YAKEEN NEET 2.0

2026

Units and Measurements

PHYSICS Lecture - 04

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Todays Goal

- Ques Practice.

Q $F = \dfrac{At^3}{B+x^2}$

$B = L^2$

$ML^3T^{-5} = A$

JEE mains PYQ

$\left(\begin{array}{l} x \rightarrow \text{Distance} \\ t \rightarrow \text{time} \end{array}\right)$

Q $x = At^2$

$\text{D.F. of } A \Rrightarrow A = \frac{x}{t^2} \Rrightarrow \frac{L}{T^2} = LT^{-2}$

Q $(K.E) = \alpha x^2$

$ML^2T^{-2} = \alpha L^2$

$\boxed{\alpha = MT^{-2}}$

Q $F = Kv^2$

$K \Rrightarrow MLT^{-2} = K(LT^{-1})^2$

$MLT^{-2} = KL^2T^{-2}$

$\boxed{K = ML^{-1}}$

Q $KE = \frac{1}{2}\alpha t^2$

$ML^2T^{-2} = \alpha T^2$

$\boxed{\alpha = ML^2T^{-4}}$

Find D.F. of A, B, C ....

Q $x = \underbrace{At^2}_{} + \underbrace{Bt^3}_{}$

Distance

$At^2 = L$

$\boxed{A = LT^{-2}}$

$BT^3 = L$

$\boxed{B = LT^{-3}}$

Q $x = At^3 + \frac{B}{t^2} + Cx^2$

find DF of A.B.C

Sol^n

$AT^3 = L$

$\boxed{A = LT^{-3}}$

$\frac{B}{T^2} = L$

$\boxed{B = LT^2}$

$CL^2 = L$

$\boxed{C = L^{-1}}$

$ABC = LT^{-3} \cdot LT^2 \cdot L^{-1}$

$= \underline{\underline{LT^{-1}}}$

Q $x = At + \frac{B}{C+t}$

$At \longrightarrow$ Distance

$AT = L$

$\boxed{A = LT^{-1}}$

$\boxed{C = T}$

$\frac{B}{C+t} \longrightarrow$ Distance

$\frac{B}{T} = L$

$\boxed{B = LT}$

Q $x = At^2 + \frac{B}{C+x^2}$

$At^2 \longrightarrow$ Distance

$C = L^2$

$AT^2 = L$

$\boxed{A = LT^{-2}}$

$\frac{B}{C+x^2} \longrightarrow$ Distance

$\frac{B}{L^2} = L \Rightarrow B = L^3$

Q $F = \frac{A}{t^2} + \frac{B}{C+x}$

$\frac{A}{T^2} = MLT^{-2}$

$C = L$

$MLT^{-2} = \frac{B}{L}$

$\boxed{A = ML}$

$\boxed{B = ML^2T^{-2}}$

Q $F = At^2 + \underbrace{Bx^2} + \dfrac{C}{D+t^2}$ $\rightarrow$ Force

$D = T^2$

$MLT^{-2} = \dfrac{C}{T^2}$

$\boxed{C = ML}$

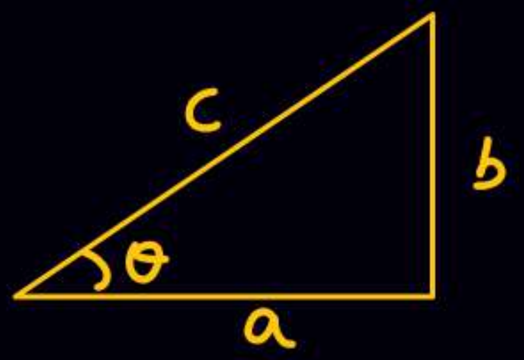
$MLT^{-2} = AT^2$

$\boxed{A = MLT^{-4}}$

$BL^2 = MLT^{-2}$

$B = \dfrac{MLT^{-2}}{L^2} = ML^{-1}T^{-2}$

$\sin\theta = \frac{b}{c} = \frac{L}{L}$



* $\sin\theta \longrightarrow$ Dimensimless
* $\cos\theta \longrightarrow$,,
* $\tan\theta \longrightarrow$,,

