UNIVERSITÀ DEGLI STUDI DI TRIESTE

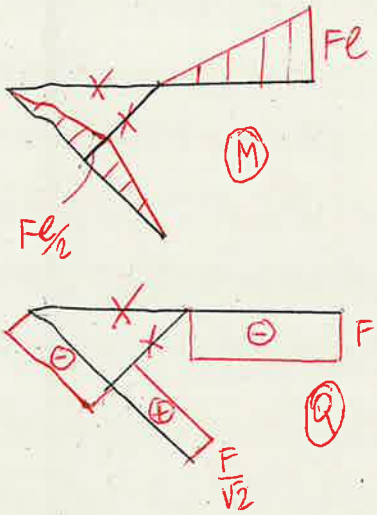
Dipartimento di Ingegneria e Architettura

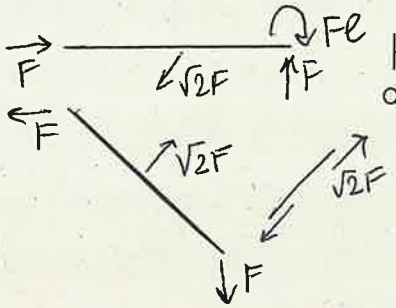
Esame di SCIENZA DELLE COSTRUZIONI (137IN, 061IN) – Prof. M. Gei

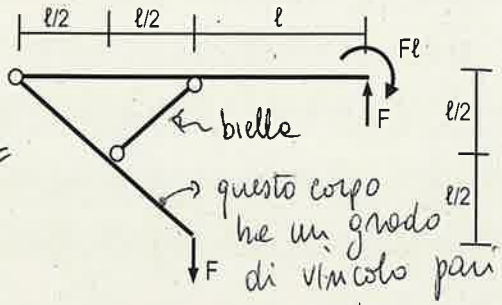
I Appello, a.a. 2025/26, 8 gennaio 2026 **Testo 1**

I PARTE

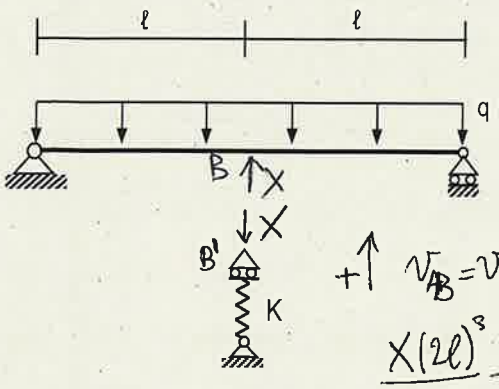
Quesito n. 1 [6/14].







Quesito n. 2 [5/14]. La struttura rappresentata in figura ha rigidezza flessionale costante pari a EJ. Si richiede di risolverla, assumendo nei calcoli K=10 EJ/ℓ³, e di tracciare i diagrammi quotati delle caratteristiche della sollecitazione (N, Q, M). Durante la risoluzione si richiede di disegnare chiaramente gli schemi ausiliari utili (struttura principale, eventuali schemi parziali, ecc.).

