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

Mark Schemes

Q1.

(a) (i) Fluorescent screen A − converts X-ray (photon) to light (photons) / lower energy photon(s)

1

(ii) Photocathode − uses (energy of) each light photon to release an electron from surface of cathode

Do not allow converts light / photon into electron

1

(iii) Anodes − accelerate (released) electrons
focuses electron beams

Mention of negative anode disqualifies first mark awarded

Do not accept direct towards the screen as focussing

2

(iv) Fluorescent screen B − converts energy of electron(s) into (many) light (photons)

Do not allow converts electrons into light / photons

1

(b) Without Barium poor contrast between area to be investigated and surrounding tissue

This will get first mark

1

Barium meal proves high proton number / high density / high attenuation material at site to be investigated which provides much better contrast

This will gain the second mark

1

Barium meal proves high proton number / high density / high attenuation material at site to be investigated which provides much better contrast between area to be investigated and surrounding tissue

But this will get both marks

[7]

Q2.

(a) (i) Z values calculated correctly 1.617×10^6 and 1.341×10^6

Allow substitutions in equation

C1

Substitute their values in formula for I_r / I_i

C1

0.87%

A1
3

(ii) Uses $v=f\lambda$ in any form condone incorrect power of 10

C1

7.7×10^{-4} (m)

A1
2

(b) The marking scheme for this question includes an overall assessment for the quality of written communication (QWC). There are no discrete marks for the assessment of QWC but the candidate's QWC in this answer will be one of the criteria used to assign a level and award the marks for this question.

Descriptor − an answer will be expected to meet most of the criteria in the level descriptor.
Level 3 − good:
claims supported by an appropriate range of evidence
good use of information or ideas about physics, going beyond those given in the question
argument well structured with minimal repetition or irrelevant points
accurate and clear expression of ideas with only minor errors of grammar, punctuation and spelling.
Level 2 − modest:
claims partly supported by evidence
good use of information or ideas about physics given in the question but limited beyond this
the argument shows some attempt at structure
the ideas are expressed with reasonable clarity but with a few errors of grammar, punctuation and spelling.
Level 1 − limited:
valid points but not clearly linked to an argument structure
limited use of information about physics
unstructured
errors in spelling, punctuation and grammar or lack of fluency.
Level 0:
incorrect, inappropriate or no response.

5 / 6 Expect a coherent account incorporating at least 4 from each section
3 / 4 Account may cover the first part well and give a more superficial account of the second giving one or two points. Or two or three points from each section.The structure may not make it easy to follow
1 / 2 Provides superficial response for one of the topics and may be brief and poorly expressed

5−6 *Answer addresses both bullets. The first should be very clear and have no significant omissions. The second may be less well done but the effect of different acoustic impedances at the boundaries should be there should be covered clearly*

3−4 *Both aspects are likely to be addressed but there will be less coherence in the response and significant points may be omitted*

1−2 *There is likely to be a superficial qualitative response probably more inclined toward the first bullet point*

Examples of creditworthy statements*:*

1 Transducer swept across surface of skin

2 Emits pulsed ultrasound signal

3 Reflected at boundaries where acoustic impedance changes

4 Time for pulse to return is measured

5 Depth of boundary calculated / position of boundary is plotted

6 Equation relating to establishing depth

1 Acoustic impedance is resistance to passage of sound through the medium

2 Causes attenuation of ultrasound

3 Causes reflection of sound at a boundary

4 Is needed in order to produce image

5 Reduced by use of gel on skin

6

(c) Ability to distinguish between objects that are close together.
Smallest angle that objects can subtend the observer and be seen as separate
OWTTE

Not clarity or number of pixels

B1

Idea that the smallest structure visible on image is comparable with wavelength
Mention of diffraction

B1
2L

[13]