad \Rightarrow \alpha = 0.037$$

Con $\gamma = 1.8 \frac{kN}{m^3}$ si ha:

$P_1 = 1.575$ $P_2 = 0.86$ S_1 e S_2 invariati.

$M_{st} = 3.30$ $M_{ust} = 89.06$ $\alpha = 0.037$

ES.4



$N_c = -30$ kN

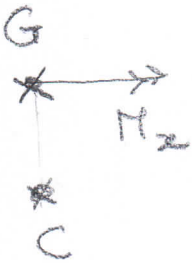
$A_{tot} = 100 \times 15 + 50 \times 15 = 2250\ cm^2$

$$d_G = \frac{15 \times 100 \times 57.5 + 50 \times 15 \times 25}{2250} = 46.67$$

$$I_z = 100 \times \frac{15^3}{12} + 100 \times 15 \cdot (18.3 - 7.5)^2 + 15 \times \frac{50^3}{12} + 15 \times 50 \times (46.7 - 25)^2 =$$

$$= 712500\ cm^4$$

$$\text{M-M)} \quad d_{G-M} \times CG = \int_{M_0}^{2} \Rightarrow d_{G-M} = \frac{712500}{2250} \frac{1}{(46.7 - 20)} = 11.9\ cm$$

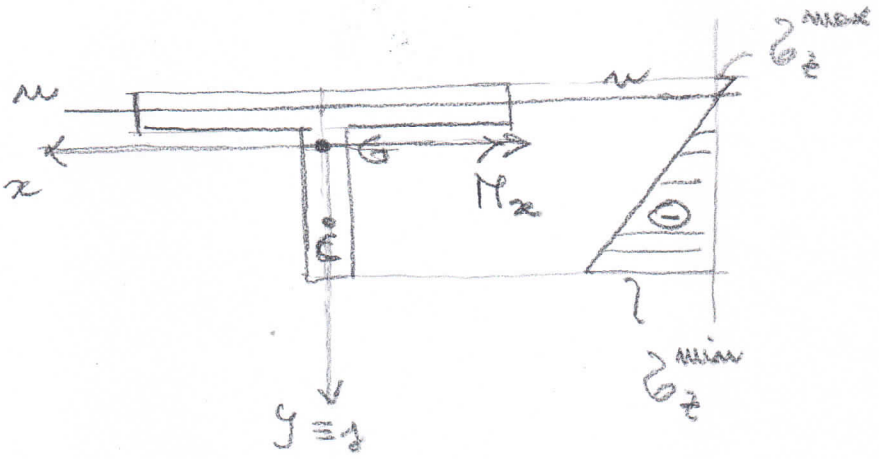


$N_G = -30$ kN

$M_x = -30 \times (0.467 - 0.20) = -8$ kNm

$$\sigma_z = -\frac{30 \times 10^3}{2250 \times 10^2} - \frac{8 \times 10^6}{712500 \times 10^4} y = -0.1333 - 0.001123\, y$$

$$\text{M-M)} \quad y = -\frac{0.1333}{0.001123} = -119\ mm$$



NON RICHIESTI IN TRACCIA

$$\sigma_z^{min} = -0.1333 - 0.000123 \times 467 = -0.66 \ N/mm^2$$

$$\sigma_z^{max} = -0.1333 - 0.000123 \times (-183) = 0.07 \ N/mm^2$$

C è esterno al n.c.i. xché n-n taglie la sez. trasversale