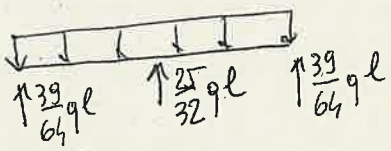


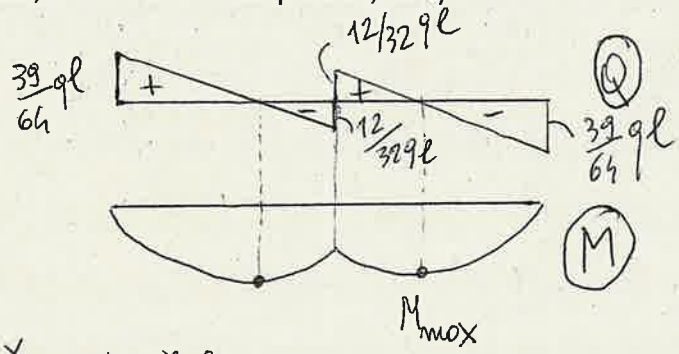
$+\uparrow \quad v_B = v_{B'}$

$$\frac{X(2\ell)^3}{48EJ} - \frac{5}{384}\frac{q(2\ell)^4}{EJ} = -\frac{X}{K}$$

K viene sostituito poi con $K = 10\frac{EJ}{\ell^3}$

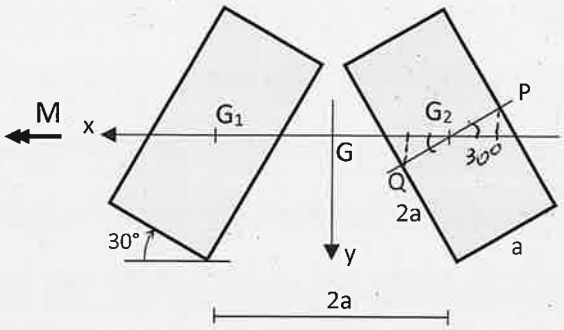
$$X = \frac{25}{32}q\ell$$

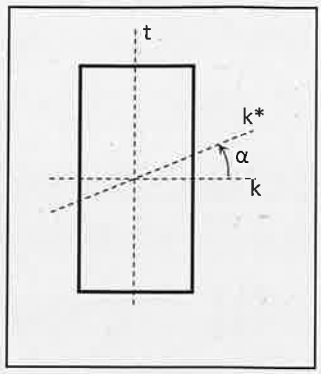




II PARTE

Quesito n. 1 [5/13]. $J_{k^*} = (J_k+J_t)/2 + \cos(2\alpha)\,(J_k-J_t)/2$. (1)

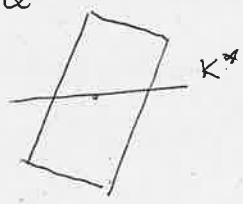




$J_x = 2J_{K^*} = \frac{13}{12}a^4$

Per $\alpha = 30°$

$J_{K^*} = \frac{13}{24}a^4$

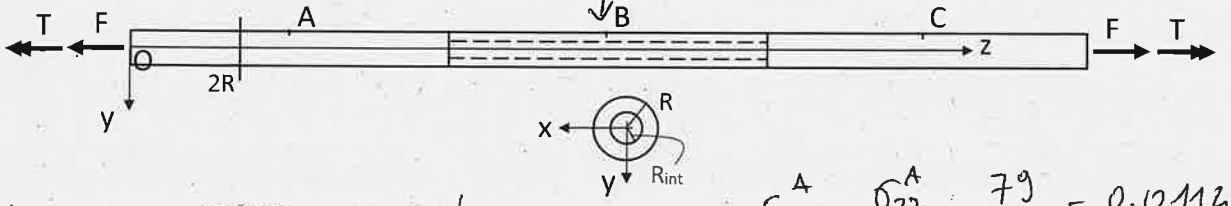


$\sigma_{zz} = \frac{M}{J_x}y$; $y_P = -\frac{a}{2}\sin 30° = -\frac{a}{4}$; $y_Q = +\frac{a}{4}$

$\sigma_{zz}^P = \frac{M}{13/12\,a^4}\left(-\frac{a}{4}\right)$

$\sigma_{zz}^Q = \frac{M}{13/12\,a^4}\frac{a}{4}$

Quesito n. 2 [5/13].



$\sigma_{zz}^A = \frac{F}{\pi R^2} = \frac{100'000}{\pi \cdot 20^2} = 79\ N/mm^2$

$\varepsilon_{zz}^A = \frac{\sigma_{zz}^A}{E} = \frac{79}{70\cdot10^3} = 0.0114$

$\varepsilon_{zz}^C = \varepsilon_{zz}^A$; $\varepsilon_{zz}^B = \frac{106}{70\cdot10^3} = 0.0152$

$\sigma_{zz}^B = \frac{F}{\pi(R^2-R_{int}^2)} = 106\ N/mm^2$

$\tau_{zx}^A = \frac{T}{J_G^A}R = \frac{T}{\frac{\pi}{2}R^4}R = \frac{1'000'000}{\frac{\pi}{2}20^3} = 80\ N/mm^2$; $\gamma_{zx}^A = \frac{\tau_{zx}^A}{G}$

$= 80\cdot\frac{2(1+0.3)}{70'000} = 0.00297$

$\tau_{zx}^B = \frac{T}{J_G^B}R = \frac{T}{\frac{\pi}{2}(R^4-R_{int}^4)}R = 85\ N/mm^2$

$\gamma_{zx}^B = \frac{\tau_{zx}^B}{G} = 0.00316$

VERIFICA CRIT. DI TRESCA (IN B) $\sqrt{106^2+4\cdot85^2} > \sigma_0$

NON VERIFICATO