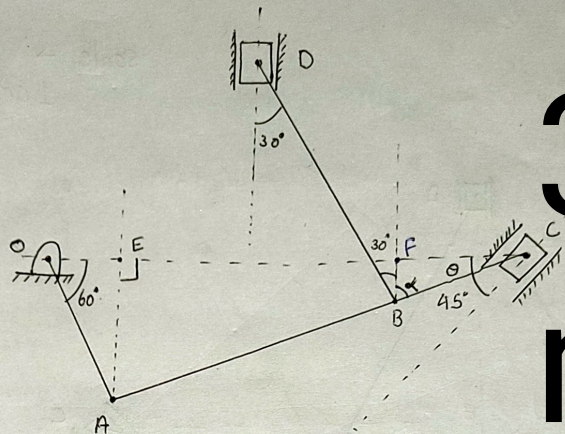


Ans :-



$$\begin{aligned} \text{In } \triangle AEO &\rightarrow AE = AO \sin 60^\circ \\ AE &= 150 \sin 60^\circ \\ AE &= 129.903 \text{ mm} \quad \text{--- (i)} \end{aligned}$$

$$\begin{aligned} \text{In } \triangle AEO &\rightarrow AE = AC \sin \theta \\ AE &= 500 \sin \theta \quad \text{--- (ii)} \end{aligned}$$

from (i) & (ii)

$$129.903 = 500 \sin \theta$$

$$\theta = \sin^{-1} \left(\frac{129.903}{500} \right)$$

$$\theta = 15.058^\circ$$

$$\begin{aligned} \therefore OC &= OE + EC \\ &= AO \cos 60^\circ + AC \cos \theta \\ &= 150 \cos 60^\circ + 500 \cos 15.058^\circ \\ &= 557.831 \text{ mm} \end{aligned}$$

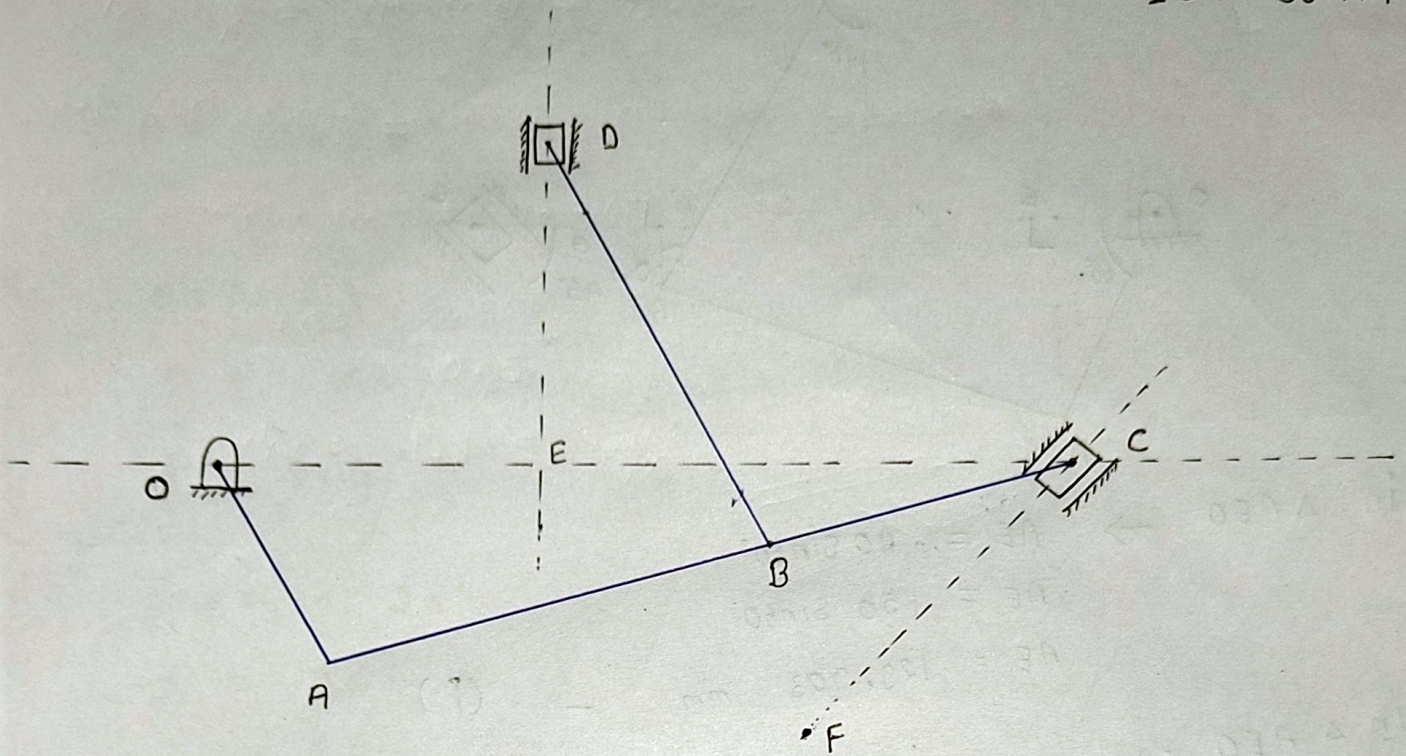
$$\begin{aligned} \text{In } \triangle BFC &\rightarrow \alpha + \theta + 90 = 180 \\ \alpha &= 90 - \theta \\ \alpha &= 90 - 15.058 \\ \alpha &= 74.942^\circ \end{aligned}$$

