Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Mark Schemes

Q1.

(a) (i) vertical field line(s)

B1

directed downwards

B1

2

(ii) mv^2/r and Bev seen

M1

equated and correctly rearranged

A1

2

(iii) $v = \frac{2\pi r}{T}$ or equivalent

M1

$T = \frac{2\pi m}{Be}$

A1

2

(iv) no v in the equation for T (m, B and e all independent of v)

B1

1

(b) (i) proton spirals outwards/suitable diagram B1

as v ↑ r ↑

B1

2

(ii) $f = 1/T$

B1

1

(c) (i) conversion of keV to J (1.92×10^{-17})

C1

use of ½ mv^2
1.50×10^5 ms^{-1}

A1

3

(ii) $\lambda = \frac{h}{p}$

$p = mv$ or substituted values

C1

2.6×10^{-12} m

A1

3

(iii) *y*-rays or X-rays or answer consistent with candidate's λ

B1

1

[17]