

**AS Level Physics A**  
**H156/02** Depth in physics

**Question Set 5**

1 This question is about a laser pen.

(a) Define the terms *phase difference* and *coherence*.

*phase difference* .....

.....

*coherence* .....

.....

(b) Green light from the laser pen passes through a pair of narrow slits  $S_1$  and  $S_2$  as shown in Fig. 5.1.

[2]

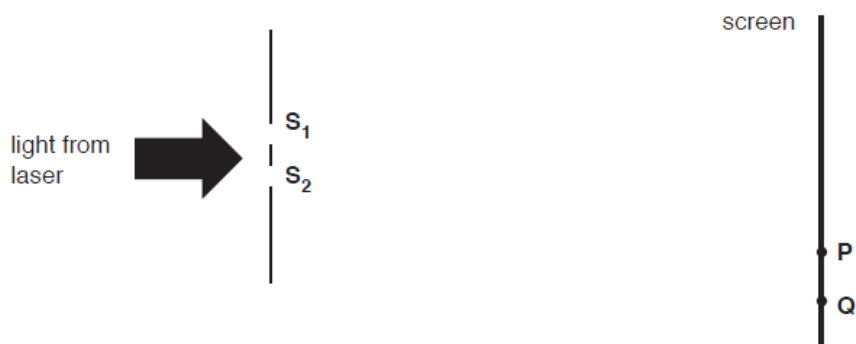


Fig. 5.1

A pattern is produced on a screen consisting of regularly spaced bright and dark lines as shown in Fig. 5.2.

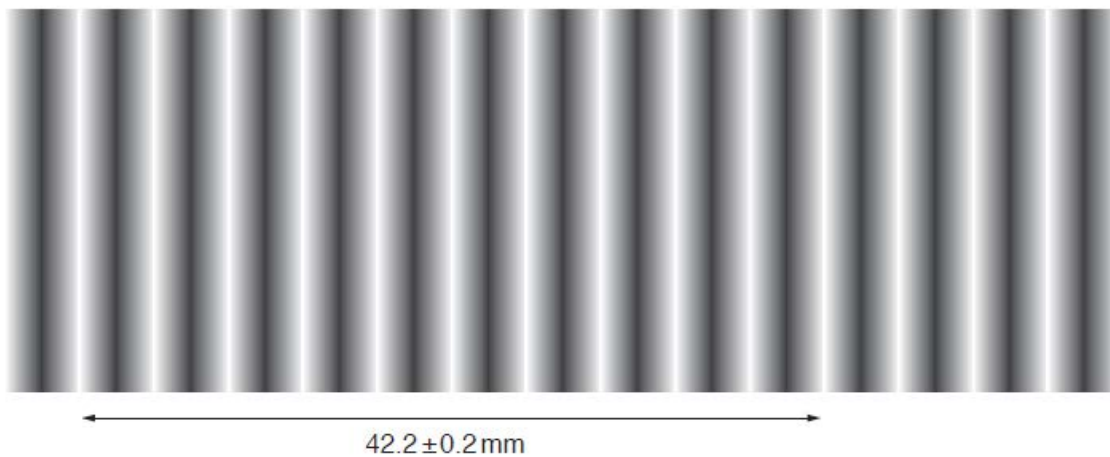


Fig. 5.2

(i) Fig. 5.1 shows two points, **P** and **Q**, on the screen. Explain in terms of path difference why point **P** is a bright line and point **Q** is a dark line.

[2]

(ii) The screen is at a distance of  $4.50 \pm 0.02$  m from the slits and the slit separation is  $0.56 \pm 0.02$  mm.

1. Use Fig. 5.2 to determine the wavelength  $\lambda$  of the light.

$\lambda = \dots\dots\dots$  m

[3]

2. Determine the percentage uncertainty in  $\lambda$ .

percentage uncertainty =  $\dots\dots\dots$  %

[2]

(c) The power of the green light from the laser pen is 50.0 mW. It is now used in a demonstration of the photoelectric effect.

(i) Calculate the number of photons  $n$  that the laser emits per second.

$$n = \dots\dots\dots$$

[2]

(ii) The green light falls on a negatively charged metal plate with a work function of 2.6 eV.

Explain whether photoelectrons will be emitted.

[2]

**Total Marks for Question Set 5: 13**

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