CH 15, 16

$x_m$ = A = max displacement

Pendulum

$x(t) = x_m \cos(\omega t + \phi)$ — phase/phase constant, phase angle

$v(t) = -\underbrace{\omega x_m}_{v_m} (\sin(\omega t + \phi))$

$a(t) = -\underbrace{\omega^2 x_m}_{a_m} \cos(\omega t + \phi)$

SHM

$\omega = \sqrt{\frac{k}{m}}$, $\sqrt{\frac{g}{L}}$

$T = 2\pi\sqrt{\frac{m}{k}}$

$T = 2\pi\sqrt{\frac{L}{g}}$

$\omega = \frac{2\pi}{T} = 2\pi f$

↓

S. Pendulum

$$\boxed{\begin{aligned} &\text{Damping Force: } F_d = -bv \quad (b \text{: damping const}) \\ &x(t) = x_m e^{-bt/2m} \cos(\omega' t + \phi) \\ &\omega' = \sqrt{\frac{k}{m} - \frac{b^2}{4m^2}} \end{aligned}}$$

$F = ma$ $\qquad F = kx$

$F = m(+\omega^2 x)$ $\qquad U(t) = \frac{1}{2} k x_m^2 \cos^2(\omega t + \phi)$

$F = +\omega^2 x m = kx$ $\qquad K(t) = \frac{1}{2} k x_m^2 \sin(\omega t + \phi)$

$\omega^2 = \frac{k}{m}$

$x \to$ linear in all

$\omega = \sqrt{\frac{k}{m}}$

$U(t) = \frac{1}{2} k(x)^2 = \frac{1}{2} k x_m^2 \cos^2(\omega t + \phi)$

$K(t) = \frac{1}{2} k v^2 = \frac{1}{2} k x_m^2 \sin(\omega t + \phi)$

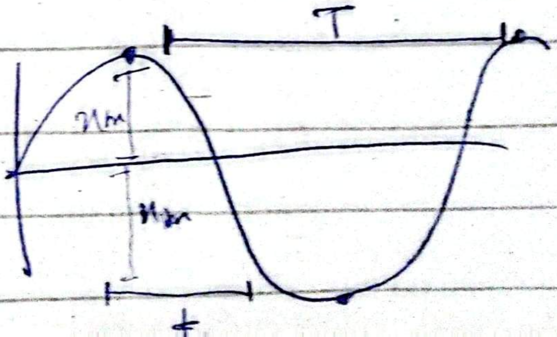
$E = U + K = \frac{1}{2} k x_m^2$

mean = $K_{max}$

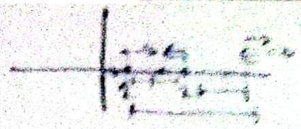
extreme = $U_{max}$

$T = 2t$

$T = t/2$, $t/n$



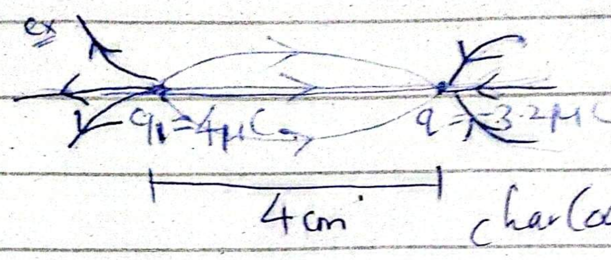
Notes (Not complete)



- 2 points → charges (2 point) → one of distance unknown and and net $\vec{E}$ due to these points is zero
  equate their individual $\vec{E}$

- understand the statement carefully.
- vector diagram → direction of $\vec{E}$ +ve q to −q)

ex




char(count s(0)) = 0

$$Y(x,t) = y_m \sin(kx - \omega t + \phi)$$

$$y(x,t) = y_m \sin(kx - \omega t + \phi)$$

wave speed → $v = \frac{\omega}{k} = \frac{\lambda}{T} = f\lambda$

$k = \frac{2\pi}{\lambda}$

'A' = 65

'a' = 97

b = 98

$98 - 97 = \boxed{1}$

~~$y(x,t) = y_m \cos(k$~~

~~$y(x,t) = y_m \sin(kx - \omega t)$~~

angular wave number ⇒ $\boxed{k = \frac{2\pi}{\lambda}}$

$$V = \frac{\omega}{K} = \frac{\lambda}{T} = f\lambda$$

$$k = \frac{2\pi}{\lambda}$$

nodes

$x = n\frac{\lambda}{2}$

antinodes

$x = (n + \frac{1}{2})\frac{\lambda}{2}$