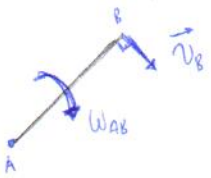
FOP2 - MCR - 3C - 2302

③ $\omega_{AB} = 300\left(\frac{2\pi}{60}\right) = 31.42$ rad/s

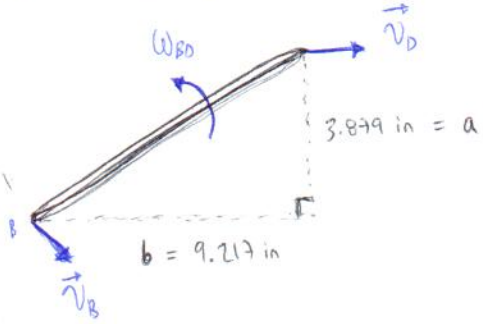
- Analizando AB para calcular $\vec{v}_B$



$$\vec{v}_B = \vec{\omega}_{AB} \times \vec{r}_{B/A} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & -31.42 \\ 2.121 & 2.121 & 0 \end{vmatrix} = (66.64\,\hat{i} - 66.64\,\hat{j})\ \text{in/s}$$

- Analizando el elemento BD:

$a = 6 - 2.121 = 3.879$ in $\quad | \quad b = \sqrt{10^2 - 3.879^2} = 9.217$ in



- Ecuación de velocidad relativa: $\vec{v}_D = \vec{v}_B + \vec{\omega}_{BD} \times \vec{r}_{D/B}$
- Vectores de posición y velocidad:

$\vec{v}_D = (v_D\,\hat{i})$ in/s ; $\vec{\omega}_{BD} = (\omega_{BD}\,\hat{k})$ rad/s

$\vec{r}_{D/B} = (9.217\,\hat{i} + 3.879\,\hat{j})$ in

- Sustituyendo en la ec. de velocidad:

$$(v_D\,\hat{i}) = (66.64\,\hat{i} - 66.64\,\hat{j}) + \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & \omega_{BD} \\ 9.217 & 3.879 & 0 \end{vmatrix}$$

$$(v_D\,\hat{i}) = (66.64\,\hat{i} - 66.64\,\hat{j}) + (-3.879\,\omega_{BD}\,\hat{i} + 9.217\,\omega_{BD}\,\hat{j})$$

- Ecuaciones escalares:

Comp. $\hat{i}$ → $v_D = 66.64 - 3.879\,\omega_{BD}$ ... (i)

Comp. $\hat{j}$ → $0 = -66.64 + 9.217\,\omega_{BD}$ ... (ii)

- De (ii) → $\omega_{BD} = \frac{66.64}{9.217} = 7.23$ rad/s

- De (i) → $v_D = 66.64 - 3.879(7.23) = 38.6$ in/s

Resultados

$\therefore$ $\omega_{BD} = 7.23$ rad/s ↻ $\qquad$ $\vec{v}_D = 38.6$ in/s →