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

Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Mark Schemes

Q1.

(a) Substitution of data in $Y = \frac{FL}{A\varepsilon}$

3.1×10^{-3} (m) ✔

2 marks can be awarded if 4mm used to show T>500 N provided an explanation is provided, otherwise award zero.

2

(b) (500 = Tcos 65)

T = 1200 N ✔

1

(c) Wind produces a wave / disturbance that travels along the wire ✔

Wave is reflected at each end / waves travel in opposite directions ✔

(Incident and reflected) waves interfere / superpose ✔

Only certain frequencies since fixed ends have to be nodes. ✔

4

(d) Mass per m of the wire = 0.14(2) kg ✔

1

(e) Use of $f = \frac{1}{2l}\sqrt{\frac{T}{\mu}} (= 2.47)$ to find fundamental

$(\text{or } f = \frac{3}{2l}\sqrt{\frac{T}{\mu}})$

Third harmonic = 7.4 (Hz) ✔

The second mark is for multiplying the fundamental frequency by 3 – allow ecf

2

(f) Diagram showing three approximately equally spaced loops

Condone single line

1

(g) Copper may be stretched beyond elastic limit / may deform plastically

✔

Permenant deformation / Does not return to original length ✔

Allow 'will remain longer than original' or 'will be permenantly deformed'

2

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Q2.

(a) EITHER

calculate value for constant using two calculations ✔

calculate value for constant using three calculations and make a comment that they have same value ✔

need to see table to look for any working

OR

calculate ratio between masses and √T for one pair of values ✔

calculate ratio between masses and √T for two pairs of values and make comment about same value ✔

e.g. 0.5/0.8 = √110/√140

OR

work out constant and use to predict one other frequency or mass ✔

work out constant and use to predict two other frequencies or mass ✔

no comment needed with this alternative

2

(b) $\mu = \rho A = 1150 \times \pi(5.0 \times 10^{-4}/2)^2$

$\mu = 2.258 \times 10^{-4}$ (kg m^{-1}) ✔

use of consistent *m* and *f* Substituted in $f = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$ including g but condone powers of 10 error ✔

Award second mark if T and f substituted correctly (ignore μ)

0.67 m ✔

If used diameter for radius incorrectly then lose first mark but can get third mark (answer 0.335 m)

3

(c) appreciation of reducing diameter when string is stretched. ✔

lower mass per unit length so (constant of proportionality and hence) frequency is higher (than would be predicted) ✔

2

[7]