

EJERCICIO F28E2603:

EBAU CANARIAS JULIO 22

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Onda sentido negativo eje x

$$f = 10 \text{ Hz}$$

$$v = 30 \text{ m/s}$$

$$\varphi_0 = \frac{\pi}{2} \text{ rad}$$

$$\left. \begin{array}{l} f = 10 \text{ Hz} \\ v = 30 \text{ m/s} \\ \varphi_0 = \frac{\pi}{2} \text{ rad} \end{array} \right\} \text{ en } t=0; x=0 \Rightarrow y = 5 \text{ cm} = 0.05 \text{ m}$$

a) Ecuación de la onda

b) Vibración $x = 20 \text{ cm}$ en $t = 0,25 \text{ s}$

c) distancia en determinado instante $\Delta\varphi = \frac{\pi}{8} \text{ rad}$

a) Ecuación de la onda: → sentido negativo x

$$y(x,t) = A \cdot \text{sen}(\omega t + kx + \varphi_0)$$

$$\omega = \frac{2\pi}{T} = 2\pi \cdot f = 2\pi \cdot 10 = 20\pi \text{ rad/s} = \omega$$

$$k = \frac{2\pi}{\lambda} \Rightarrow v = \frac{\lambda}{T} = \lambda \cdot f \Rightarrow \lambda = \frac{v}{f} = \frac{30}{10} = 3 \text{ m}$$

$$k = \frac{2\pi}{3} \text{ rad/m}$$

$$\varphi_0 = \frac{\pi}{2} \text{ rad}$$

Como en $t=0$ $\left\{ \begin{array}{l} x=0 \\ y = 0,05 \text{ m} \end{array} \right.$

$$y(0,0) = A \cdot \text{sen}\left(20\pi \cdot 0 + \frac{2\pi}{3} \cdot 0 + \frac{\pi}{2}\right)$$

$$0,05 = A \cdot \text{sen} \frac{\pi}{2} \Rightarrow 0,05 \text{ m} = A$$

$$y(x,t) = 0,05 \cdot \text{sen}\left(20\pi t + \frac{2\pi}{3} x + \frac{\pi}{2}\right) \quad (\text{m})$$

Continúa...

b) Velocidad $x=0,2\text{ m}$; $t=0,25\text{ s}$:

$$v(x,t) = \frac{dy(x,t)}{dt} = 0,05 \cdot 20\pi \cdot \cos\left(20\pi t + \frac{2\pi}{3}x + \frac{\pi}{2}\right)$$

$$v(0,2;0,25) = 0,05 \cdot 20\pi \cdot \cos\left(20\pi \cdot 0,25 + \frac{2\pi}{3} \cdot 0,2 + \frac{\pi}{2}\right)$$

$$v(0,2;0,25) = 1,28 \text{ m/s}$$

c) distancia, mismo instante, $\Delta\varphi = \frac{\pi}{8} \text{ rad}$:

mismo instante ($t_2 = t_1$)

$$\Delta\varphi = \varphi_2 - \varphi_1 = \left(20\pi t + \frac{2\pi}{3}x + \frac{\pi}{2}\right)_2 - \left(20\pi t + \frac{2\pi}{3}x + \frac{\pi}{2}\right)_1$$

$$\Delta\varphi = \frac{\pi}{8} = \frac{2\pi}{3}x_2 - \frac{2\pi}{3}x_1$$

$$\frac{\pi}{8} = \frac{2\pi}{3}(x_2 - x_1)$$

→ distancia (d)

$$\frac{\pi}{8} = \frac{2\pi}{3} \cdot d \Rightarrow d = \frac{3}{8 \cdot 2} = 0,1875 \text{ m}$$