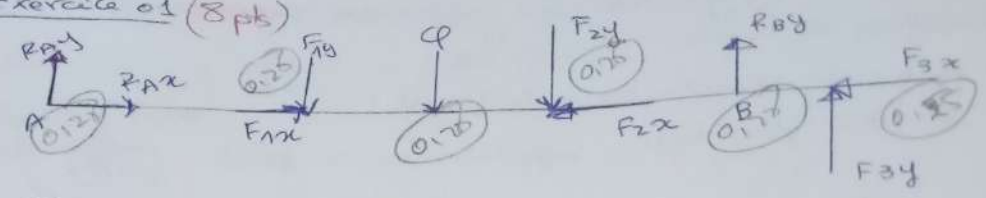
$tg\alpha = \frac{PA}{OA} \Rightarrow P_A = tg\alpha \times OA = tg60 \times 1,70$

Exercice 01 (8 pts)



$$\begin{cases} \sum \vec{F}_{ext} = 0 \\ \sum \vec{M}/_A = 0 \end{cases} \quad (0,5)$$

$\varphi = q \times l$ (0,5) $= 50 \times 30 =$ (0,5) 1500 [N]

$R_A \begin{pmatrix} R_{Ax} \\ R_{Ay} \end{pmatrix}$, $F_1 \begin{pmatrix} + F\cos 60 \\ - F_1 \sin 60 \end{pmatrix}$, $F_2 \begin{pmatrix} - F_2 \cos 30 \\ - F_2 \sin 30 \end{pmatrix}$, $\varphi \begin{pmatrix} 0 \\ -\varphi \end{pmatrix}$

$R_B \begin{pmatrix} 0 \\ R_{By} \end{pmatrix}$, $F_3 \begin{pmatrix} - F_3 \cos 45 \\ + F_3 \sin 45 \end{pmatrix}$

$$\begin{cases} R_{Ax} + F_1 \cos 60 - F_2 \cos 30 - F_3 \cos 45 = 0 \quad \cdots (1) \\ R_{Ay} - F_1 \sin 60 - F_2 \sin 30 - \varphi + R_{By} + F_3 \sin 45 = 0 \quad \cdots (2) \end{cases}$$

(1) $\Rightarrow R_{Ax} = F_2 \cos 30 + F_3 \cos 45 - F_1 \cos 60$ (0,75)

$R_{Ax} = 2000 \times 0,86 + 2500 \times 0,70 - 3000 \times 0,5$

$$\boxed{R_{Ax} = 1970 \text{ [N]}} \quad (0,25)$$

$\begin{pmatrix} F_1 \cos 60 \\ -F_1 \sin 60 \end{pmatrix} \wedge \begin{pmatrix} 2,5 \\ 0 \end{pmatrix}$ (0,25) $+ \begin{pmatrix} 0 \\ -\varphi \end{pmatrix} \wedge \begin{pmatrix} 4,5 \\ 0 \end{pmatrix}$ (0,25) $+ \begin{pmatrix} - F_2 \cos 30 \\ - F_2 \sin 30 \end{pmatrix} \wedge \begin{pmatrix} 7 \\ 0 \end{pmatrix}$ (0,25)

$+ \begin{pmatrix} 0 \\ R_{By} \end{pmatrix} \wedge \begin{pmatrix} 8 \\ 0 \end{pmatrix}$ (0,25) $+ \begin{pmatrix} - F_3 \cos 45 \\ + F_3 \sin 45 \end{pmatrix} \wedge \begin{pmatrix} 10 \\ 0 \end{pmatrix}$ (0,25) $= 0$

$$-2,5 F_1 \sin 60 - 4,5 \times \varphi - 7 F_2 \sin 30 + 8 R_{By} + 10 F_3 \sin 45 = 0 \quad (3)$$

$$R_{By} = \frac{2,5 \times F_1 \sin 60 + 4,5\,\varphi + 7 F_2 \sin 30 - 10 F_3 \sin 45}{8} \quad (1)$$

(9)

$R_{By} = \dfrac{2,5 \times 3000 \times 0,86 + 4,5 \times 150 + 7 \times 2000 \times 0,5 - 2500 \times 0,7}{8}$

$\boxed{R_{By} = -421,87\ [N]}$ (0,5)

Equation ② :

$R_{Ay} = F_1 \sin 60 + F_2 \sin 30 + 4 - R_{By} - F_3 \sin 45$ (0,5)

$R_{Ay} = 3000 \times 0,86 + 2000 \times 0,5 + 150 + 421,87 - 2500 \times 0,70$

$\boxed{R_{Ay} = 2401,87\ [N]}$ (0,25)

$R_A = \sqrt{R_{Ay}^2 + R_{Ax}^2} = \sqrt{(2401,87)^2 + (1970)^2}$ (0,25)

$\boxed{R_A = 3106,42\ [N]}$ (0,25)

$R_B = \sqrt{R_{By}^2 + R_{yx}^2} = \sqrt{(-421,87)^2}$ (0,25)

$\boxed{R_B = 421,87\ [N]}$ (0,25)

Exercice 02 $\vec{\omega}_{AB}$, $\vec{V}_C$

$\vec{V}_A = \vec{V}_P + \vec{\omega} \wedge \vec{P_A}$ ... ① (0,25)

$\vec{V}_P \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$ (0,25) $\vec{\omega} \begin{pmatrix} 0 \\ 0 \\ \omega \end{pmatrix}$ (0,25) , $\vec{P_A} \begin{pmatrix} 0 \\ -P_A \\ 0 \end{pmatrix}$ (0,25) , $\vec{V}_A \begin{pmatrix} V_A \\ 0 \\ 0 \end{pmatrix}$ (0,25)

$V_A = \omega P_A \Rightarrow \omega = \dfrac{V_A}{P_A}$ (0,25)

Δ triangle

OCA $\Rightarrow \cos\alpha = \dfrac{r}{OA} = \dfrac{25}{50} = 0,5$ (0,25) (0,25)

$\alpha = 60°$ (0,25)

Triangle OAP