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Mark Scheme
Summer 2008

GCE

GCE Physics (6756/01)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1 (a) i	Upthrust / *U* up Weight / *W* / *mg* down [do not accept gravity] Tension / *T* / *F* up [Ignore any incorrect arrows]	**1** **1** **1**
(a) ii	use of *U* = weight of liquid displaced / $v\rho g$ recognition of *T* and *W* opposite direction [ecf from diagram] answer = 0.067 (m^3) eg *V* . 9.81 . 1000 (=) 678 – 20 or 658 Volume = 0.067 m^3 [note 678/9.8.1000 =1]	**1** **1** **1**
(b)	Rate of decay (of source) / rate of disintegrations/emissions "rate" can be replaced by per second or (unit) time Accept $A = dN/dt$ or λN if N, λ, t defined	**1**
(c) i	The 2 should not appear in the calculation (or cancel) Answer = 0.042 m^3 eg 4530/108 x 10^{-3} = 0.042 m^3	**1** **1**
(c) ii	Same amount/activity of tritium in body and standard Isotope fully dispersed (round body water) No drinks / addition /excretion in the time Background has been taken into account No other radioactive substance in body Tritium not absorbed by other parts of body	**1** **1** **1** **1** **1** **1** **2 Max**
(d)	Length/height of body/position between contacts Size of emf/pd/voltage attached to body cross section area of (sections) body / volume/width of body body temperature surface/skin/contact resistance metal implants	**1** **1** **1** **1** **1** **1** **3 max**
(e)	90 degree phase shift starts at negative (max) value of Voltage	**1** **1**
(f)	(i) Due to changing/alternating magnetic field / cutting flux /Faraday's law Bodywater is a conductor / induced voltages / eddy currents (ii) Currents have their own magnetic fields reduce (original) flux / oppose (original) flux	**1** **1**

	• lenz's law	**1** • **1** • **1** • **2 max**
•	(iii) Reduced amplitude • Change of phase • No change in frequency •	• • • • **2 Max**
•	•	• **22**

• Question Number	• Answer	• Mark
• **2 (a)**	• 0.01 mA / 10^{-5} A / 0.005 • 0.005 mA •	• **1** • **2** • **2 max**
• **(b) i** • • **(b) ii**	• compare with y = mx +c / gradient will equal *k* / straight line graph • • Values of $1/I^2$ and $1/f^2$ [look for 10^{-8} appearing in $1/f^2$] • $1/mA^2$ or $1/A^2$ [units can appear in table or graph] • s^2 / Hz^{-2} • Scales (points occupy more than half grid) • Points • Straight line fit •	• **1** • • **1** • **1** • **1** • **1** • **1** • **1**
• **(c)**	• Attempt to find gradient • Large triangle – more than half graph line – evident from numbers • 1.7-2.1 x 10^{14} ($A^{-2}s^{-2}$) / 1.7-2.1 x 10^{8} ($mA^{-2}s^{-2}$) •	• **1** • **1** • **1**
• **(d)**	• Identify $1/I^2$ intercept • Square root and x *V* • Answer with unit • • 4.8 x10^6 - 7 x 10^6 or 4.8-7 • 2200 – 2700 or 2.2 – 2.7 x 0.2 • 440 - 540 Ω •	• **1** • **1** • **1**
• **(e)**	• • Body water (ratio) is lower than usual • Dry contact with skin • (More resistance implies) more fat • Resistance also dictated by body shape [can be implied] • Detail: long legs / thinner arms / tall(could give larger resistance)/ • Teacher is female/ •	• • **1** • **1** • **1** • **1** • • **1** • **3 max**

	•	•
•	•	• **18**

Question Number	Answer	Mark
3 (a)	18 1 18 1 **O + p/H equals F + n** 8 1 9 0 [omitting the n with everything else correct = 1]	**1** **1** **1**
(b)	 Accelerated through 19 x 10^6 V / MV Using linear accelerator / cyclotron / particle accelerator / recognisable description 	 **1** **1**
(c)	Time taken for half the original quantity/ nuclei /activity to decay Long enough for (cancer/tumour/body to absorb) and still be active/detected Will not be in body for too long 	**1** **1** **1**
(d)	Use of $E = mc^2$ Use of $E = hf$ Use of $v = f\lambda$ λ = 2.4 x10^{-12} m eg 9.11 x 10^{-31} x 9 x 10^{16} (x2) f = 8.2 x 10^{-14} / 6.6 x 10^{-34} ecf λ= 3 x10^8 / 1.2 x10^{20} ecf	**1** **1** **1** **1**
(e)	Conservation of momentum Before momentum = 0 so + for one photon and – for other 	**1** **1** **1** **2 max**
		14

Question Number	Answer	Mark
4 (a)	Tera - 10^{12} Frequency – no of oscillations per second em waves travel at speed of light Visible light has higher freq/shorter wavelength compared to IR Shock wave would produce longitudinal/compressions/rarefractions in crystal (Reflections off moving reflector) = Doppler shift/effect/ref diagram decrease usually means reflector moving away from wave/observer Detail eg faster moving = larger shift Carrier wave is light /IR Carrier wave modulated with signal Frequency division multiplexing	**1** **1** **1** **1** **1** **1** **1** **1** **1** **1** **1** **1** **6**

	• (Optical fibres transmit light) by total internal reflection •	**max**
•	•	• **6**
•	• **Total for paper**	• **60**