

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

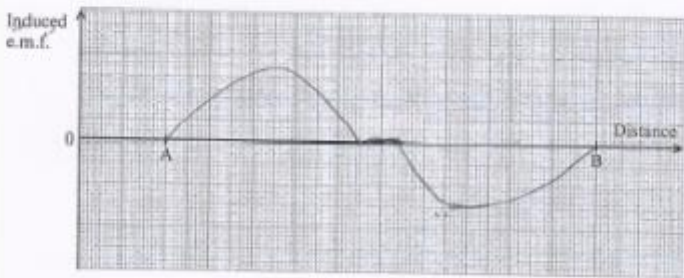
Q1.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	- The ions experience a force perpendicular to their velocity (and the magnetic field) (1) - The (resultant) force on the ions causes an acceleration at right angles to their velocity (1) Or There is a magnetic force acting towards the centre of the path	For velocity accept direction of motion or direction of travel	2

Question Number	Acceptable Answer	Additional Guidance	Mark
(ii)	- Use of $r = \frac{mv}{BQ}$ (1) $r = 0.23 \text{ m}$ (1)	Example of calculation: $r = \frac{mv}{BQ}$ $= \frac{(34.97 \times 1.66 \times 10^{-27}) \text{ kg} \times 2.2 \times 10^5 \text{ ms}^{-1}}{0.35 \text{ T} \times 1.6 \times 10^{-19} \text{ C}} = 0.228 \text{ m}$	2

Question Number	Acceptable Answer	Additional Guidance	Mark
1 (iii)	path drawn with less curvature (less overall deflection) (1)	MP1 awarded for path in the magnetic field	1

Question Number	Acceptable Answer	Additional Guidance	Mark
2 (iii)	- ions are more massive (1) - ions have the same charge so the radius of the path would be greater (1)		2

Question Number	Answer		Mark
* (a)	(QWC – Work must be clear and organised in a logical manner using technical wording where appropriate) Max 6 from Reference to changing/cutting of field/flux Induced e.m.f. proportional to rate of change/cutting of flux (linkage) (accept equation) Initial increase in e.m.f. as the magnet gets closer to the coil Identifies region of negative gradient with magnet going through the coil Indication that magnet's speed increases as it falls Negative (max) value > positive (max) value (this mark is dependent on awarding marking point 5) Time for second pulse shorter (this mark is dependent on awarding marking point 5) The areas of the two parts of the graph will be the same (since $N\Phi$ constant)	(1) (1) (1) (1) (1) (1) (1)	6
(b)	Two sequential pulses (if not two sequential pulses, scores zero) Pulses same height (+/- 3 mm squares) and width (by eye) Pulses in opposite directions Region of zero e.m.f. in the middle <u>Example</u> (peaks could be in opposite directions) 	(1) (1) (1) (1)	4