**Name of the Student**:_____

**Max. Marks : 24 Marks** **Time : 24 Minutes**

Mark Schemes

## Q1.

(a) any **one** from:

- (sun) tan
- energy efficient lamps

*allow*

- *(invisible) security coding*
- *detecting forged bank notes*
- *kill microbes*
- *attract insects*
- *sterilise (surgical) equipment*
- *cause the body to produce vitamin D*
- *increasing the growth rate of plants*
- *water purification*

**1**

(b) $3 \times 10^{-7}$ m

**1**

(c) $3.0 \times 10^{8}$ = frequency × $3 \times 10^{-7}$

*allow ecf from part (b)*

**1**

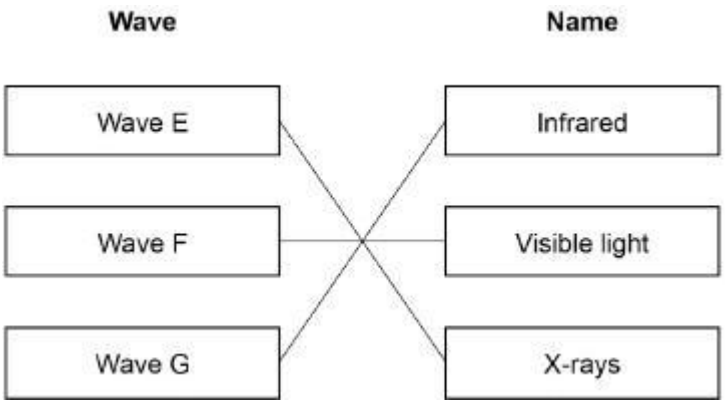
$$\text{frequency} = \frac{3.0 \times 10^{8}}{3 \times 10^{-7}}$$

**1**

frequency = $1 \times 10^{15}$ (Hz)

**1**

(d)




all three lines correct for **1** mark

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1

(e) in a transverse wave, the oscillations / vibrations are perpendicular to the direction of energy transfer

*allow direction of wave travel for direction of energy transfer*

1

in a longitudinal wave, the oscillations / vibrations are parallel to the direction of energy transfer

1

**[8]**

## Q2.

(a) motor (effect)

1

(b) current creates a magnetic field (around the coil)

1

(which) interacts with the permanent magnet field

1

producing a (resultant) force causing the coil/cone to move

1

(when the) direction of the current reverses, the direction of the (resultant) force reverses (producing a sound wave)

*allow coil/cone for force allow backwards for reverses*

1

(c) the student changed two variables at the same time

*allow only one variable should be changed at a time*

1

(so) it is not possible to know the effect of each variable

1

**[7]**

## Q3.

(a) to reduce the effect of random errors

*allow gives a more accurate mean*

*ignore reference to anomalous results*

*ignore measurements are more accurate*

1

(b) $\frac{(8.4+7.8+8.1)}{3} = 8.1$ (s)

1

$\frac{8.1}{10} = 0.81$ (s)

$= 0.81$ (s)

1

$\text{frequency} = \frac{1}{0.81}$

*allow a correct substitution of an incorrectly calculated*

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*value for time*

**1**

frequency = 1.2345…

*this mark may be awarded if the time is incorrectly calculated*

**1**

frequency = 1.2 (Hz)

*allow a calculated value correctly rounded to 2 sig figs*

**1**

(c) measure the distance travelled by a wave using a metre rule

*allow measure the length of the (ripple) tank using a metre rule*

**1**

measure the time taken (for the wave to travel the measured distance) with a timer / stopwatch

**1**

divide the distance by the time

*dependant on scoring the first two mark points*

**1**

**[9]**

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