

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Q1.

- (a) The *threshold of hearing* is quoted as $1.0 \times 10^{-12} \text{ W m}^{-2}$. Explain what is meant by the *threshold of hearing* and state the frequency at which the threshold has this value.

(2)

- (b) Sound intensity levels are usually measured in decibels. Give **two** reasons why this *logarithmic* scale is used.

(2)

- (c) Why was it necessary to introduce an adapted scale referred to as the dBA scale, which is used on some sound level matters?

(1)

- (d) Modern hi-fi equipment and televisions often have volume controls which allow the sound volume to be increased in steps. If each of these steps produces an increase in the sound intensity level of 2.0 dB, calculate

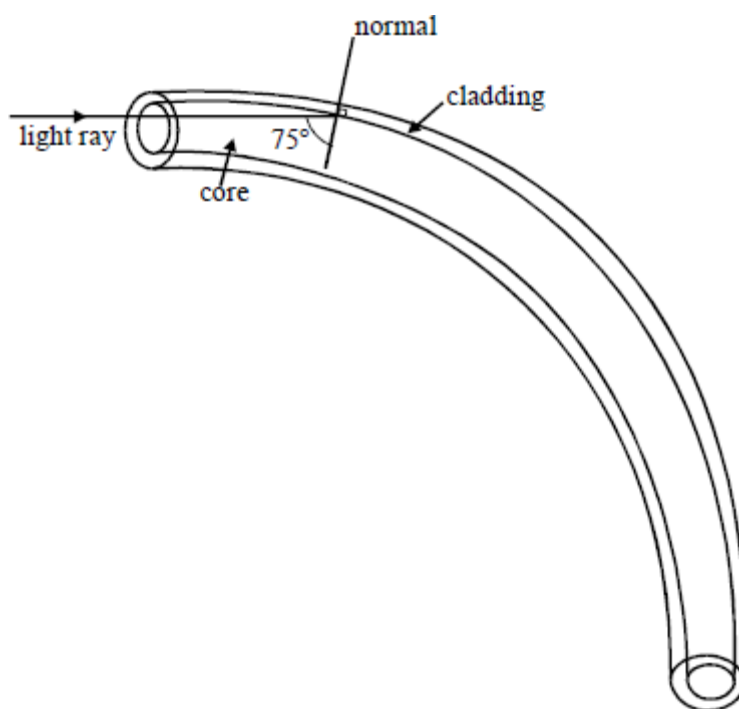
- (i) the ratio by which the sound intensity is increased for each step up in volume,

- (ii) the ratio by which the sound intensity is increased for a total of 10 identical steps up in the volume.

(4)
(Total 9 marks)

Q2.

The diagram shows a glass optical fibre with a central core of refractive index 1.55 and a surrounding cladding of refractive index 1.40.



- (a) Calculate the critical angle, C , for the boundary between these two types of glass.

(3)

- (b) Complete the path of the light ray shown in the diagram.

(2)

- (c) State and explain whether the following changes in the optical fibre would increase or decrease the probability of light escaping from the fibre.

- (i) increasing the refractive index of the cladding

(ii) bending the fibre into a tighter curve

(3)

(Total 8 marks)