

Q. 29

8)

$$\text{Frequency (F)} = 600 \text{ kHz}$$

$$\text{Velocity (v)} = 3.0 \times 10^8 \text{ m s}^{-1}$$

$$\text{Wavelength (\lambda)} = ?$$

$$F = \frac{v}{\lambda}$$

$$600 \times 1000 = \frac{3.0 \times 10^8}{\lambda}$$

$$6.0 \times 10^5 = \frac{3.0 \times 10^8}{\lambda}$$

$$\lambda = \frac{3.0 \times 10^8}{6.0 \times 10^5}$$

$$= \frac{1}{2} \times 10^3$$

$$0.5 \times 10^3$$

$$= 5.0 \times 10^2 \text{ m.}$$

Correct answer is B.

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

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Question 3 - Nuclear physics

file 37

5) Half life $t = 1/2$

from the graph,

mass is 12g

for this mass to be reduced to its half i.e. 6,
the time taken is 30 minutes.

5)

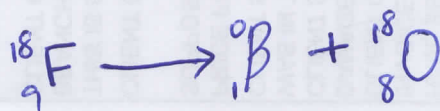
mass remaining after 15 hours

$$t_{1/2} = \left(\frac{1}{2}\right)^{15} 12$$
$$= 3.66 \times 10^{-4}$$

b)

file 38

i) Balanced equation on Fluorine decay.



Fluorine 18 positron Oxygen 18.

File 39

$$x = A \cos(\omega t)$$

$$x = 0.02 \cos(5t)$$

$$\omega = 2\pi F$$

$$\text{but } F = \left(\frac{1}{T}\right)$$

$$\omega = 2\pi \left(\frac{1}{T}\right)$$

$$= 2\pi \frac{1}{1.26}$$

$$= 5 \text{ rad s}^{-1}$$

$$T = A \cos(\omega t) = 0.02 \cos(5t)$$

$$A \cos(5t) = 0.02 \cos(5t)$$

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$$\text{but } F = \frac{1}{T}$$

$$= 2 \times 3.142 \times \frac{1}{T} = 0.02 \times 5t$$

$$T \times 6.284 = 5 \times T$$

$$5T = 6.284$$

$$T = \frac{6.284}{5} = 1.26 \text{ s}$$

Correct Ans.
is C.

$$\text{Wave length } (\lambda) = \frac{\text{Velocity}}{\text{Frequency}} = \frac{3.0 \times 10^8 \text{ m s}^{-1}}{600 \text{ KHz}}$$

$$\text{Frequency } = 600 \text{ KHz}$$

Question 2 - Waves

File 34.

ai)

$$L = 90 \text{ cm}$$

$$F = 20 \text{ Hz}$$

$$T = 4.0 \text{ N}$$

Calculating wavelength (λ)

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

$$= \frac{90}{2} = \underline{\underline{45 \text{ cm.}}}$$

ii) Speed of the wave:

$$F = \frac{V}{\lambda}$$

$$\lambda = 45 \text{ cm or } \cancel{45 \text{ m}} 0.45 \text{ m}$$

$$\cancel{45} 20 = \frac{V}{\cancel{45} \text{ m}} \times 4.5$$

$$V = \frac{\cancel{45} \times 20}{\cancel{45}}$$

$$V = 20 \times \cancel{4.5} \times 4.5$$
$$= \underline{\underline{9 \text{ ms}^{-1}}}$$

iii) Mass per unit length

$$F = mg$$

where F = Force

m = mass

g = gravity

$$4.0 = m \times 10$$

$$4.0 = 10m$$

$$m = \frac{4.0}{10}$$
$$= \underline{\underline{0.4 \text{ kg.}}}$$

5v)

$$F = \frac{v}{\lambda}$$

$$= \frac{9}{0.45} = 20 \text{ Hz}$$

∴ The frequency need to change by 0 Hz.

5s) File 36

at $d = 120 \text{ km}$.

$$\lambda = \frac{L}{2} = \frac{120}{2} = 60 \text{ km}$$

5ss) At wavelength, 1500 m .

Since the height is 80 km .

at wavelength 1500 m ,

the waves a minimum.

