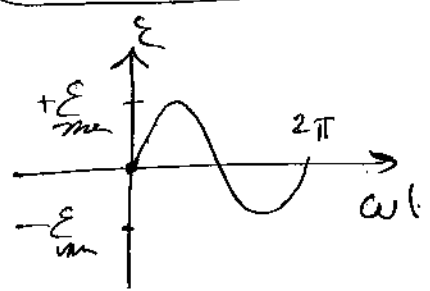


(4)

$$\begin{aligned} \phi &= NBS \cos \alpha \\ \alpha &= \omega t \\ \phi &= NBS \cos \omega t \\ \bar{E} &= -\frac{d\phi}{dt} \\ &= +NBS\omega \sin \omega t \end{aligned}$$

$$E_{max} = NBS\omega$$

$$E = E_{max} \sin \omega t$$



$$\begin{aligned} \bar{\theta} &= \theta_{max} \cos(\omega t + \phi) \\ \bar{\omega} &= \dot{\bar{\theta}} = -\omega \theta_{max} \sin(\omega t + \phi) \end{aligned}$$

$$\bar{\theta} = -\omega_c^2 \theta$$

$$\omega_c = \sqrt{\frac{\kappa}{I_0}} > 0$$

$$T_0 = 2\pi \sqrt{\frac{I_0}{\kappa}}$$

تزداد الزاوية بزيادة طول السلك المعلق

$$\frac{T_{02}}{T_{01}} = \sqrt{\frac{\kappa_1}{\kappa_2}}$$

$$\kappa = \kappa' \frac{e r^2}{l}$$

$$\frac{\kappa_1}{\kappa_2} = \frac{l_2}{l_1}$$

$$\frac{T_{02}}{T_{01}} = \sqrt{\frac{l_1}{l_2}}$$

10
10
10
10
10
10

- السؤال 1
اختر الإجابة
451 أ (ب) 11
 $E_p = E_k$ (ب) 2
 $\frac{1}{4} \alpha$ (ب) 3
 10^4 (أ) 4
تغير سرعة ثابتة (ب) 5
 $B' = B$ (ب) 6

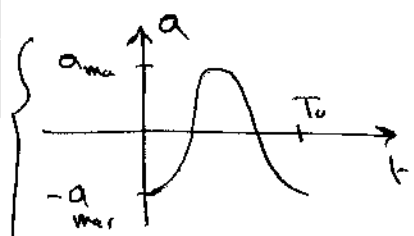
السؤال 2

$$\bar{x} = X_{max} \cos \omega t$$

$$\bar{x}' = -\omega_0 X_{max} \sin \omega t$$

$$\bar{x}'' = \bar{a} = -\omega_0^2 X_{max} \cos \omega t$$

$$\bar{a} = -\omega^2 \bar{x}$$



عظم عتبات:
 $t=0$ $t=\frac{1}{2}T$ $t=T$
الموضع: في X_{max}

10
5
5
5

(3)

- عاملية
- الطيف المهيمن للذرة
- نقطة الوسط

العناصر في نقطة ما كمن

الطال: نموذج المستوي المحدود
في النقط المعينه والمناظر

المساحة: $\frac{1}{2} \times$ $\frac{1}{2} \times$
تطولا:

$$B = 2 \times 10^{-7} \frac{I}{d}$$

5
5
5

$$\vec{E} = \int \vec{a}$$

$$\vec{E} = \int \vec{a}$$

$$0 + 0 - \kappa \bar{\theta} = \int \vec{a}$$

قطبان
في البداية

$$\bar{\alpha} = -\frac{\kappa}{I_0} \bar{\theta}$$

$$\alpha = \bar{\theta}''$$

معادلة تماثلية من الرتبة الثانية تعبر عن حركتها

3
3
3

20

$$I' = \frac{\varepsilon}{R}$$

$$= \frac{2 \times 10^2}{20}$$

$$= 10 \text{ A}$$

$$P = \varepsilon I'$$

$$= 2 \times 10^2 \times 10$$

$$= 2 \times 10^3 \text{ W}$$

10

$$\omega_c = \omega d$$

$$= 2\pi \frac{3}{8}$$

$$= \frac{3\pi}{4} \text{ ms}^{-1}$$

$$\theta_{max} = \frac{1}{2\pi} \text{ rad} \quad \textcircled{3}$$

20

$$\theta = \theta_{max} \cos(\omega t + \phi)$$

$$\omega_0 = \frac{2\pi}{T_0} = \frac{2\pi}{\sqrt{2}} \text{ rads}^{-1}$$

فصل

$$-\theta_{max} = \theta_{max} \cos \phi$$

$$\cos \phi = -1$$

$$\phi = \pi$$

$$\theta = \frac{1}{2\pi} \cos(\sqrt{2}\pi t + \pi)$$

$$T_0 = T = \sqrt{2}$$

$$\sqrt{2} = 2\pi \sqrt{\frac{l}{\pi^2}}$$

$$l = \frac{1}{2} \text{ (m)}$$

15

③ نيل

$$E = \frac{1}{2} K X_{max}^2$$

$$X_{max} = 5 \times 10^{-2} \text{ m}, \quad \omega_0 = 0$$

$$25 \times 10^{-3} = \frac{1}{2} K (5 \times 10^{-2})^2$$

$$K = 20 \text{ N m}^{-1}$$

15

$$W = F_{s0} = F_{s'}$$

$$mg = K x_0$$

$$x_0 = \frac{mg}{K}$$

$$= \frac{0.2 \times 10}{20}$$

$$= 10^{-1} \text{ m}$$

$$\bar{x} = X_{max} \cos(\omega t + \phi)$$

$$\omega_0 = \frac{2\pi}{T} \sqrt{\frac{K}{m}} = \sqrt{\frac{20}{0.2}}$$

$$\omega_0 = 10$$

فصل

$$0 = X_{max} \cos \phi$$

$$\cos \phi = 0$$

$$\phi = \frac{\pi}{2} \text{ rad}$$

$$\phi = -\frac{\pi}{2} \text{ rad}$$

25

② نيل

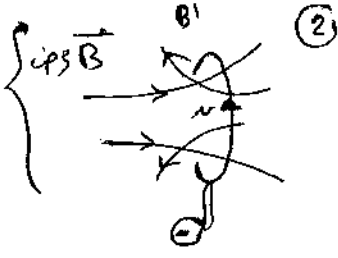
$$\bar{\varepsilon} = - \frac{\Delta \Phi}{\Delta t}$$

