Anshika Parihar

276

Date

Page

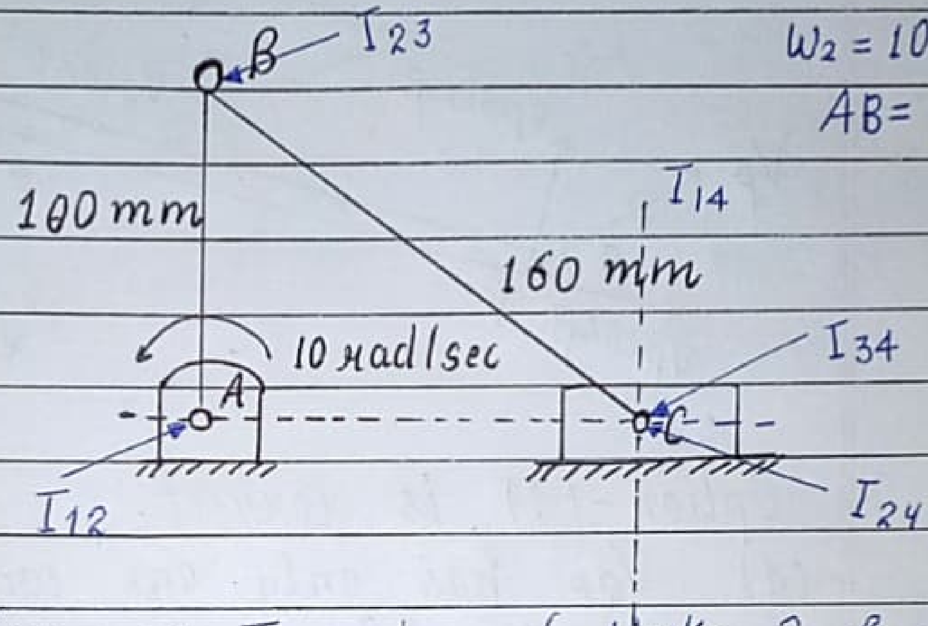
28·1·22

CLASS TEST

1.

$\omega_2 = 10 \, rad/sec$

$AB = 100 \, mm$



$I_{24} \rightarrow$ (common I centre of links 2 & 4)

$$\Rightarrow \omega_2 \times (I_{12} - I_{24}) = \omega_4 \times (I_{14} - I_{24})$$

where,

$V_s = \omega_4 (I_{14} - I_{24}) \rightarrow$ velocity of slider w.r.t ground.

~~so, the velocity of slider,~~

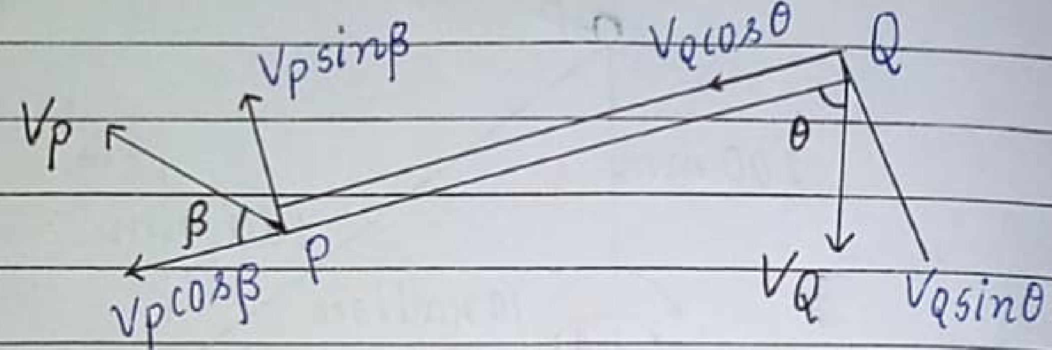
$$V_s = \omega_2 \times (I_{12} - I_{24}) = \omega_2 \times AB \quad \text{—— (i)}$$

$$V_s = 10 \times 0.100$$

$$V_s = 0.1 \times 10$$

$$\boxed{V_s = 1 \, m/sec}$$

2.



Option-(d) is correct.

(d) V_{QP} has only one component perpendicular to PQ.

PQ is a rigid link so the distance between P & Q can not changes.

V_{QP} → the velocity of Q relative to P, which has only component perpendicular to PQ.

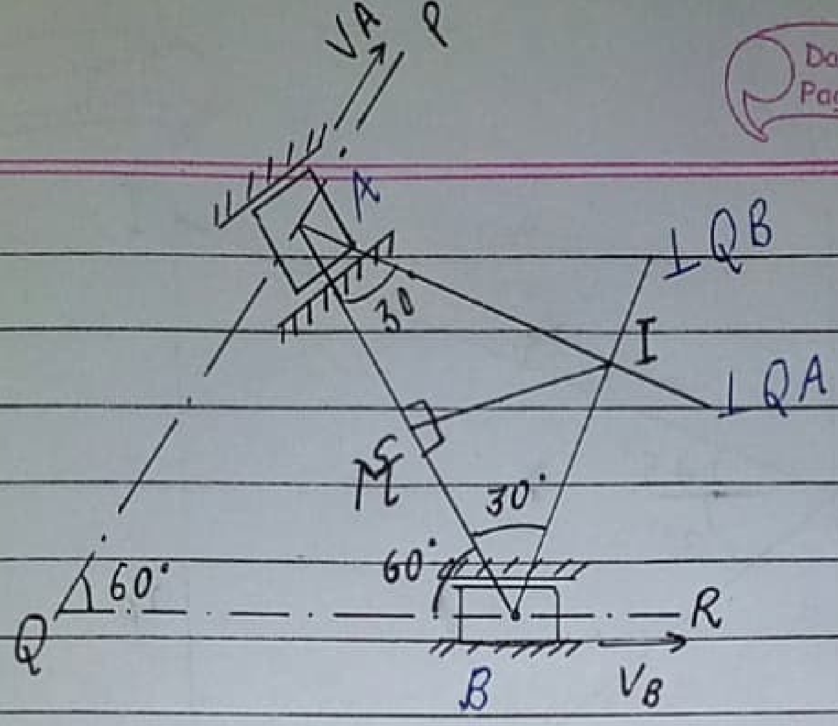
$\therefore V_P \cos\beta = V_Q \cos\theta$

