$$\begin{aligned} &V_G = 4F \\ &W_B = -W = -Fb \\ &q_{BC} = -2q = -2F/b \\ &q_{EF} = 3q = 3F/b \end{aligned}$$

 $u_{CCB} = ?$  $\varphi_{B} = ?$ 

 $EJ_{AB} = EJ$ 

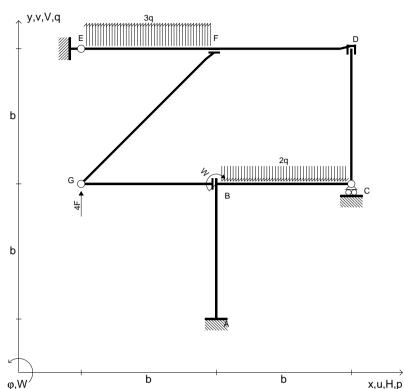
 $EJ_{BC} = EJ$  $EJ_{CD} = EJ$ 

 $EJ_{EF} = EJ$ 

 $EJ_{FD} = EJ$ 

 $EJ_{GB} = EJ$ 

 $EJ_{GF} = EJ$ 



- \*Svolgere e riportare su questo foglio l'analisi cinematica.
- \*Riportare le reazioni vincolari finali in forma grafica e analitica.
- \*Riportare i diagrammi quotati delle azioni interne.
- \*Indicare chiaramente i sistemi di riferimento adottati per le espressioni della linea elastica
- \*Allegare l'elaborato.

Carichi e deformazioni date hanno verso efficace in disegno. Calcolare reazioni vincolari della struttura e delle aste.

Tracciare i diagrammi quotati delle azioni interne nelle aste.

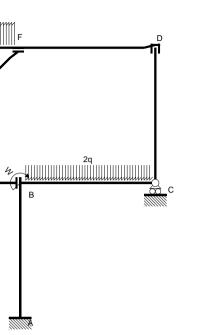
Esprimere la linea elastica delle aste. AB BC

Carichi di aste curve misurati in proiezione sugli assi x,y.

 $J_{YZ}$  -  $x_{YZ}$  -  $\theta_{YZ}$  riferimento locale asta YZ con origine in Y.

Calcolare lo spostamento orizzont. del nodo C su asta CB.

Calcolare la rotazione assoluta del nodo B



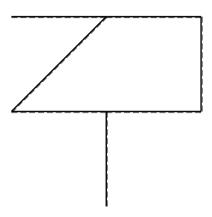
 $\varphi_B =$ 

 $u_c =$ 

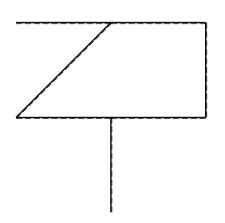
Indicare il verso del riferimento locale AB oppure BA