* $\sin\theta$ $\longrightarrow$ Angle $= \frac{\text{Arc length}}{\text{Radius}} = \frac{L}{L}$ $\longrightarrow$ Dimensimless

sin(kaddu) $\longrightarrow$ Dimensionless

cos(kaddu) $\longrightarrow$ Dimensionless

Q $x = x_0 \sin(At^2)$

$At^2 \longrightarrow$ Dimensionless $= M^0 L^0 T^0 = 1$

$AT^2 = 1$

$\boxed{A = T^{-2}}$

Q $y = \sin(At^2 + Bt^3)$

$At^2 \equiv 1$

$AT^2 = 1$

$\boxed{A = T^{-2}}$

$Bt^3 \equiv 1$

$BT^3 = 1$

$\boxed{B = T^{-3}}$

Q $y = \sin\left(Ax^2 + \frac{B}{t^2} + \frac{C}{t^3}\right)$

$AL^2 = 1$

$A = L^{-2}$

$\frac{B}{T^2} = 1$

$B = T^2$

$\frac{C}{T^3} = 1$

$C = T^3$

Q $y = \sin\left(\frac{A}{t^3} + Bx^2 + Ct^2 + D\right)$

$A = T^3$

$B = L^{-2}$

$C = T^{-2}$

$D = M^0 L^0 T^0$

Q $x = A \underbrace{\sin(\omega t + \phi)}_{\text{Dimensionless}}$

Displacement

$\boxed{A \Rightarrow L}$

$\omega t \Rightarrow 1$

$\omega T = 1$

$\boxed{\omega = T^{-1}}$

$\phi = M^0 L^0 T^0$

Q $y = \sin\left(Ax^2 + \frac{B}{t^2}\right)$

Q $y = \log\left(Ax^2 + \frac{B}{t^2}\right)$

$\Downarrow$

Q $y = e^{\left(Ax^2 + \frac{B}{t^2}\right)}$

$$\boxed{\begin{aligned} A &\equiv L^{-2} \\ B &\equiv T^{2} \end{aligned}}$$

$y = 2^{\left(Ax^2 + B/t^2\right)}$

Q $y = \tan\left(Ax^2 + \frac{B}{t^2}\right)$

*

tan(kaddu)

sin(kaddu)

cos (kaddu)

ln (kaddu)

e^{kaddu}

Log (kaddu)

Kaddu ⟶ Dimensionless

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* $\sin\theta$ ⟶ Dimensionless

* $\cos\theta$ ⟶ Dimensionless

* $e^{(kaddu)}$ ⟶ dimensionless

log (kaddu) ⟶ Dimensionless

Q $\overset{\text{P.E}}{U} = a(1 - \sin bt) \Longrightarrow U = a - a\sin bt$

find D.F. of a & b.

P.E

$\boxed{a = ML^2T^{-2}}$

$bT = 1$

$b = T^{-1}$

Solⁿ $bT = 1$

$\boxed{b = T^{-1}}$

$a \equiv U \equiv ML^2T^{-2}$

Q $\quad P = \frac{\alpha}{\beta} e^{-\alpha t^2}$

Pressure

$$\boxed{P = \frac{\text{Force}}{\text{Area}} = ML^{-1}T^{-2}}$$

$\alpha t^2 \longrightarrow$ Dimensionless

$\alpha T^2 = 1$

$$\boxed{\alpha = T^{-2}}$$

$ML^{-1} = \frac{1}{\beta}$

$M^{-1}L^{1} = \beta$

$P = \frac{\alpha}{\beta}$ (Dimensionally)

$ML^{-1}T^{-2} = \frac{T^{-2}}{\beta}$

$$\boxed{\beta = M^{-1}L}$$

Q $x = x_0 \cot(At^2)$

$At^2 \longrightarrow$ Dimensionless $= M^0L^0T^0 = 1$

$AT^2 = 1$

$\boxed{A = T^{-2}}$

Q $y = \tan(At^2 + Bt^3)$

$At^2 \equiv 1$

$AT^2 = 1$

$\boxed{A = T^{-2}}$

$Bt^3 \equiv 1$

$BT^3 = 1$

$\boxed{B = T^{-3}}$

Q $y = \cos\left(Ax^2 + \frac{B}{t^2} + \frac{C}{t^3}\right)$

$AL^2 = 1$

$A = L^{-2}$

$\frac{B}{T^2} = 1$

$B = T^2$

$\frac{C}{T^3} = 1$

$C = T^3$

Pressure

Q $P = \frac{\alpha}{\beta} e^{-\frac{\alpha t^2}{x}}$

NEET(Ex)

