

Problema 1

1) $f = 1 \text{ Hz}$

2) $\vec{a}_n = \pi^2 \left(1 - \frac{\sqrt{3}}{3} \right) (\vec{u}_x - \vec{u}_y) \text{ mm s}^{-2}; \quad \vec{a}_t = -\pi^2 \left(\frac{\sqrt{3}}{3} + 1 \right) (\vec{u}_x + \vec{u}_y) \text{ mm s}^{-2}$

Problema 2

1) $\vec{v} = -\frac{\pi b \sqrt{2}}{6} \vec{u}_z$

2) $z = \pm \frac{2\sqrt{2}}{3} b$

Problema 3

1) $x = 10 \text{ sen} \left(6\pi t + \frac{2\pi}{3} \right) \text{ cm}; \quad y = 10 \text{ sen} \left(6\pi t + \frac{\pi}{6} \right) \text{ cm}$

2) $\vec{a}_t = 0; \quad \vec{a}_n = 180\pi^2 (\sqrt{3} \vec{u}_x + \vec{u}_y) \text{ cm s}^{-2}$

3) $x' = 10 \text{ sen} \left(6\pi t - \frac{\pi}{3} \right) \text{ cm}; \quad \vec{a}_t = 180\pi^2 \vec{u}_y \text{ cm s}^{-2}; \quad \vec{a}_n = 0$

Problema 4

1) $t = (1 + 4m) \text{ s}, \quad m \geq 0$

2) $\vec{v} = \frac{\pi}{2} (-\vec{u}_x + 3\vec{u}_y) \text{ cm s}^{-1}; \quad \vec{a} = -\frac{\pi^2 \sqrt{3}}{4} \vec{u}_x \text{ cm s}^{-2}$

3) $\vec{a}_t = \frac{\pi^2 \sqrt{3}}{40} (-\vec{u}_x + 3\vec{u}_y) \text{ cm s}^{-2}; \quad \vec{a}_n = -\frac{3\pi^2 \sqrt{3}}{40} (3\vec{u}_x + \vec{u}_y) \text{ cm s}^{-2}$

Problema 5

1) $y^2 + z^2 = 1 \quad (y, z \text{ en mm})$

2) $\vec{a}_t = 0; \quad \vec{a}_n = 2\pi^2 (\vec{u}_y - \sqrt{3} \vec{u}_z) \text{ mm s}^{-2}$

3) $m = 20 \text{ g}$

Problema 6

1) $x = 2\sqrt{3} \cos 2\pi t \text{ cm}$ (amplitud $2\sqrt{3} \text{ cm}$, fase inicial nula)

2) $E_c = \frac{27\pi^2}{5} \cdot 10^{-5} \text{ kg m}^2 \text{ s}^{-2}; \quad E_p = 18\pi^2 \cdot 10^{-6} \text{ kg m}^2 \text{ s}^{-2}$

3) $\vec{v} = \pm 2\pi\sqrt{3} \vec{u}_x \text{ cm s}^{-1}; \quad \vec{a} = \pm 12\pi^2 \vec{u}_x \text{ cm s}^{-2}$

Problema 7

$x = 2\sqrt{3} \text{ sen} \left(\frac{\pi}{5} t + \frac{\pi}{3} \right) \text{ cm}$

Problema 8

- 1) $x^2 + y^2 = 16$ (x, y en mm); $y = 4 \operatorname{sen}(10\pi t - \pi/4)$ mm
 2) $\vec{F} = -2 \cdot 10^{-3} \pi^2 (\sqrt{3} \vec{u}_x + \vec{u}_y)$ N

Problema 9

$$T = 2\pi \sqrt{\frac{m}{C}}; \quad x = \sqrt{5} \operatorname{sen} \left(\sqrt{\frac{C}{m}} t + \frac{7\pi}{6} \right)$$

Problema 10

- 1) $x = 2 \operatorname{sen} \left(\frac{\pi}{4} t + \frac{\pi}{3} \right)$ mm; $z = \sqrt{3} \operatorname{sen} \left(\frac{\pi}{4} t + \frac{4\pi}{3} \right)$ mm
 2) $z = -\frac{\sqrt{3}}{2} x$
 3) $\vec{a}_t = \frac{\pi^2}{16} \left(\vec{u}_x - \frac{\sqrt{3}}{2} \vec{u}_z \right) \text{ mm s}^{-2}; \quad \vec{a}_n = 0$

Problema 11

$$\vec{r} = 5 \operatorname{sen} \left(6t - \frac{\pi}{6} \right) \vec{u}_x - 4 \operatorname{sen} 6t \vec{u}_y \text{ cm}$$

Problema 12

- 1) $x = 2 \operatorname{sen} \left(2\pi t + \frac{\pi}{4} \right)$ mm; $y = 6 \operatorname{sen} \left(2\pi t - \frac{\pi}{4} \right)$ mm
 2) $\frac{(E_c)_{\text{eje } X}}{(E_c)_{\text{eje } Y}} = 9$
 3) $\vec{a}_t = \frac{16\pi^2 \sqrt{2}}{5} (\vec{u}_x + 3 \vec{u}_y) \text{ mm s}^{-2}; \quad \vec{a}_n = -\frac{12\pi^2 \sqrt{2}}{5} (3\vec{u}_x - \vec{u}_y) \text{ mm s}^{-2}$