Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Mark Schemes

Q1.

(a) Frequency does not change ✓ **1**

Amplitude is reduced ✓ **1**

(b) Ossicles lever system produces increase in force ✓ **1**

Area of oval window much less than area of ear drum ✓ **1**

Pressure = F / A so large increase in pressure ✓ **1**

(c) I = 1.0 x 10^{-12} W m^{-2} ✓ x $10^{8.2}$ ✓ **1**

I = 1.6 x 10^{-4} W m^{-2} ✓ **1**

(d) P = 1.6 x 10^{-4} x 4 x π x 2.02 ✓ **1**

P = 8.0 x 10^{-3} W ✓ **1**

[10]

Q2.

The mark scheme gives some guidance as to what statements are expected to be seen in a 1 or 2 mark (L1), 3 or 4 mark (L2) and 5 or 6 mark (L3) answer. Guidance provided in section 3.10 of the '*Mark Scheme Instructions*' document should be used to assist in marking this question.

Mark	Criteria	QoWC
6	All three aspects covered: An comparison of patient safety in terms of ionising radiation exposure.	The student presents relevant information coherently, employing structure, style and sp&g to render meaning clear.

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	An appreciation of convenience in terms of pre treatment, scan time, patient movement and discomfort. There may also be a discussion of comparative cost and equipment partability. A discussion of the types of information available in terms of uses and limitations.	The text is legible.
5	Two of the three aspects fully covered, with some detail missing from the third.	
4	One aspect fully covered, with some detail missing from the other two Or Two aspects fully covered, with little or no relevant information about the third.	The student presents relevant information and in a way which assists the communication of meaning. The text is legible. Sp&g are sufficiently accurate not to obscure meaning.
3	All three aspects partially covered, with some detail missing from each Or One aspect fully covered, with little or no relevant information about the other two	
2	Two aspects partially covered, with little or no relevant information about the third.	The student presents some relevant information in a simple form. The text is usually legible. Sp&g allow meaning to be derived although errors are sometimes obstructive.
1	One aspect partially covered, with little or no relevant information about the other two.	
0	Little or no relevant information about any of the three aspects.	The student's presentation, spelling punctuation and grammar seriously obstruct understanding.

The following comparisons are likely to be present:

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		PET	*u / s*
Patient Safety	*Ionising radiation exposure*	*Mod to high*	*None (no tracer)*
Convenience	*Scan time*	*2-4 h*	*10 -15 min*
	equipment	*Large, bulky*	*portable*
	cost	*expensive*	*relatively cheap*
	Pre-treatment	*Needs tracer injection*	*No injection*
	Patient movement	*Must lie still*	*Movement tolerated*
	discomfort	*Not good if claustrophobic*	*Requires cold gel*
Information		*Chemical and physiological changes related to metabolism*	*Size position movement (of foetus, organs etc.)*
		Useful for detecting brain activity	*Cannot penetrate bone – cannot examine brain*
			Good for imaging soft tissues
			Cannot pass through air spaces / lungs
		Can provide info re malignancy and tumour spreading	*Cannot distinguish between benign and malignant solid masses*

[6]

Q3.

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(a) (Intensity) measured on dBA scale / adjusted scale which mimics normal ear (so values around 0dBA) at all frequencies

1
1

(b) (i) Figure 2 - falling to larger values as frequency increases

Start must be between 0 and 20 dBA
must not consistently go above 0dBA
must cover the 0.125 to 8 kHz range
can go on after 8 kHz

1

(ii) Figure 3 – falling to larger values and then going up to smaller values as frequency increases
Maximum value at f = 4 kHz

Start must be between 0 and 20 dBA
must not consistently go above 0dBA
must cover the 0.125 to 8 kHz range
can go on after 8 kHz

1
1

(c) (i) $I = I_0 \times 10^{9.2}$ or correct substitution in formula

1

$I = 1.6 \times 10^{-3}$ W m^{-2}

1

(ii) Use of $4 \times \pi \times 400 \times 400$
Correct calc to give 3.2×10^{3} W

Allow ecf from previous calculation

1
1

[9]

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