Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Waves

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Name of the Student:_____
Max. Marks : 24 Marks **Time : 24 Minutes**

Mark Schemes

Q1.

(a) same wavelength / frequency ✓

constant phase relationship ✓ allow 'constant phase difference' but not 'in phase'

2

(b) (i) ($\lambda = \frac{c}{f}$)

Use of speed of sound gets zero

$3.00 \times 10^8 = 9.4\ (10^9)\ \lambda$ OR $\frac{3.00\times10^8}{9.4\times(10^9)}$ ✓

$= 3.2 \times 10^{-2}$ (3.19×10^{-2} m) ✓

Allow 0.03

2

(ii) 3.2×10^{-2} ✓ (m) ecf from bi

Don't allow '1 wavelength', 1λ, etc
Do not accept: zero, 2 π, 360 °

1

(c) maximum (at position shown) ✓

allow constructive superposition.
'Addition' is not enough

constructive interference / reinforcement ✓

ecf for 'minimum' or for reference to wrong maximum

(the waves meet) 'in step' / peak meets peak / trough meets trough / path difference is (n) λ / in phase ✓

3

(d) $s = \frac{\lambda D}{w}$

Don't allow use of the diagram shown as a scale diagram

$= \frac{0.0319\times0.42}{0.11}$ ✓ ecf bi

Do not penalise s and w symbols wrong way round in working if answer is correct.

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= 0.12 (0.1218 m)

Correct answer gains first two marks.

= **any <u>2sf</u>** number ✓

*Independent sf mark for **any** 2 sf number*

3

(e) a maximum ✓

Candidates stating ' minimum ' can get second mark only

(f × 2 results in) $\lambda/2$ ✓

path difference is an even number of multiples of the new wavelength ($2n\lambda_{new}$) ✓

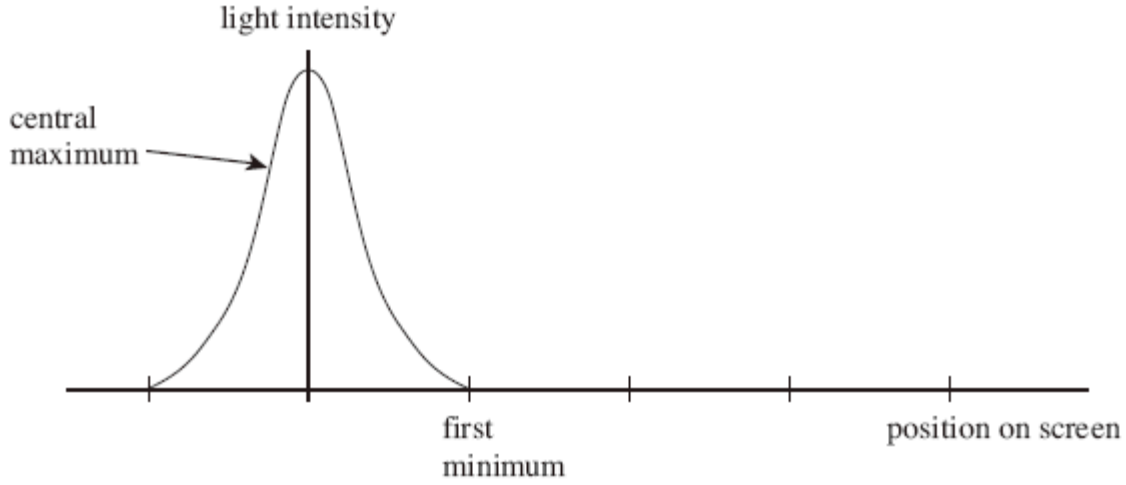
allow 'path difference is $n\lambda$' / any even number of multiples of the new λ quoted e.g. 'path difference is now 2 λ'

3

[14]

Q2.

A single slit diffraction pattern is produced on a screen using a laser. The intensity of the central maximum is plotted on the axes in the figure below.



(a) On the figure above, sketch how the intensity varies across the screen to the right of the central maximum.

(2)

(b) A laser is a source of *monochromatic*, *coherent* light. State what is meant by

monochromatic light _____

_____

coherent light _____

_____

(2)

(c) Describe how the pattern would change if light of a longer wavelength was used.

_____

_____

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(1)

(d) State **two** ways in which the appearance of the fringes would change if the slit was made narrower.

_____

_____

(2)

(e) The laser is replaced with a lamp that produces a narrow beam of white light. Sketch and label the appearance of the fringes as you would see them on a screen.

(3)

(Total 10 marks)

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