Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Particle And Radiation

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

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

Mark Schemes

Q1.

(a) Idea that atoms gains energy (from beta particle) eg atoms excited or atoms/electrons moved to higher energy levels ✔

Idea that atom loses energy by emission of light/photons eg atoms de-excite or electrons move to lower energy levels ✔

Allow ionisation as named process

2

(b) Use of $E = \frac{hc}{\lambda}$ **OR** use of $c = f\lambda$ and $E = hf$ ✔

Condone POT error for λ

3.2×10^{-19} (J) ✔

Allow 3.1×10^{-19} (J) if 6.6×10^{-34} used

2

(c) Use of $W = QV$ **OR** determines pd = 750 V ✔

1.2×10^{-16} (J) ✔

2

(d) Max 3 from: ✔ ✔ ✔

Attempt to count squares **OR** calculate unit area **OR** Statement that area under curve = charge flow

1 small square = 2×10^{-12} (C) ; 1 large square = 5×10^{-11} (C)

Counts number of squares/Determines area

Converts number of squares to charge

Accept 140 to 180 small or 5.5–7 large squares

Accept $\frac{1}{2}$ base × height for triangle of base 12–16 ns and height 50 mA

Divides their total charge by 1.60×10^{-19}

2×10^{9} ✔

Allow 1 sf answer

4

[10]

Downloaded from www.merit-minds.com

Q2.

(a) Particle with equal (rest) mass/energy ✔

but <u>opposite</u> charge/baryon number/lepton number ✔

2

(b) Antiproton ✔

Positron ✔

Do not accept antielectron for positron

2

(c) Rest energy of positron (0.510999) <u>and</u> antiproton (938.257) quoted, or 938.768 (MeV) seen ✔

Multiplies by 1.6 ✔

1.5×10^{-10} (J) ✔

Allow valid use of $E=mc^2$.

Allow any power of ten

Allow credit for 3.0×10^{-10} (J) for proton–antiproton and electron–positron production

3

(d) Max 3 ✔ ✔ ✔

Idea that (atomic) energy levels/states are discrete, or (emitted) photon energy is discrete

Idea that a photon is produced by electrons/atoms moving to <u>lower</u> energy levels/states

Allow light/radiation for "photon"

Idea that wavelength/frequency relates to photon energy/ΔE

May see equation relating ΔE to f or λ

Idea that different wavelengths/frequencies are produced

3

[10]

Downloaded from www.merit-minds.com