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# Tutorial 2

Q1 Am

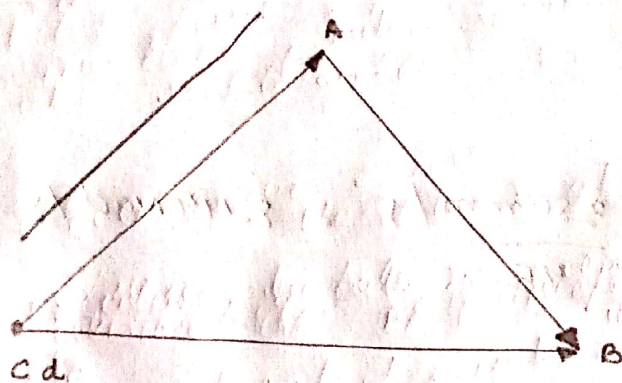
Scale 1:2

$$10m = \frac{3.8cm/s}{4.5}$$

$$4.50m = 3.8cm/s$$

$$= 38cm/s$$

$$BC = 6.9cm$$

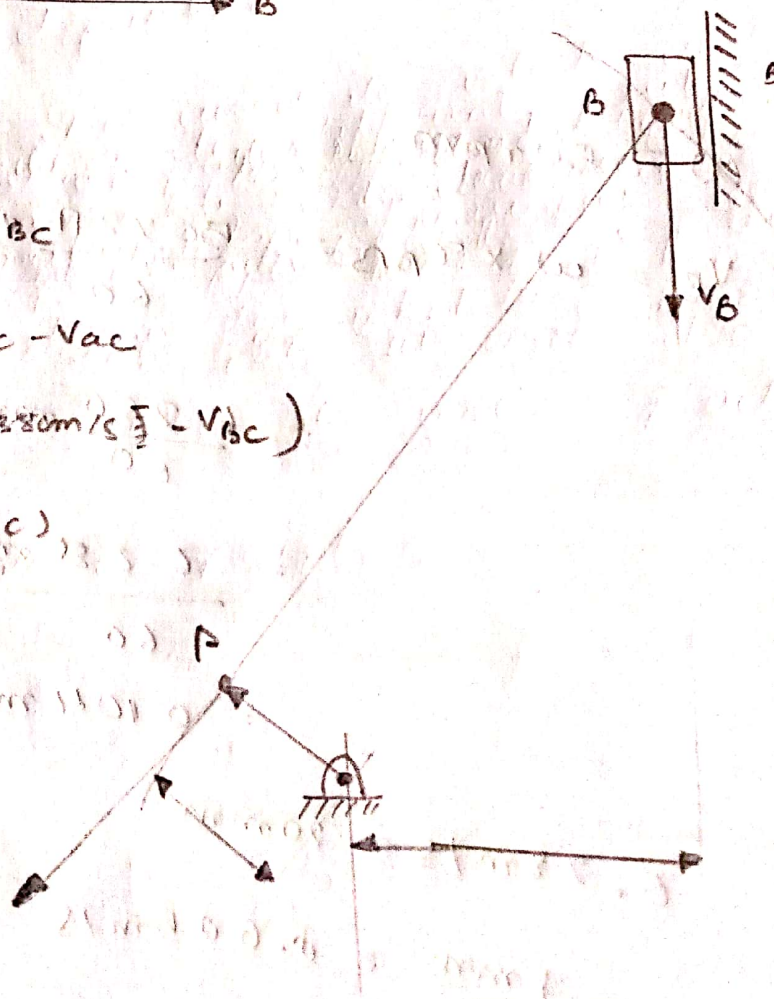


$$V_{AC} + V_{BA} = V_{BC}$$

$$V_{BA} = V_{BC} - V_{AC}$$

$$= (38cm/s) - V_{BC}$$

$$= V_{BC}$$





$$\therefore V_{BC} = \frac{38}{4.5 \times 2} \times 6.9 \text{ cm/s}$$

$$= \frac{58.26 \text{ cm}}{2} / \text{s}$$

$$\therefore V_{BD} = (V_{BC} - V_{DC})$$

$$= (58.26 - 38) \text{ cm/s}$$

$$= 20.266 \text{ cm/s}$$

now,

$$\omega_{crack} = v/r = \frac{380 \text{ mm/s}}{45} = 8.44 \text{ rad/s}$$

OR

$$\omega = 50 \text{ rpm}$$

$$V_B = \omega \times r_{BD} = \frac{50 \times 2\pi \times 20 \text{ mm}}{60}$$

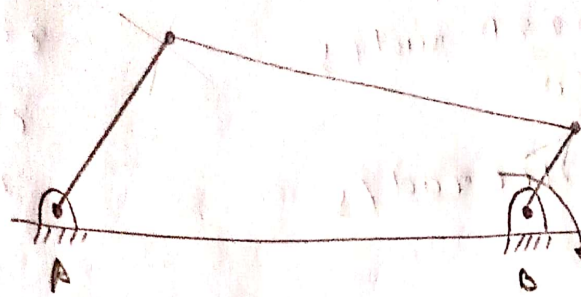
$$= \frac{6.28}{60} \text{ mm/s}$$

$$= \frac{6.28 \text{ mm/s}}{60}$$

$$= 0.104 \text{ m/s}$$

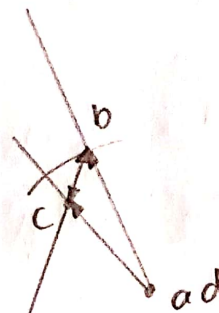
$$6.28 \text{ m/s} = 20 \text{ mm}$$

$$1 \text{ mm} = 0.005 \text{ m/s}$$



Scale 1:1

50 x  $\pi$  rad/s.



$$V_{CD} = V_{BA} + V_{CB}$$

$$= \frac{6.28}{60} + \left( \frac{0.314 \text{ m/s}}{60} \times bc \right)$$

$$= \frac{6.280}{60} + \left( \frac{0.314}{60} \times \frac{8}{1000} \right)$$

$$= 0.104035 \text{ m/s} = 104.035 \text{ mm/s}$$

$$\rightarrow V_{CB} = \omega \times r_{CD}$$

$$\therefore \omega = \frac{0.104035}{45 \times 10^{-3}} = 2.31 \text{ rad/sec}$$