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(i)

Scale \rightarrow

1 cm = 50 mm



$$OA = 150 \text{ mm}$$

$$AC = 500 \text{ mm}$$

$$AB = 300 \text{ mm}$$

$$BD = 300 \text{ mm}$$

$$OC = 557.83 \text{ mm}$$

$$\angle AOC = 60^\circ$$

$$\angle ACO = 15.058^\circ$$

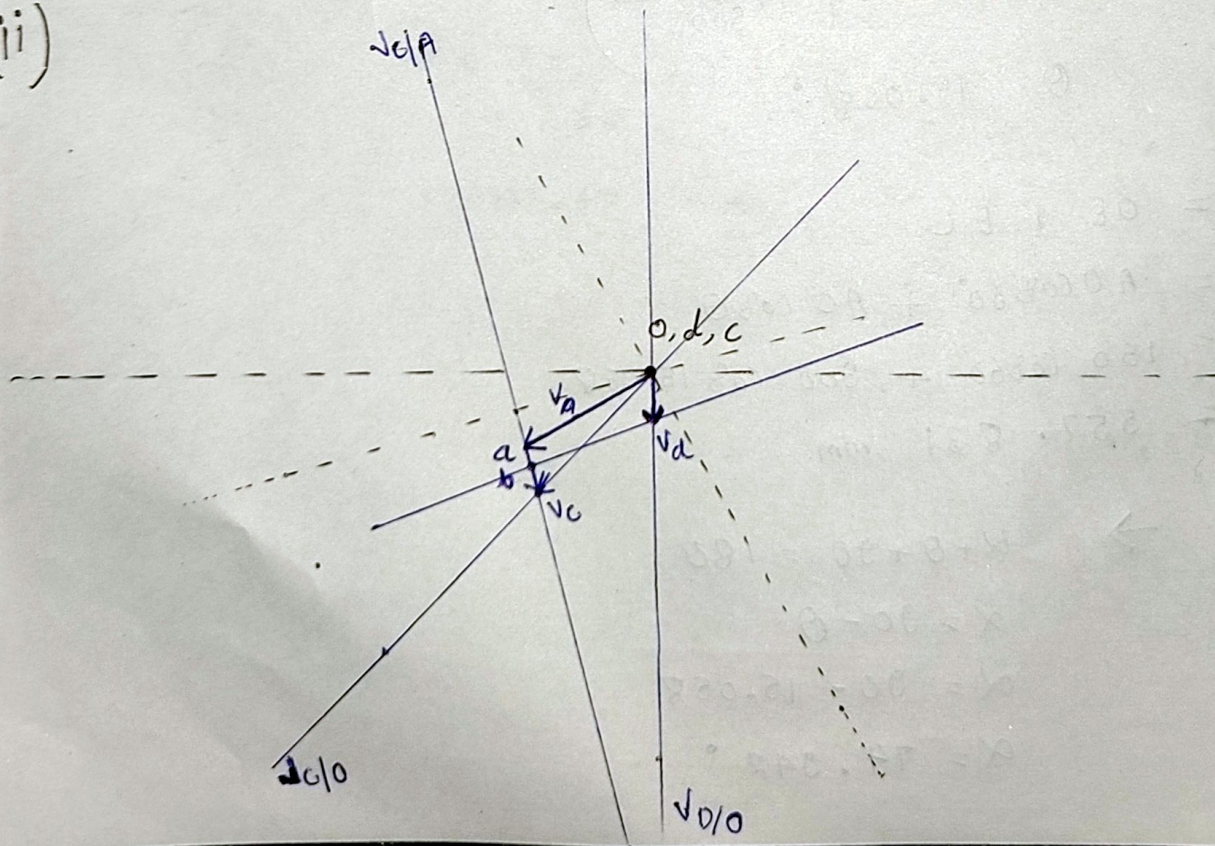
$$\angle OCF = 45^\circ$$

$$\angle EDB = 30^\circ$$

$$\angle DBC = 104.942^\circ$$

$$\angle OAC = 104.942^\circ$$

(ii)



(iii)

$$V_A = \frac{2\pi n \times Y}{60}$$

$$= \frac{2\pi \times 120 \times 0.15}{60}$$

$$= 1.885 \text{ m/s}$$

$$V_C = OC \times 0.097$$

$$V_C = 45 \times 0.097 = 2.1 \text{ m/s}$$

$$V_d = OD \times 0.097 = 8 \times 0.097$$

$$= 0.376 \text{ m/s}$$

$$\omega_{AC} = \frac{V_{AC}}{A_C} = \frac{12.1 \times 0.097}{0.5} = 1.137 \text{ rad/s}$$

$$\omega_{BD} = \frac{V_{BD}}{B_D} = \frac{3.7 \times 0.097}{0.3} = 5.94 \text{ m/s}$$

