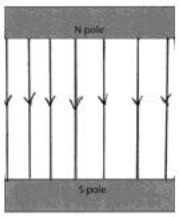
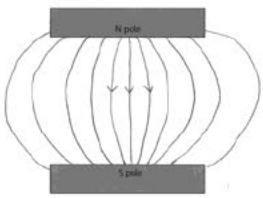
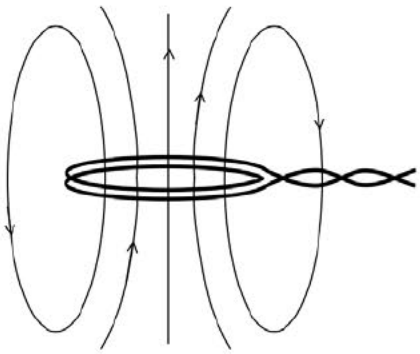
Question number	Answer	Notes	Marks
1 (a) (i)	arrows on two or more {lines from N to S and/or clockwise on loops around wire};	accept arrows beside lines showing correct directions reject contradicting arrows (i.e. one correct and one incorrect)	1
(ii)	horizontal arrow (by eye); pointing to the left;	accept • arrow not passing through wire • unlabelled arrow if clear DOP	2
(b)	EITHER: **Uniform field drawn** MP1. single straight line drawn perpendicular to and between poles; MP2. additional straight lines drawn either side that are parallel and evenly spaced (by eye); OR **Non-uniform field drawn** MP1. central straight line(s) drawn perpendicular to and between poles; MP2. correctly curved lines drawn either side of the centre and drawn symmetrically (by eye);	Lines can start/end at faces or edges of poles   ignore all arrows on lines	2

(c)	MP1. place compass around magnet and note / mark its direction; MP2. place compass in **new position** and note / mark its direction again; MP3. directions linked together to find a field line / pattern;	ignore references to iron filings award marks if clear in diagram if contradiction between words and diagram, go by the diagram allow use of additional compass(es)	3

Total 8 marks

Question number			Answer	Notes	Marks
2	a		**one** of: iron is (soft) magnetic; iron loses its magnetism easily;	allow RA for steel	1
	b		**these can be shown on a labelled diagram** MP1. current carrying (insulated) wire; MP2. wrapped into coil; MP3. wrapped on **iron** core;	allow wire shown connected to a battery solenoid = MP2 only	3
	c		Any two **ideas** from: MP1. current/ voltage reduces OR eq; MP2. magnetic field of em reduces; MP3. (magnetic) force holding the iron plate to the magnet no longer present;	do not give marks for • 'the door closes'/eq • electricity • power allow current stops circuit broken • iron plate no longer magnetised	2
				total = 6 marks	

Question number	Answer	Notes	Marks
3 (a)	MP1. at least one straight, vertical central field line; MP2. any field line drawn circling the wire / at least one peripheral field loop; MP3. field directions correct and consistent throughout and shown on at least two lines; 	ignore breaking of field lines as they pass through the centre of the coil by eye condone spiral drawn round wire	3
(b)	any 3 from: MP1. idea of magnetic fields interacting; MP2. idea of (magnetic) attraction or repulsion; MP3. reversing current reverses direction of magnetic field / force; MP4. some comparison with magnets, e.g. like poles repel, unlike poles attract;	allow field lines crossing ignore 'cutting' reject mention of electrostatic force or charge mention of having 'poles'	3

Total 6 marks

Question number	Answer	Notes	Marks
4 (a)	Rods magnetised; And repel;	 Reject ideas of charge for one mark only	2
(b)	MP1. A named magnetic material e.g.(soft) iron; MP2. because the material is capable of being magnetised; MP3. DOP (iron only) but does not retain its magnetism;	ACCEPT steel, mu-metal, nickel, cobalt accept RA steel would stay magnetised/apart	3
(c)	any two from- MP1. field (in coil) switches polarity; MP2. field (in rods) weaker; MP3. (since) field alternates with current or at 50 Hz; MP4. rods may not have time to become fully magnetised;	 allow • 100 times a second or mains frequency • hysteresis ideas • domain theory • reluctance ideas	2

Total 7 marks