Q $P = \frac{\alpha}{\beta} e^{-\frac{K\alpha}{t^2}}$

Botzman const

$U = \frac{3}{2} KT$

P.E. temp

$P \equiv ML^{-1}T^{-2}$

$\frac{\alpha t^2}{x} \longrightarrow 1$

$\frac{\alpha T^2}{L} = 1$

$\boxed{\alpha = LT^{-2}}$

$P \equiv \frac{\alpha}{\beta}$

$ML^{-1}T^{-2} = \frac{LT^{-2}}{\beta}$

$ML^{-1} = \frac{L}{\beta}$

Be careful

$\boxed{\beta = M^{-1}L^{2}}$

NEET(XI)

Q

$$P = \frac{\alpha}{\beta} e^{-\frac{K\alpha}{t^2}}$$

pressure

Botzman const

$U = \frac{3}{2} KT$

P.E. temp

$$\frac{K\alpha}{T^2} = 1$$

$$\frac{ML^2T^{-2}\theta^{-1} \cdot \alpha}{T^2} = 1$$

$$\alpha = M^{-1}L^{-2}T^{4}\theta.$$

$$ML^2T^{-2} = K\theta$$

$$K \equiv ML^2T^{-2}\theta^{-1}$$

$$\frac{\alpha}{\beta} = ML^{-1}T^{-2} \text{ (pressure)}$$

$$\beta = \frac{\alpha}{ML^{-1}T^{-2}} = \frac{M^{-1}L^{-2}T^{4}\theta}{ML^{-1}T^{-2}} = M^{-2}L^{-1}T^{6}\theta.$$

work done

Boltzman const

Q $w = \frac{\beta}{\alpha} e^{-\frac{\alpha K}{t^2}}$

Sol^n

$\frac{\alpha K}{t^2} = 1$

$\frac{\alpha\, ML^2T^{-2}\theta^{-1}}{T^2} = 1$

$\alpha = M^{-1}L^{-2}T^{4}\theta^{1}$

$\frac{\beta}{\alpha} \Rightarrow ML^2T^{-2}$

$\beta = ML^2T^{-2}\cdot(M^{-1}L^{-2}T^{4}\theta^{1})$

$\boxed{\beta \equiv M^0L^0T^2\theta}$

Bolzmann const

temp

Q

$$P = \frac{\beta}{\alpha} e^{-\frac{K\theta}{\alpha}}$$

Power

$$\frac{K\theta}{\alpha} = 1$$

$$\text{Power} = \frac{\text{Energy}}{\text{time}}$$

$$\frac{ML^2T^{-2}}{\alpha} = 1$$

$$U = \frac{3}{2}K\theta$$

$$\boxed{\alpha = ML^2T^{-2}}$$

$$\frac{\beta}{\alpha} = \frac{ML^2T^{-2}}{T}$$

$$\beta = \frac{ML^2T^{-2}}{T} \cdot ML^2T^{-2} = M^2L^4T^{-5}$$

Q

Power

$$P = P_0 e^{-\alpha x^2}$$

$$\alpha = L^{-2}$$

$$P_0 = \text{Power} \equiv ML^2T^{-3}$$

Q $I = \frac{\alpha}{\beta} e^{-\alpha t}$ Distance

$\boxed{\begin{array}{l} I \rightarrow \text{Intensity} \\ t \rightarrow \text{thickness} \end{array}}$

$I = \frac{\text{Energy}}{\text{time} \cdot \text{Area}} = \frac{M L^2 T^{-2}}{T \cdot L^2} = M L^0 T^{-3}$

