

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

Q1.

- (a) lowest level of sound (intensity) which the ear can detect **(1)**
1 kHz **(1)**

2

- (b) ear has a logarithmic response
[or log scale chosen to match (perceived) response of the ear] (*)
to accommodate very wide range of sound intensities to which ear can respond (*)
perceived change in loudness is proportional to fractional change in intensity (*)
10- fold increases in intensity are perceived as steps of equal increase in loudness (*)
log scale means that numerical values on the scale represent ratios of
two sounds, expressed as the log of that ratio (*)
(*) any two **(1) (1)**

2

- (c) the dBA scale takes account of the frequency dependence of the sensitivity of the ear [or
to match the ear's frequency response
or meters calibrated on a dBA scale give frequency-weighted readings] **(1)**

1

- (d) (i) $2.0 = 10 \log \left(\frac{I_2}{I_1} \right)$ **(1)**

$$\frac{I_2}{I_1} = 1.58 \text{ **(1)**}$$

- (ii) 10 steps = $10 \times 2\text{dB} = 20\text{dB}$ **(1)**

$$\frac{I_2}{I_1} = 100 \text{ **(1)**}$$

$$[1.58^{10} \text{ **(1)**} = 100 \text{ **(1)**}]$$

4

[9]**Q2.**

- (a) $\frac{\sin i}{\sin r} = \frac{\sin C}{1} \text{ **(1)**} = \frac{1.40}{1.55} = 0.903 \text{ **(1)**}$

$$\text{angle } C = 64.6^\circ \text{ **(1)**}$$

3

- (b) on outer edge only of core **(1)**
two to four reflections **(1)**

- (c) (i) smaller difference between the core index and cladding index makes critical angle larger **(1)**
therefore increases the chance of light escaping **(1)**
- (ii) makes internal angle of incidence at core-cladding interface more likely to be less than the critical angle **(1)**
therefore increases the chance of light escaping **(1)**

max 3

[8]