Q3 An

$$\omega_P = 100 \pi \text{ rpm}$$

$$= \frac{100 \times 2\pi \text{ rad/s}}{60}$$

$$= 10.466 \text{ rad/s}$$

1 : 10 Scale

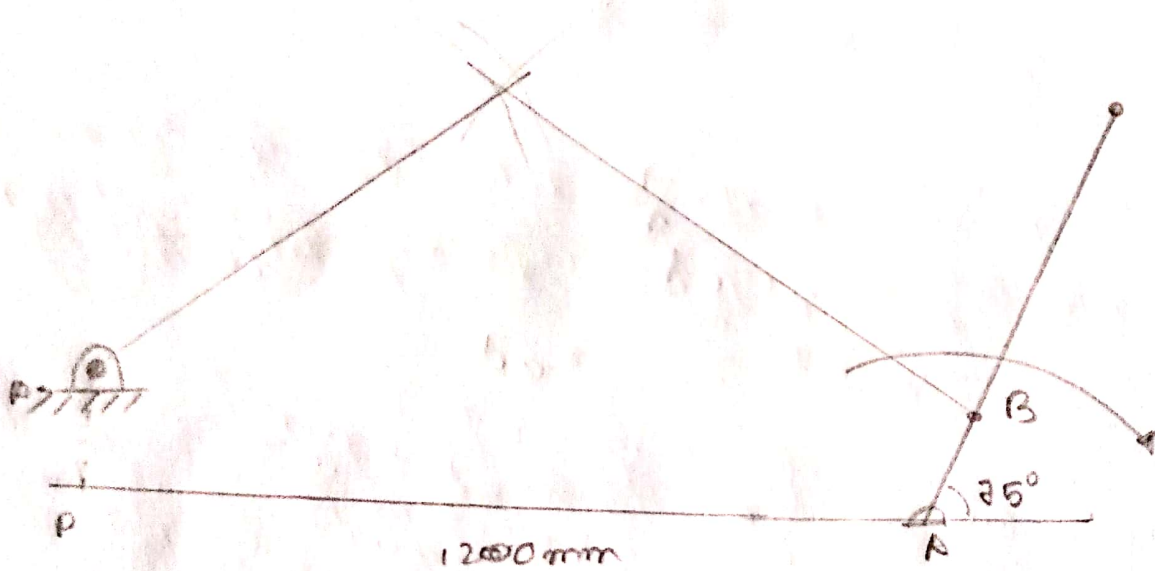
$$8 \text{ mm} = 8 \text{ mm}$$

$$80 \text{ mm} = 80 \text{ mm}$$

$$820 \text{ mm} = 82 \text{ mm}$$

$$1200 \text{ mm} = 120 \text{ mm}$$

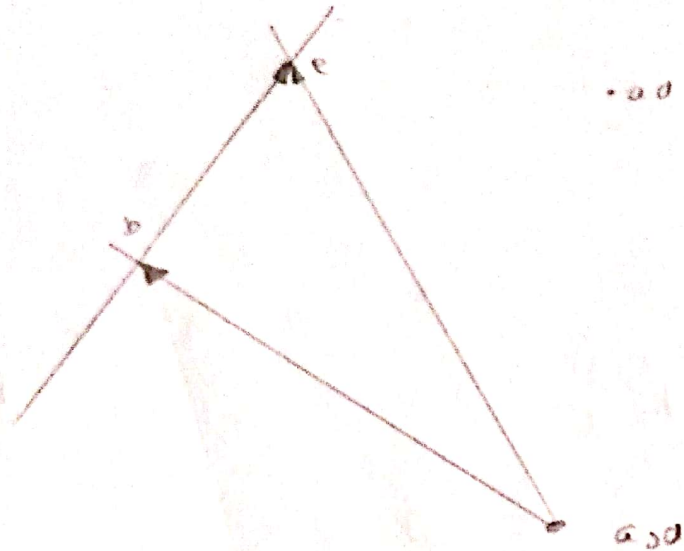
$$120 \text{ mm} = 12 \text{ mm}$$



$$832.33 \text{ mm/s} = 80 \text{ mm} \times \omega_P$$