$\alpha L = 1$

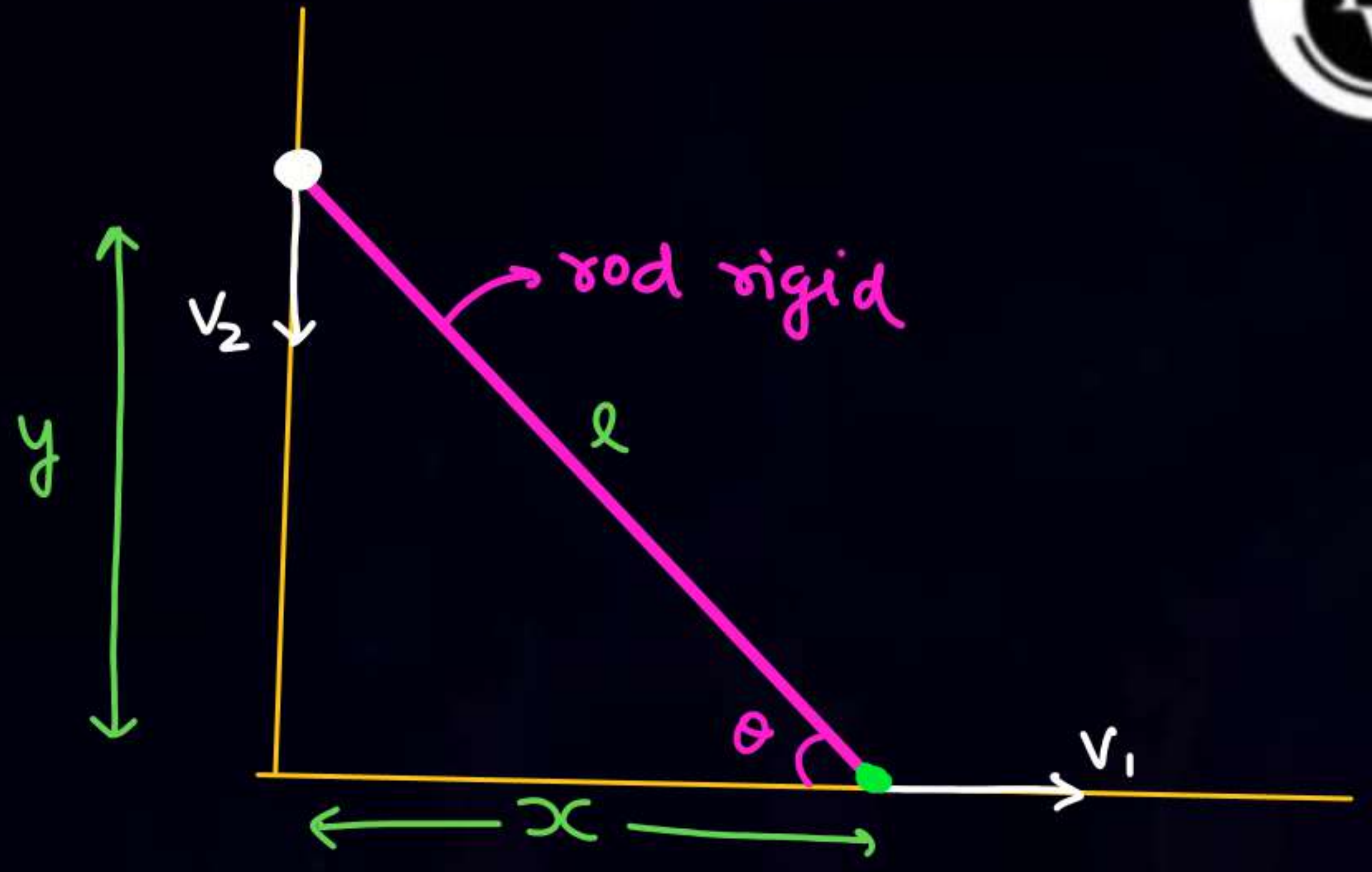
$\alpha = L^{-1}$

$\beta = \frac{\alpha}{\text{Inten}} = \frac{L^{-1}}{M L^0 T^{-3}} = M^{-1} L^{-1} T^3$