$$= - \frac{\Delta B S \cos \theta}{\Delta t}$$

$$= \frac{-100 (0.08 - 0) \pi \cdot 16 \times 10^{-4}}{2}$$

$$= -2 \times 10^{-2} \text{ A}$$

15



السؤال الثالث
الجزء 1

$$T_0 = 2\pi \sqrt{\frac{I_{0/c}}{mgd}}$$

$$d = \frac{L}{2}$$

$$I_{0/c} = I_{0/c} + md^2$$

$$= \frac{1}{12} mL^2 + m \frac{L^2}{4}$$

$$= \frac{1}{3} mL^2$$

$$T_0 = 2\pi \sqrt{\frac{\frac{1}{3} mL^2}{m \pi^2 \frac{L}{2}}}$$

$$= 2 \sqrt{\frac{2}{3}} L$$

$$= 2 \sqrt{\frac{2}{3} \frac{3}{4}} = \sqrt{2} (1)$$

20

$$\Delta E_k = \sum W_F \quad \textcircled{2}$$

$$E_{k2} - E_{k1} = W_{\bar{w}} + W_R$$

$$(\theta_2 = 0) \quad (\theta_1 = \theta_m)$$

$$\frac{1}{2} I_{0/c} \omega^2 - 0 = mgh + 0$$

لارتفاع نقطة انزلاق

$$h = d(1 - \cos \theta_m)$$

$$\omega = \sqrt{\frac{2mgd(1 - \cos \theta_m)}{I_{0/c}}}$$

$$= \sqrt{\frac{2 \cdot m \cdot 10 \cdot \frac{L}{2} (1 - 0)}{\frac{1}{3} mL^2}}$$

$$= \sqrt{\frac{30}{L}} = \sqrt{40} = 2\pi \text{ rads}^{-1}$$

$$\begin{aligned}
 W &= \int \Delta \phi \quad (2) \\
 &= \int (\phi_2 - \phi_1) \\
 &= \int \mu B S (\cos \alpha_2 - \cos \alpha_1) \\
 &= \frac{1}{10} \cdot 100 \cdot 10^{-2} \cdot \frac{1}{16} (1-0) \\
 &= \frac{1}{160} \text{ J}
 \end{aligned}$$

مخطط التوازن
الدوراني (3)

$$\sum \tau_a = 0$$

$$\tau_a + \tau_b = 0$$

مخطط التوازن
الخطي

$$\mu B S \sin \alpha - K \theta = 0$$

$$K = \frac{\mu B S \sin \alpha}{\theta}$$

$$\alpha + \theta = 90^\circ$$

$$\alpha = 60^\circ$$

$$K = \frac{100 \cdot 10^{-2} \cdot \frac{1}{16} \cdot 10 \cdot \frac{\sqrt{3}}{2}}{\frac{\pi}{6}}$$

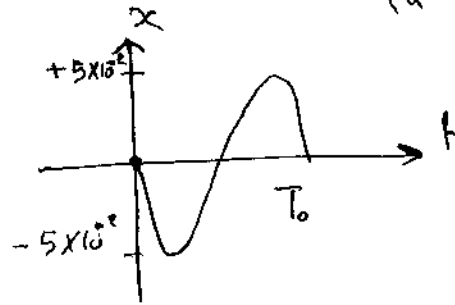
$$= \frac{3\sqrt{3} \cdot 10^{-3}}{16\pi} \text{ m.v. val}^{-1}$$

$$\begin{aligned}
 x &= -a_0 X_m \sin \omega t \\
 &\quad \swarrow \quad \searrow \\
 &\quad \frac{\pi}{2} \quad \quad -\frac{\pi}{2} \\
 &\quad \frac{1}{2} \omega t \quad \quad \phi_0
 \end{aligned}$$

$$x = 5 \times 10^{-2} \cos(10t + \frac{\pi}{2})$$

$$\begin{aligned}
 x &= 0 \quad (3) \\
 x &= \mp X_m
 \end{aligned}$$

$$\begin{aligned}
 F &= K X_m \\
 &= 20 \times 5 \times 10^{-2} \\
 &= 1 \text{ N}
 \end{aligned}$$



(4) الحل

$$x = \frac{1}{4} \text{ (m)} \quad (1)$$

$$\begin{aligned}
 x &= \mu \cdot B \cdot S \cdot \int \sin \alpha \\
 &= 100 \cdot 10^{-2} \cdot \frac{1}{16} \cdot 10^{-1} \cdot 1 \\
 &= \frac{1}{160} \text{ m.v.}
 \end{aligned}$$

$$\begin{aligned}
 F &= \mu \cdot I \cdot L \cdot B \cdot \sin \theta \\
 &= 100 \cdot \frac{1}{10} \cdot \frac{1}{4} \cdot 10^{-2} \cdot 1 \\
 &= \frac{1}{40} \text{ N}
 \end{aligned}$$