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

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Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

(a) As angle of refraction greater than angle of incidence with reference to Snell's law / $n = \sin i \div \sin r$

OR

light bends away from normal when it speeds up ✔

(Therefore $n_A > n_B$)

1

(b) Calculation of angle of incidence = 90° − 43° = 47° ✔

Use of Snell's law to give angle of refraction = 61(.4)° cao ✔

MP1 may be seen on diagram
Calculator value: 61.357 115 7

2

(c) Use of sin $c = 1/n$ to get $c = 48°$

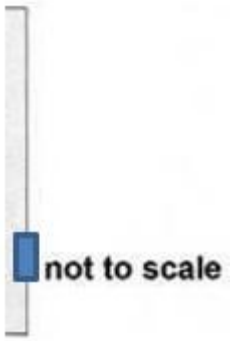
OR

i = (180° – 43° − 61.4° =) 76° ✔

Other calculation and i greater than c therefore tir ✔

Ray reflecting off **P** to land where the top of the n of 'not to scale' label meets the glass surface ✔

Condone 77° but not 75°
No ecf from MP1 to MP2
Allow a range:



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Q2.

(a) Rotate aerial in vertical plane ✔

When aerial vertical signal is a maximum

When aerial horizontal signal is a minimum ✔

Max occurs when aerial aligned with plane of polarisation of microwave ✔

The first mark is for what needs to be done
The second mark is for what is measured
The third mark is for the link to polarisation

3

(b) Received signal goes through series of max and min✔

Reflected and direct microwaves interfere ✔

Path length of reflected wave/path difference increases as plate moved✔

Phase difference between reflected and direct waves changes (so signal strength changes.) ✔

First mark is for what is observed
Accept 'both' for 'reflected and direct'
If no other mark given, 1 mark can be awarded for mention of interference/ superposition/ out of phase

4

(c) Equation only valid if slit-screen distance is a lot greater than slit separation✔

Allow arguments in terms of angles
Allow 0.45 m for slit-screen distance
Allow use of standard symbols

1

(d) Maximum path length for first slit
$= \sqrt{(0.45^2 + (0.25 - 0.06)^2)}$
$= 0.49$ m✔$_1$

MP1 is for one path length correct
MP2 is for both path lengths correct

Max path length for second slit
$= \sqrt{(0.45^2 + (0.25 + 0.06)^2)}$
$= 0.55$ m✔$_2$

MP3 is for determination of path difference and conclusion.

Path difference = 0.55 – 0.49 = 0.06 m
Which is greater than half a wavelength – so yes✔$_3$

Alternative for MAX2
Young equation used to determine fringe separation. ✔$_{12}$
Idea that fringe separation < 0.25 m so wavelength can be determined.
✔$_3$

3

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