Q $V_1 = 10\,m/s$

$\theta = 37°$

$V_2 = ?$



(M1) $x^2 + y^2 = l^2$ → const

$$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 0$$

$$xV_1 + y(-V_2) = 0$$

$$xV_1 = yV_2$$

$$V_1 = \frac{y}{x}V_2$$

$$\boxed{V_1 = V_2 \tan\theta}$$

$$V_1 = \frac{dx}{dt}$$

$$10 = V_2 \times \frac{3}{4}$$

$$V_2 = \frac{40}{3}$$

Q $V_1 = 10\,m/s$

$\theta = 37^\circ$

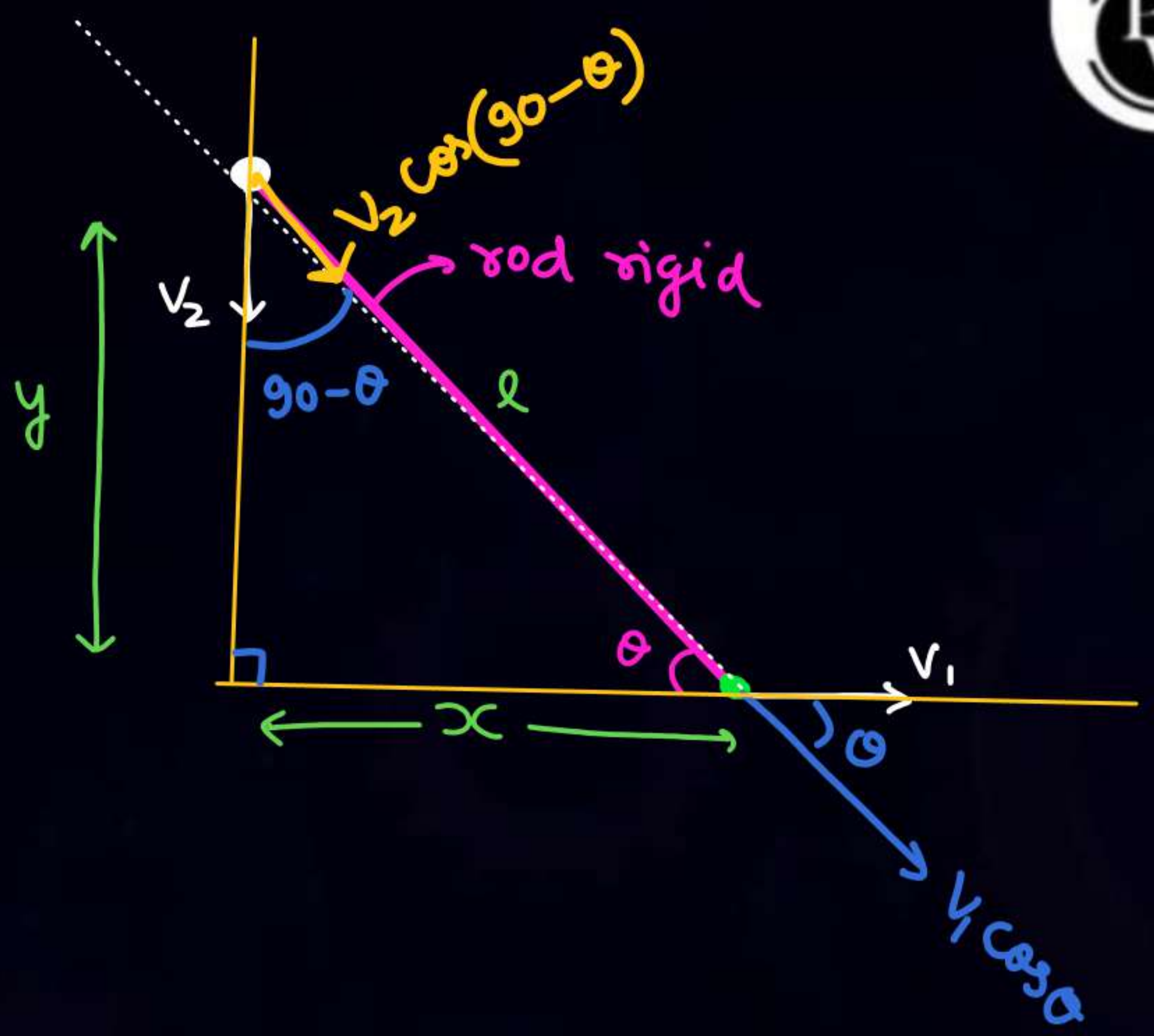
$V_2 = ?$

m2

$$V_2 \cos(90-\theta) = V_1 \cos\theta$$

$$V_2 \sin\theta = V_1 \cos\theta$$