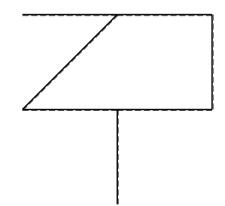
AB BA y(x)EJ=

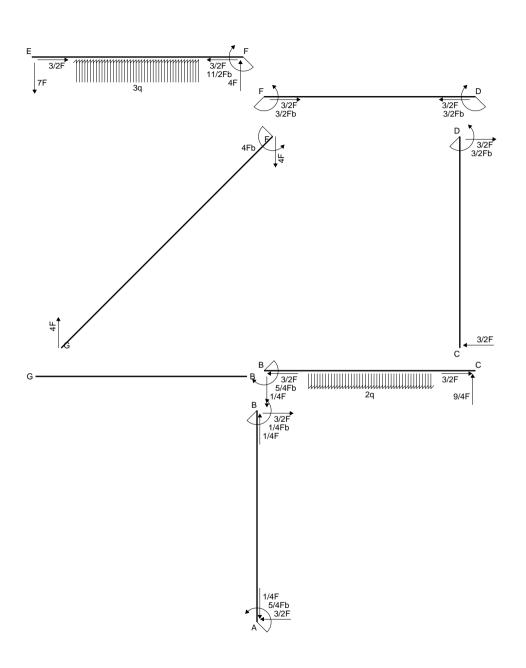
BC CB y(x)EJ=

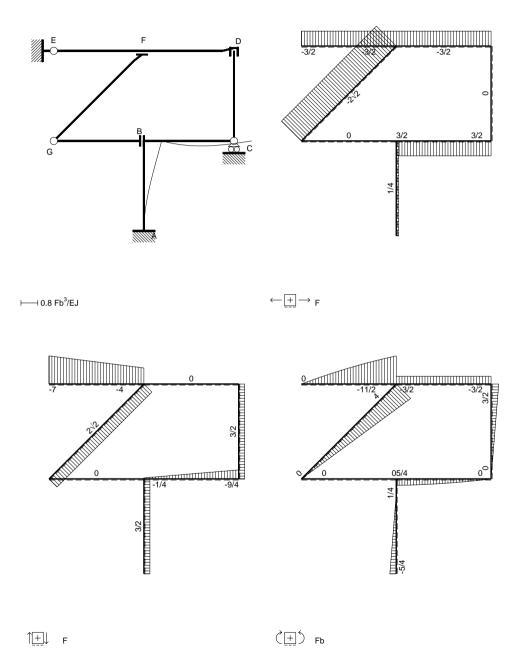


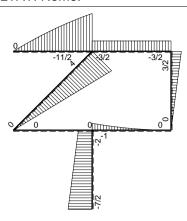
 $\leftarrow + \rightarrow$ 



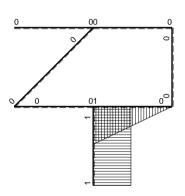




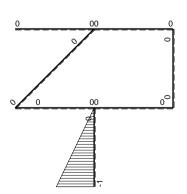


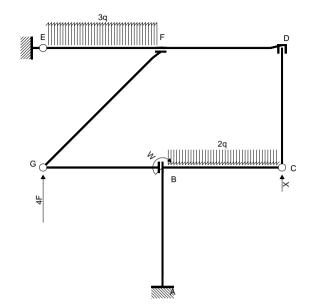


Azione flettente M<sub>o</sub>

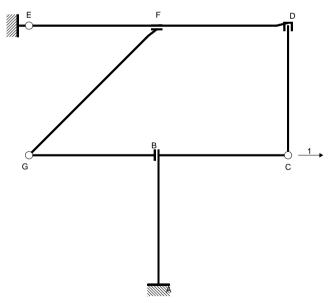


Azione flettente M<sub>x</sub>





Calcolo iperstatico



Calcolo spostamenti

REAZIONI IPERSTATICHE

 $X = V_C$ 

## DETERMINAZIONE DELLA DEFORMATA ELASTICA

Costanti di integrazione:  $\phi_{AB} K_{AB} \phi_{BC} K_{BC}$ 

### Relazioni di congruenza

$$y'_{AB}(0) = 0$$

$$y'_{AB}(b) - y'_{BC}(0) = 0$$

$$y_{\Delta B}(0) = 0$$

$$y_{BC}(0) = 0$$

$$y_{BC}(b) = 0$$

 $M_{AB} = 3/2Fx - 7/2Fb + Xb$ 

 $EJy''_{AB} = 3/2Fx - 7/2Fb + Xb$ 

 $EJy'_{AB} = 3/4Fx^2 - 7/2Fbx + Xbx + EJ\phi_{AB}$ 

 $EJy_{AB} = 1/4Fx^3 - 7/4Fbx^2 + 1/2Xbx^2 + EJ\phi_{AB}x + EJK_{AB}$ 



(+1)

 $M_{PA} = 3/2Fx + 2Fb - Xb$ 

 $EJy''_{BA} = 3/2Fx + 2Fb - Xb$ 

 $EJy'_{BA} = 3/4Fx^2 + 2Fbx - Xbx + EJ\phi_{BA}$ 

 $EJy_{RA} = \frac{1}{4}Fx^3 + Fbx^2 - \frac{1}{2}Xbx^2 + EJ\phi_{RA}x + EJK_{RA}$ 

$$M_{BC} = 2Fx - Fb - qx^2 - Xx + Xb$$

 $EJy''_{BC} = 2Fx - Fb - qx^2 - Xx + Xb$ 

 $EJy'_{BC} = Fx^2 - Fbx - 1/3qx^3 - 1/2Xx^2 + Xbx + EJ\phi_{BC}$ 

 $EJy_{BC} = 1/3Fx^3 - 1/2Fbx^2 - 1/12qx^4 - 1/6Xx^3 + 1/2Xbx^2 + EJ\phi_{BC}x + EJK_{BC}$ 



(+)

 $\phi_{AB}b$ 

 $\begin{matrix} \phi_{BC} b \\ K_{AB} \end{matrix}$ 

Xb<sup>3</sup>/EJ

 $M_{CB} = qx^2 - Xx$ 

 $EJy''_{CB} = qx^2 - Xx$ 

 $EJy'_{CR} = 1/3qx^3 - 1/2Xx^2 + EJ\phi_{CR}$ 

 $EJy_{CB} = 1/12qx^4 - 1/6Xx^3 + EJ\phi_{CB}x + EJK_{CB}$ 

# Condizioni al contorno

	$[ \phi_{AB} b$	$K_{AB}$	$\phi_{BC}b$	$K_{\mathtt{BC}}$	Xb <sup>3</sup> /EJ]		[Fb <sup>3</sup> /EJ]	
y' <sub>AB</sub>	1	0	0	0	0		0	
y' <sub>BA</sub>	1	0	-1	0	1		11/4	
$\mathbf{y}_{AB}$	0	1	0	0	0	=	0	
$y_{BC}$	0	0	0	1	0		0	
V	0	0	1	1	1/3		1/4	

$$K_{BA} = 3/8 Fb^3/EJ$$

 $\varphi_{BA} = -1/2Fb^2/EJ$ 

 $K_{CB} = 0$ 

 $\varphi_{CB} = 7/24 \text{Fb}^2/\text{EJ}$ 

## DEFORMATA (coordinate locali)

AB  $y(x)EJ = -5/8x^2Fb + 1/4x^3F$ 

BA  $y(x)EJ = 3/8Fb^3 - 1/2xFb^2 - 1/8x^2Fb + 1/4x^3F$ 

BC y(x)EJ =  $-1/2xFb^2 + 5/8x^2Fb - 1/24x^3F - 1/12x^4q$ 

CB  $y(x)EJ = 7/24xFb^2 - 3/8x^3F + 1/12x^4q$ 

## SPOSTAMENTI ASSOLUTI

 $u_{CCB} = 3/8(Fb^3/EJ)$ 

 $\phi_{\rm p} = -1/2({\rm Fb}^2/{\rm EJ})$ 

# ↑y A B x ↑y B A X ↑y B C X ↑y C B C B X

В х

Soluzione

[Fb³/EJ]

-1/2

0

9/4