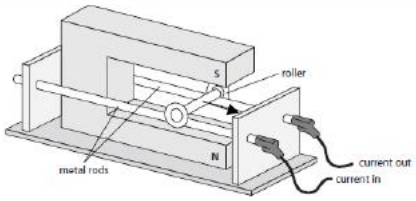
Mark Scheme

Q1.

Question number	Answer	Additional guidance	Mark
(i)	substitution (1) (F=) 1.2 x2.5 x0.06 evaluation (1) 0.18 (N)	 award full marks for the correct answer without working	(2)

Question number	Answer	Additional guidance	Mark
(ii)	a description to include first finger, second finger and thumb (of left-hand) held mutually perpendicular (1) first finger (is in the direction of) magnetic field OR second finger (is in the direction of) current (1) thumb (is in the direction of) force / motion (1)	 award 1 mark for attempt at mutually perpendicular shown in a diagram diagram relating thumb and fingers to correct quantities at right angle gains 3 marks	(3)

Question number	Answer	Additional guidance	Mark
(iii)	 arrow from roller towards contacts (1)		(1)

Q2.

Question number	Answer	Additional guidance	Mark
	rearrangement and substitution (1) $(B = \frac{F}{I \times l})$ $= \frac{1.11 \times 10^{-5}}{93(.1 \times 10^{-3}) \times 0.6(000)}$ evaluation (1) 2.0×10^{-4} (T)	0.0002 (T) accept any number that rounds to 2.0×10^{-4} (T) e.g. 1.989×10^{-4} (T) any number that rounds to 2.0×10^{-7} (T) e.g. 1.987×10^{-7} (T) is awarded 1 mark only award full marks for the correct answer without working	**(2)** **AO2.1**

Q3.

Question number	Answer	Additional guidance	Mark
i	arrow pointing vertically up (1)	seen anywhere judge direction by eye	**(1)** **AO2.1**

Question number	Answer	Additional guidance	Mark
iii	rearrangement and substitution (1) $(B =) \frac{0.078}{3.2 \times 0.042}$ evaluation (1) 0.58 (T)	$(B =) \frac{0.078}{0.1344}$ any number rounding to 0.6 (T) award full marks for the correct answer without working	**(2)** **AO2.1**

Q4.

Question Number	Answer	Additional guidance	Mark
(i)	**The only correct answer is B:** up **A is incorrect** because it does not follow the "Left Hand Rule" **C is incorrect** because it is not perpendicular to the direction of the magnetic field. **D is incorrect** because it is not perpendicular to the direction of the magnetic field.		**(1)**

Question Number	Answer	Additional guidance	Mark
(ii)	A description that includes: (forces are) equal (in size) **and** opposite (in direction)	 accept (in this context) forces balance	**(1)**

Question Number	Answer	Additional guidance	Mark
(iii)	substitution into $F = B \times I \times l$ (1) $0.045 = 0.72 \times I \times 30\ (\times 10^{-3})$ rearrangement (1) $(I =) \frac{F}{B \times l}$ OR $\frac{0.045}{0.72 \times 30\ (\times 10^{-3})}$ evaluation (1) 2.1 (A)	rearrangement and substitution can be in either order $(I =) \frac{45}{21.6}$ accept answers that round to 2.1 (A) accept final value rounded down to 2 leave POT until final evaluation award full marks for the correct answer without working	**(3)**

Q5.

Question number	Answer	Additional guidance	Mark
(i)	1 up(wards) (1) 2 down(wards) (1)	independent marks accept out(wards from the magnet) accept in(wards) / into (magnet) allow 1 mark for 1 down / in(wards) AND 2 up / out(wards)	**(2)** **AO1**

Question number	Answer	Additional guidance	Mark
(ii)	substitution (1) 0.15 = 0.5(0) x 2.7 x L(ength) rearrangement and evaluation (1) (length =) 0.11 (m)	alternative method re-arrangement (1) (length =) $\frac{F}{B \times I}$ Or (length =) $\frac{0.15}{0.5(0) \times 2.7}$ (substitution and) evaluation (1) (length =) 0.11 (m) allow any values that round to 0.11 e.g 0.111 accept 0.1 or 0.$\dot{1}$ (m) allow 1 mark for answer of 9 (with or without working) award full marks for correct answer without working.	**(2)** **AO2**