$$\omega_P = 10.466 \text{ rad/s}$$

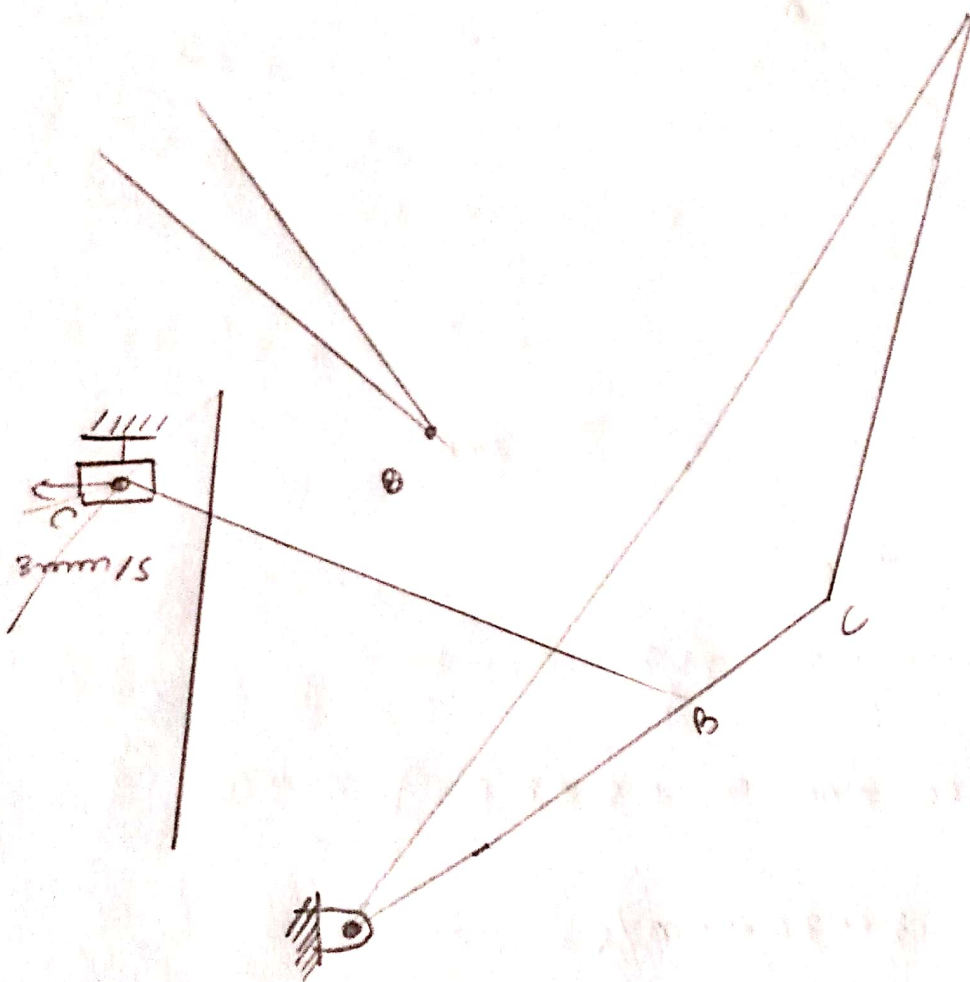
$$\left( \frac{6 \times 111.5}{100} \right) \times 10.466 = 6.088$$



$$\begin{aligned}
 V_{cd} &= V_{cb} + \omega_{BD} \times BC \\
 &= (10.460 + 830.33 \text{ mm/s} \times bc) \\
 &= [10.460 \times 4.19 + 830.33] \text{ mm/s} \\
 &= 890.24304 \text{ mm/s}
 \end{aligned}$$

$$\omega_D = \frac{890.24}{820} \text{ rad/s}$$

$$= 1.2225 \text{ rad/s}$$



$$V_C = 3 \text{ mm/s}$$