

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

Q1.

Question Number	Answer	Mark
(a)	Use of $\Phi = BA$ (1) Converts cm to m Or mT to T (1) $\Phi = 1.1 \times 10^{-4} \text{ Wb}$ (1) <u>Example of calculation</u> $\Phi = 6.0 \times 10^{-2} \text{ m} \times 2.4 \times 10^{-2} \text{ m} \times 74 \times 10^{-3} \text{ T}$ $\Phi = 1.07 \times 10^{-4} \text{ Wb}$	3
(b)	Use of $\mathcal{E} = \Delta\Phi/\Delta t$ (1) Use of time = distance/speed (1) $\mathcal{E} = 5.3 \text{ mV}$ (5.0 mV or 5.5 mV depending on value of Φ used, ecf value of Φ from (a)) (1) Or (1) Quotes $\mathcal{E} = Blv$ (1) $l = 6.0 \times 10^{-2} \text{ m}$ used (1) $\mathcal{E} = 5.3 \text{ mV}$ (1) <u>Example of calculation</u> Time = $0.024 \text{ m} / 1.2 \text{ m s}^{-1}$ $t = 0.020 \text{ s}$ $\mathcal{E} = 1.1 \times 10^{-4} \text{ Wb} / 0.02 \text{ s}$ $= 5.5 \text{ mV}$	3
(c)	Use of $I = V/R$ (1) Use of $F = BIl$ (1) $F = 9.8 \times 10^{-5} \text{ N}$ (ecf value of $\mathcal{E}$ from (b)) (1) This force is too small to be felt. (this comment must be consistent with their value of force) (1) <u>Example of calculation</u> $I = 5.5 \text{ mV} / 0.25 \Omega = 0.022 \text{ A}$ $F = 74 \times 10^{-3} \text{ T} \times 0.022 \text{ A} \times 0.060 \text{ m}$ $F = 9.8 \times 10^{-5} \text{ N}$	4
Total for question		10

Q2.

Question Number	Answer	Mark
	B	1

Q3.

Question Number	Answer	Mark
(a)	Only (moving) charged particles are deflected by a magnetic field (1) Or Only charged particles can be accelerated to produce a beam (1)	1
(b)	Into the page (1)	1
(c)	Use of $F = mv^2/r$ Or use of $r = p/BQ$ (1) Use of $F = Bqv$ Or use of $p = mv$ (1) $m = 6.64 \times 10^{-26} \text{ kg}$ (1) <u>Example of calculation</u> $mv^2/r = Bqv$ $m = Bqr/v = (0.673 \text{ T} \times 1.6 \times 10^{-19} \text{ C} \times 7.40 \times 10^{-2} \text{ m}) / 1.20 \times 10^5 \text{ m s}^{-1}$ $m = 6.64 \times 10^{-26} \text{ kg}$	3
(d)	Semicircle drawn starting from same initial point <u>and</u> a smaller radius (1)	1
	Total for question	6