$$\boxed{V_1 = V_2 \tan\theta}$$



(M3) Rotation

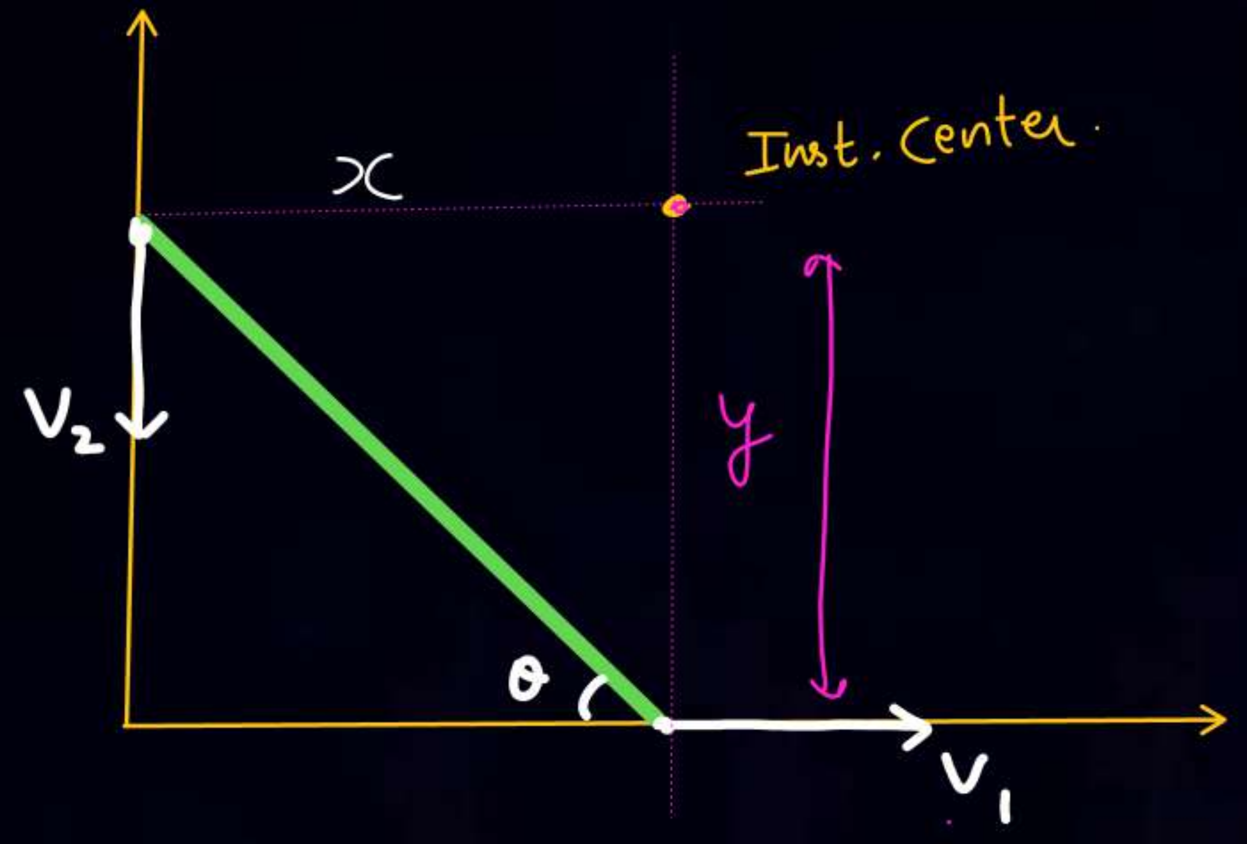
$$V_1 = y\omega$$

$$V_2 = x\omega$$

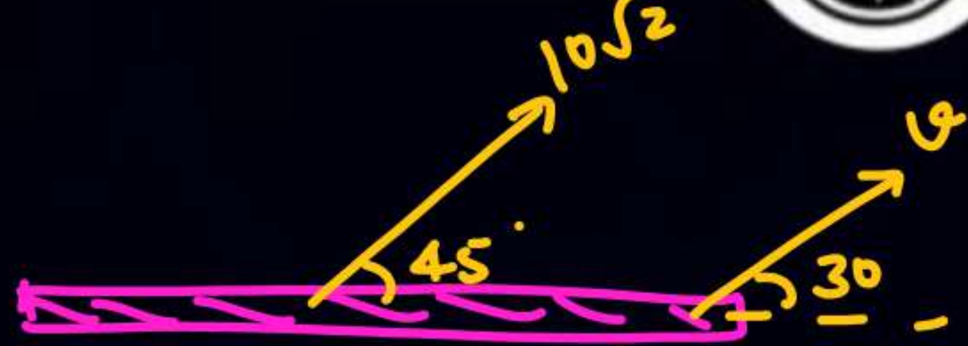
$$\frac{V_1}{V_2} = \frac{y}{x} = \tan\theta$$

$$V_1 = V_2 \tan\theta$$

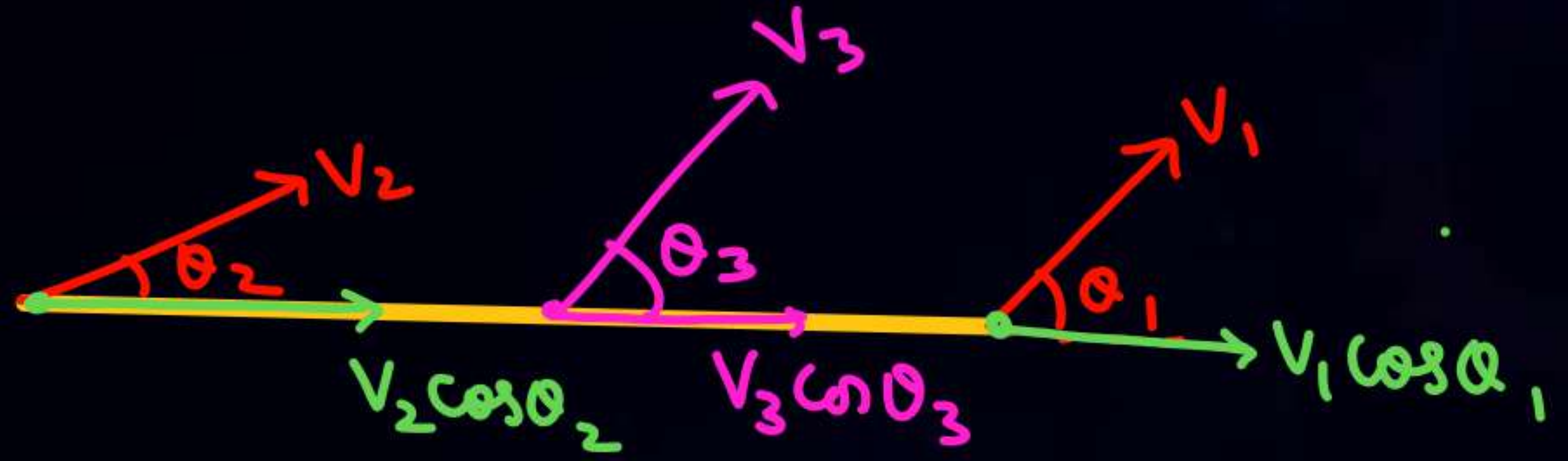
$v =$



$$v = r\omega$$



$$10\sqrt{2}\,\frac{1}{\sqrt{2}} = v \times \frac{\sqrt{3}}{2}$$



$$\boxed{V_1\cos\theta_1 = V_2\cos\theta_2 = V_3\cos\theta_3}$$

10. The electric current in a charging R-C circuit is given by $i = i_0 e^{-t/RC}$ where i_0, R and C are constant parameters of the circuit and t is time. Find the rate of change of current at (a) $t = 0$, (b) $t = RC$, (c) $t = 10\ RC$.

HCV

Isme

Rate of change of current matlab

$$= \frac{di}{dt}$$

11. The electric current in a discharging R-C circuit is given by $i = i_0 e^{-t/RC}$ where i_0, R and C are constant parameters and t is time. Let $i_0 = 2.00$ A, $R = 6.00 \times 10^5\ \Omega$ and $C = 0.500\ \mu F$.

