Chapter 6
Multiple choice and quick questions

Light can exhibit any of the phenomena **A** to **E**, listed below.

A dispersion **B** superposition **C** polarisation

D refraction **E** total internal reflection

1. Which one of the above can be used to explain each of the following?

(a) Light signals can be confined within a fibre optic cable.

(b) Equally spaced bright and dark fringes are observed when viewing a light soure through a pair of narrow, closely spaced slits.

(c) Some sunglasses can reduce reflected glare from a water surface.

2. A laser produces a parallel beam of light of wavelength 600 nm. The light passes through a slit of width 1.0 mm and falls on a screen 10 m away. What is the approximate width of the central bright band (fringe) of light formed on the screen?

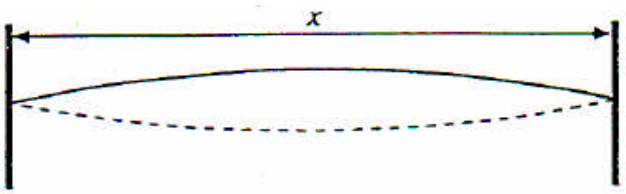
A 24 mm **B** 12 mm **C** 6 mm **D** 3 mm **E** 1 mm

3. A diffraction grating has a slit separation of 1.6×10^{-6} m. When a parallel beam of light is incident normally on the grating, which of the wavelengths **A** to **E** has a second order maximum at an angle of 32^{o} to the direction of the incident beam?

A 210 nm **B** 275 nm **C** 420 nm **D** 550 nm

E 840 nm

4. A string of length *x* is fixed at both ends. In its fundamental mode of vibration it has a frequency of f_0 and wavelength $?_0$.



It can also be made to vibrate so that there are 1.5 wavelengths, λ, in the length x. When $x = 3\lambda/2$, which one of **A** to **E** is the frequency of the vibration?

A $6f_0$ **B** $3f_0$ **C** $2f_0$ **D** $3f_0/2$ **E** $2f_0/3$

5. The speed c of surface waves of wavelength λ travelling in deep water is given by the equation

$$c = \sqrt{\frac{\lambda g}{2\pi}}$$

where g is the acceleration due to gravity.

Which one of the graphs **A** to **E** would be a straight line given that f is the frequency of the waves?

A f against λ^{-1}

B f against λ

C f against λ^{2}

D f^2 against λ

E f^2 against λ^{-1}

6. The string is fixed at one end; the other end passes over a pulley and the string is held in tension by a weight (fig. 3). Standing waves are set up in the string by the vibration generator shown. The three lowest frequencies at which standing waves are produced are 20 Hz, 40 Hz and 60 Hz.

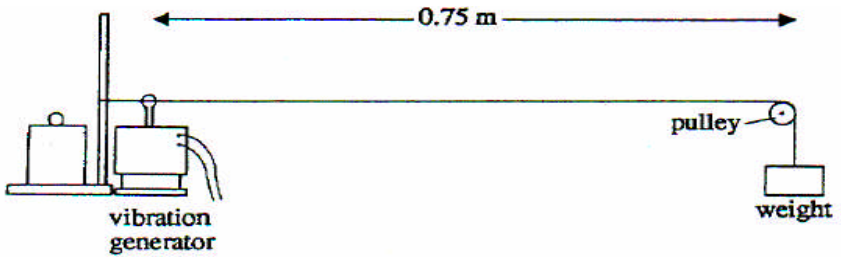


Fig. 3

(a) On Fig. 3 draw the appearance of the 60 Hz standing wave.

(b) What is the wavelength of the wave on the string at 60 Hz?

(c) The standing wave is produced by progressive waves travelling in opposite directions.

(i) Calculate the speed of the progressive wave along the string.