

Name of the Student: _____

Max. Marks : 23 Marks

Time : 23 Minutes

Mark Schemes

Q1.

- (a) (i) out of plane of diagram **(1)**
- (ii) circular path **(1)**
 in a horizontal plane [or out of the plane of the diagram] **(1)**

$$BQv = \frac{mv^2}{r} \quad \mathbf{(1)}$$

$$\text{radius of path, } r \left(\frac{mv}{BQ} \right) = \frac{1.05 \times 10^{-25} \times 7.8 \times 10^5}{0.28 \times 2 \times 1.6 \times 10^{-19}} \quad \mathbf{(1)}$$

$$= 0.91(4) \text{ m} \quad \mathbf{(1)}$$

max 5

- (b) (i) radius decreased **(1)**
 halved **(1)**
 [or radius is halved **(1) (1)**]
- (ii) radius increased **(1)**
 doubled **(1)**
 [or radius is doubled **(1) (1)**]

max 3

[8]**Q2.**

(a)

quantity	SI unit	
(gravitational potential)	J kg^{-1} or N m kg^{-1}	scalar
(electric field strength)	N C^{-1} or V m^{-1}	vector
(magnetic flux density)	T or Wb m^{-2} or $\text{N A}^{-1} \text{m}^{-1}$	vector

6 entries correct **(1) (1) (1)**4 or 5 entries correct **(1) (1)**2 or 3 entries correct **(1)**

3

- (b) (i) $mg = EQ$ **(1)**

$$\mathcal{E} \left(\frac{mg}{\Delta} = \frac{4.3 \times 10^{-9} \times 9.81}{0.0040^{-12}} \right) = 1.32 \times 10^4 \text{ (V m}^{-1}\text{)} \text{ (1)}$$

(ii) positive **(1)**

3

[6]

Q3.

(a) deflects one way **(1)**
then the other way **(1)**

2

(b) (i) acceleration is less than g [or reduced] **(1)**
suitable argument **(1)** (e.g. correct use of Lenz's law)

(ii) acceleration is less than g [or reduced] **(1)**
suitable argument **(1)** (e.g. correct use of Lenz's law)

4

(c) magnet now falls at acceleration g **(1)**
emf induced **(1)**
but no current **(1)**
no energy lost from circuit **(1)**
[or no opposing force on magnet, or no force from
magnetic field or no magnetic field produced]

3

QWC 2

[9]