Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Mark Schemes

Q1.

Question Number	Acceptable answers	Additional guidance	Mark
	• $(\Lambda^0) \rightarrow p^{(1)} + \pi^{-1}$ (1)		1

Q2.

Question Number	Acceptable answers	Additional guidance	Mark
	An explanation that makes reference to the following points: • charge: 0 = +1 identified as proton (1) −1 identified as pion • Baryon number: 1 = 1 identified as proton (1) + 0 identified as pion • Lepton number: 0 = 0 + 0 (1) **Or** there are no leptons involved		3

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Q3.

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

Q4.

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

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Q5.

Question Number	Acceptable answers	Additional guidance	Mark
	• The curved surface is (analogous to) a radial field **(1)** • (as $h \propto {}^{1}/_{r}$ then) potential (energy) $\propto {}^{1}/_{r}$ **(1)** • compares with $V \propto {}^{1}/_{r}$ around a point charge **(1)**		3

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