(a) Find the current at $t = 0.3$ s.

(b) Find the rate of change of current at $t = 0.3$ s.

(c) Find approximately the current at $t = 0.31$ s.

KPP- 11

Find D.F. of α & β

① $w = \frac{\alpha}{\beta} e^{-\frac{\alpha t}{K}}$

$w \rightarrow$ workdone
$K \rightarrow$ Bolzman const

② $w = \frac{\alpha}{\beta} e^{-\frac{\alpha t}{K\theta}}$

$w \rightarrow$ workdone
$K \rightarrow$ Bolzman const
$\theta \rightarrow$ temp

③ $P = \alpha\left(1 - e^{\frac{-K\theta}{\beta t}}\right)$

$P \rightarrow$ Pressure
$K \rightarrow$ Bolzman const
$\theta \rightarrow$ temp

(4) $U = K(1 - \cos ax)$

$U \rightarrow$ Potential energy.

Find D.F. of $\frac{a}{K}$

(5) $v = \sqrt{\frac{\gamma K T}{m}}$

$v \rightarrow$ speed of sound

$\gamma \longrightarrow$ Dimensionless.

$K \longrightarrow$ Bolzman const

$T \longrightarrow$ temp

$m \longrightarrow$ mass

Find SI unit of K

Ans $\frac{Kg\, m^2 s^{-2}}{K}$

(6) $$b = \frac{ma}{K}\sqrt{1+\frac{2Kl}{ma}}$$

$a \longrightarrow$ acc

$l \longrightarrow$ length

$m \longrightarrow$ mass

D.F of b will be ?

(1) LT^{-1}

(2) LT^{-2}

(3) L

(4) Cannot be find

$x \rightarrow$ distance

$\rightarrow$ Displacement

(7) $$y = 2A\sin\left(\frac{2\pi ct}{\lambda}\right)\cos\left(\frac{2\pi x}{\lambda}\right)$$

Find D.F of ct and $\frac{cx}{\lambda^2}$

(8) $\vec{F} = -\frac{A}{r^3}\vec{r}$

$F \rightarrow$ Force

$r \rightarrow$ Distance

Find D.F. of A

(9) $\vec{F} = -\frac{A}{r^3}\hat{r}$

$F \rightarrow$ Force

$r \rightarrow$ Distance

Find D.F. of A

(10) $\alpha = \frac{(\vec{r}\cdot\vec{a})\hat{r}}{r^2}$

Find DF of α

(11) $\beta = \frac{(\vec{r}\cdot\vec{a})\hat{r}}{r^2}$

Find DF of β

(12) If $\alpha = \frac{1}{2\pi}\sqrt{\frac{P_0 A^2 \gamma}{m V_0}}$

where
$P_0 \longrightarrow$ Pressure
$V_0 \longrightarrow$ Volume
$A \longrightarrow$ Cross section Area
$\gamma \longrightarrow$ Dimensionless
$m \longrightarrow$ mass

If D.F. of AT is $M^x L^y T^z$ where T is time then find.

$x+y+z$

(13) $F = \alpha x^2 + \beta\sqrt{t}$

find D.F of $\frac{\beta^2}{\alpha}$

(14) $\alpha = \sqrt{\frac{hc^5}{G}}$

Find D.F of α

$c \longrightarrow$ speed of light

$h \longrightarrow$ plank const

$G \longrightarrow$ univ. grav. const

(15) $x = \frac{F}{B}\sin(ct^2)$

$x \rightarrow$ Distance

$F \rightarrow$ Force

Find D.F of A.B

(16) $F = \frac{\alpha}{\beta + \sqrt{\rho}}$

$F \rightarrow$ Force

$\rho \rightarrow$ Density

Find DF of α & β

(17)

$$P = \alpha \log\left(\frac{\beta}{x^2} + \gamma t^2\right)$$

$P \rightarrow$ power

find D.F of $\frac{\alpha\beta}{\gamma}$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Homework

- 17 ques of KPP are Attached in this KPP solve them carefully. (KPP - 11)
- DPP
-

THANK
YOU