

3 (a) Explain the meaning of the following terms as applied to waves. You may include labelled diagrams as part of your explanation.

(i) polarisation

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[2]

(ii) constructive interference

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[2]

(b) Two polarising disks whose planes are parallel are centered on a common axis. The direction of the polarising axis in each case relative to the common vertical reference direction are as shown in Fig. 3.1. A plane polarised beam of light parallel to the vertical reference direction is incident from the left on the first disk with an intensity of I_i .

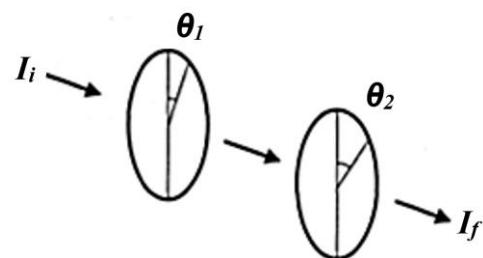


Fig. 3.1

Calculate the transmitted intensity I_f when $\theta_1 = 20.0^\circ$ and $\theta_2 = 40.0^\circ$. Leave your answer in terms of I_i .

$$I_f = \dots \quad [2]$$

- (c) Point source P, consisting of light with wavelength 630 nm, passes through a narrow slit and is incident on a screen at a distance of 2.4 m from the slit. Fig. 3.2 below shows the variation of intensity I of the light on the screen with distance x along the screen.

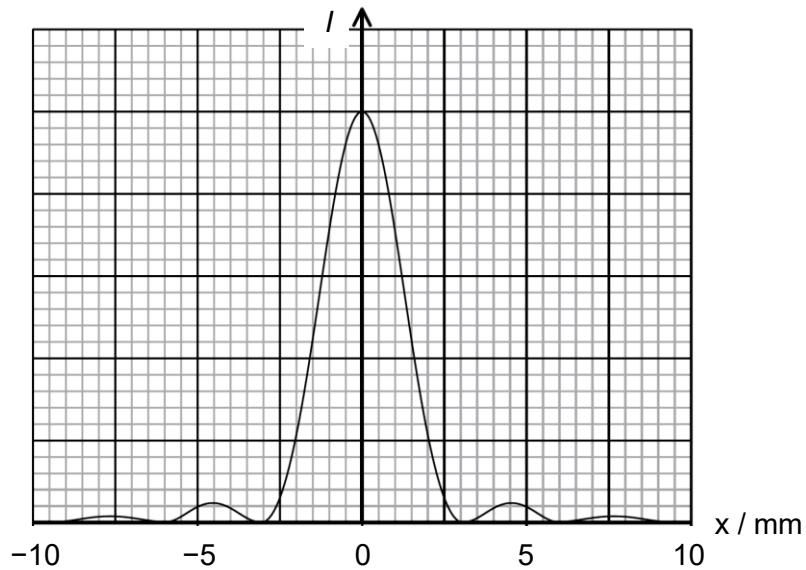


Fig. 3.2

- (i) Use Fig. 3.2 to determine the width of the slit.

$$\text{width} = \dots \text{ mm} \quad [2]$$

- (ii) State the effect on the pattern on the screen if the width of the single slit is reduced.

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[2]

[Total: 10]