(iv)

$$\theta = 14.942^\circ$$

$$\phi = 45 - 15.058$$

$$\phi = 29.842^\circ$$

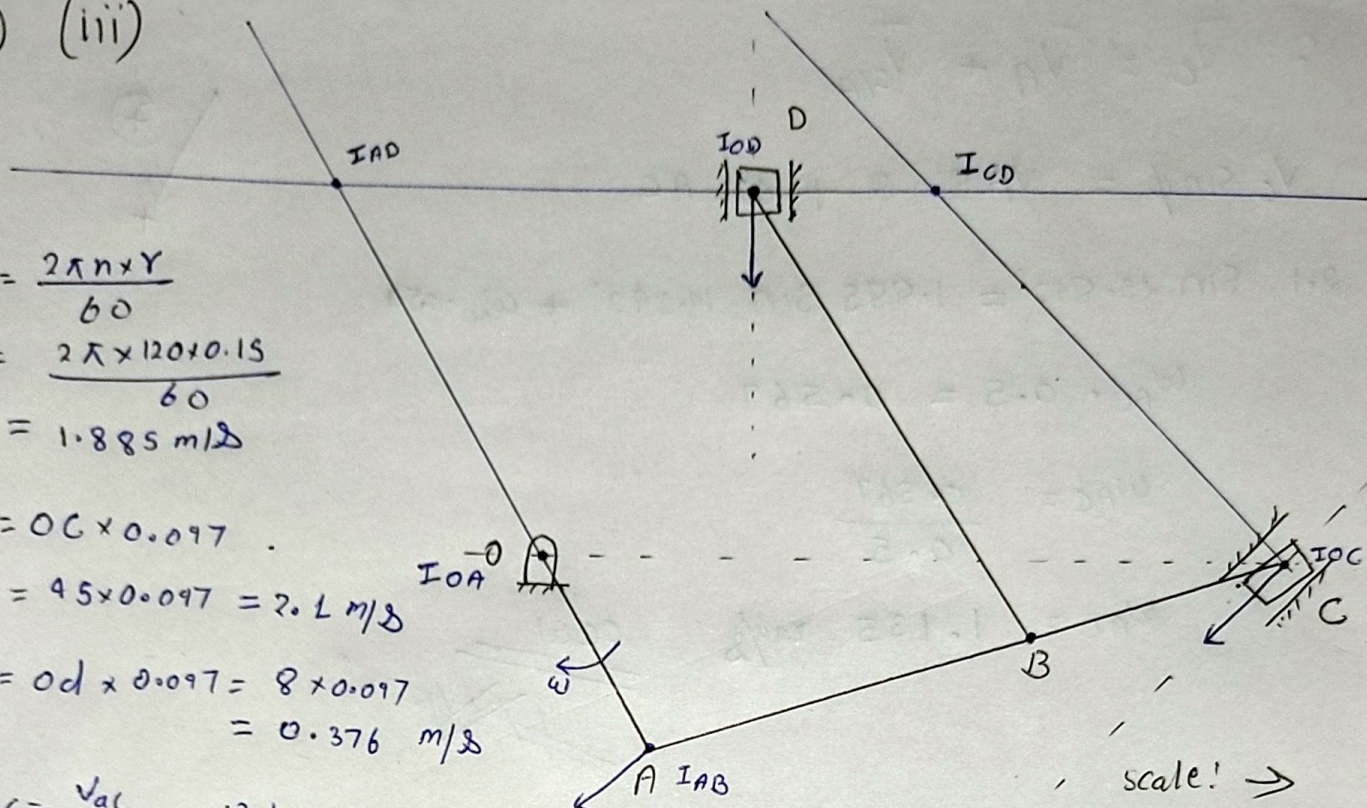
$$V_A \cos \theta = V_C \cos \phi$$

$$V_C = V_A \frac{\cos 14.942^\circ}{\cos 29.842^\circ}$$

$$V_C = 1.885 \times \frac{\cos 14.942^\circ}{\cos 29.842^\circ}$$

$$V_C = 2.1 \text{ m/s}$$

~~TTTTT~~



$$1.885 \text{ m/s} = 40 \text{ mm}$$

$$1 \text{ m/s} = 21.2 \text{ mm}$$

$$1 \text{ mm} = 0.097 \text{ m/s}$$

$$\therefore \bar{V}_C = \bar{V}_A + \bar{V}_{C/A}$$

$$V_C \sin \phi = V_A \sin \theta + \omega \cdot AC$$

$$2.1 \sin 29.812^\circ = 1.885 \sin 19.342^\circ + \omega_{AC} \cdot 0.5$$

$$\omega_{AC} \cdot 0.5 = 0.567$$

$$\omega_{AC} = \frac{0.567}{0.5}$$

$$\omega_{AC} = 1.135 \text{ rad/s} \quad \underline{\underline{\text{CCW}}}$$

~~1.135~~