$\therefore V_{QP} = V_Q \sin\theta - V_P \sin\beta$

Hence, only one component is present & it is perpendicular to PQ.

Date
Page

3.



M is the mid pt. of rod.

$$V_A = \omega \cdot IA \Rightarrow \omega = \frac{V_A}{IA} \quad \text{—— (i)}$$

$$V_M = \omega \cdot IM \Rightarrow \omega = \frac{V_M}{IM} \quad \text{—— (ii)}$$

from (i) & (ii),

$$\frac{V_A}{IA} = \frac{V_M}{IM}$$

$$V_M = \frac{V_A}{IA} \times IM$$

$$= V_A \times \frac{IM}{IA}$$

Given,
$[V_A = 2\ m/s]$

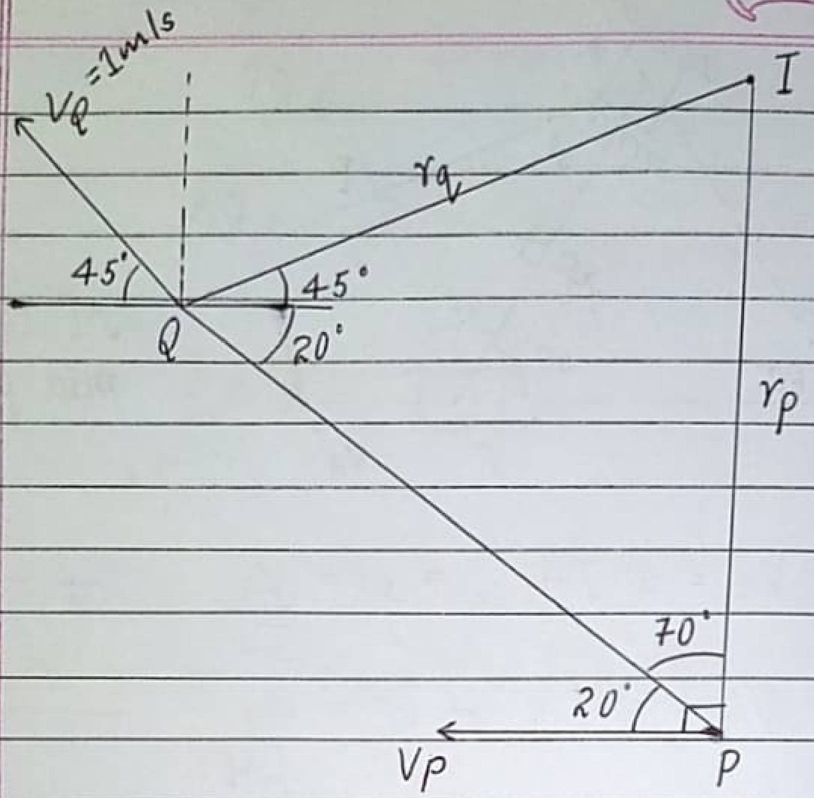
$$V_M = 2 \times \sin 30^\circ \quad \therefore \left[\sin 30^\circ = \frac{IM}{IA}\right]$$

$$V_M = 2 \times \frac{1}{2}\ m/sec$$

$$\boxed{V_M = 1\ m/sec}$$

Date______
Page______

4.



$V_Q = 1 m/s$

Draw the line perpendicular to velocity & meet at a single pt i.e. I

$V_Q = r_q \cdot \omega$ —— (i)

$V_p = r_p \cdot \omega$ —— (ii)

from (i) & (ii),

$$\frac{V_Q}{r_q} = \frac{V_p}{r_p} = \omega$$

$$V_p = V_Q \cdot \frac{r_p}{r_q} \quad \text{—— (iii)}$$

by sin rule,

$$\frac{r_p}{\sin(45+20°)} = \frac{r_q}{\sin 70°}$$

$$\frac{r_p}{\sin 65°} = \frac{r_q}{\sin 70°}$$

put it in eq (iii),

$$V_p = V_Q \cdot \frac{r_p}{r_q}$$

Date
Page

$$V_p = V_Q \cdot \frac{\sin 65^\circ}{\sin 70^\circ}$$

$$V_p = 1 \times \frac{\sin 65^\circ}{\sin 70^\circ}$$

$$V_p = \frac{0.826}{0.773}$$

$$V_p = 1.068\ m/s$$