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

Mark Schemes

Q1.

Question Number	Acceptable answers	Additional guidance	Mark
	• measures radius (allow between 4 cm and 6 cm) (1) • Use of $p = Bqr$ (1) • $B = 1.1$ T (range 0.95 T – 1.42 T) (1) • direction: out of page (1)	Allow use of their measured radius in MP2 Example of calculation: 9.1×10^{-20} N s = $B \times 1.6 \times 10^{-19}$ C $\times 0.52$ m $B = 1.09$ T	4

Q2.

Question Number	Answer	Mark
(a)	The magnetic field (must be) at right angles to the current (1)	1
(b)	All three units for force, length and current clearly identified (1) (The unit of force is kg m s^{-2}, the unit of current is A, the unit of length is m) T = kg A^{-1} s^{-2} (1)	2
(c)	*Use* of $\rho = m/V$ (1) Use of $mg = BIl$ (1) $B = 0.53$ (T) (no u.e. as given in question for part (b)) (1) Example of calculation $m = 2.7 \times 10^3$ kg $m^{-3} \times 10 \times 10^{-3}$ m $\times 10 \times 10^{-3}$ m $\times l$ $m = 0.27 \times l$ $B = (0.27 \times l \times 9.81$ m $s^{-2})/(5$ A $\times l)$ $B = 0.53$ T	3
(d)	(Magnetic field is) into paper/page (1)	1
	Total for question	7

Q3.

Question Number	Acceptable Answer		Additional Guidance	Mark
(i)	• Use of y-sensitivity value • $V_0 = 4.0$ V	(1) (1)	Example of calculation: $V_0 = 2 \times 2.0\ V = 4.0$ V	2
(ii)	• Use of $I = \frac{V}{R}$ • Use of $I_{rms} = \frac{I_0}{\sqrt{2}}$ **Or** use of $V_{rms} = \frac{V_0}{\sqrt{2}}$ • $I_{rms} = 0.019$ A ECF from(i)	(1) (1) (1)	Example of calculation $I_0 = \frac{4.0\text{ V}}{150\ \Omega} = 0.0267$ A $I_{rms} = \frac{0.0267\text{ A}}{\sqrt{2}} = 0.0189$ A	3
(iii)	• Use of $R = R_1 + R_2$ • Use of $P = I^2R$ (or other valid power equation) • $P = 0.096$ W ECF from(i) and (ii)	(1) (1) (1)	Example of calculation: $R = 150\ \Omega + 120\ \Omega = 270\ \Omega$ $P = I^2R$ $= (0.019\text{ A})^2$ $\times 270\ \Omega = 0.0964$ A	3

Q4.

Question Number	Answer	Mark
	A	1