

- 4 (a) State how a *polarised* transverse wave differs from an *unpolarised* transverse wave.

.....

.....

.....[1]

- (b) Light is polarised when it passes through a sheet material known as a polaroid. Three polaroids are stacked, with the polarising axis of the second and third polaroids at θ and 62° respectively, to that of the first, as shown in Fig. 4.1.

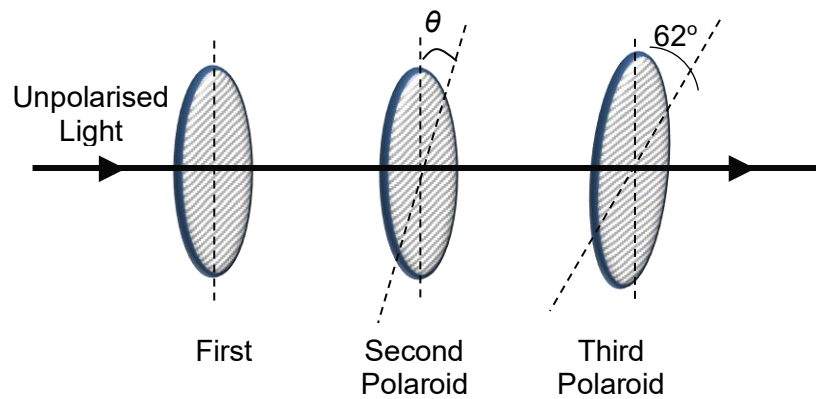


Fig. 4.1

When an unpolarised light of amplitude A_0 is incident on the stack of polaroids, the light has amplitude of A_1 after it passes through the first polaroid, A_2 after it passes through the second polaroid and A_3 after it passes through the third polaroid.

- (i) If $\theta = 90^\circ$, determine A_3 in terms of A_1 .

$$A_3 = \dots\dots\dots [1]$$

(ii) If the second polaroid is rotated such that $\theta = 23^\circ$

1. Show that $A_3 = 0.715 A_1$.

[2]

2. The intensity of the unpolarised light after it passes through the first polaroid is reduced to half.

Determine the percentage reduction of the intensity after the unpolarised light passes through the stack of three polaroids.

percentage reduction = % [3]

[Total: 7]

