

MARK SCHEME

ELECTROMAGNETISM

1 X	a(i) steel	1	A1	
	(ii) insert bar in coil (switch on, leave, switch off)	1	B1	
	(iii) to control/measure current or stop circuit/coil overheating	1	B1	3
	b(i) $R = 12/4$ $= 3 \text{ ohms}^*$	2	A1	
	(ii) $P = 12 \times 4$ $= 48 \text{ W}^*$	2	A1	
	(iii) $E = 48 \times 5$ $= 240 \text{ J}^*$	2	A1	6
	c(i) 5 (V)	1	A1	
	(ii) sum of p.d.'s = circuit supply p.d. above + detail eg across each component/ in closed circuit etc	2	A1	3
				QT 12
2 X	a (magnetic field) from left to right/ N to S	1	B1	1
	b(i) movement at right angles/between poles, up or down (vertically) down, stated or reference to arrow on diagram or label	2	A1	
	(ii) mention of Fleming's L.H.R. or interacting fields full explanation leading to correct direction e.g. what fingers show	2	A1	4
	c use coil instead of single wire mount coil on bearings arrange suitable contacts e.g. slip/slit rings and commutator	2	B1 M2	
				QT 7

3	(a) (i) power = VI or 24×2 power is 48 W	C1		
	(ii) voltage = power/current or $48/0.4$ voltage is 120 V	A1		
		C1		
		A1		4
	(b) (i) no/very little energy/power lost or energy/power in = energy/power out	B1		
	(ii) any mention of magnetic field	B1		
	changing magnetic field	B1		
	field passes through core or secondary coil	B1		
	induces voltage in secondary coil	B1		
	number of turns on secondary determines voltage output	B1		
				max 4
				[8]

4	a(i) curve upwards between plates curve upwards between plates + straight line	2	A1	
	(ii) top +, bottom -	1	B1	
	(iii) to left, arrow and C marking any point on the beam between X and P	1	B1	4
	b cathode/heater, labelled	B1		
	anode labelled	B1		
	correct arrangement of cathode with anode cylinder	B1		
	suitable power supplies to heater/ anode-cathode (either to score)	4	B1	4
				QT 8

mark
on diag

PTO

10
~~X~~
5

(a)	(i)	circular line of force around wire through P arrow(s) on line anticlockwise - none wrong	M1	
	(ii)	arrow through Q to left	A1	3
			A1	
(b)	(i)	none/stays same	B1	
	(ii)	direction reverses	B1	2
(c)		at S - stronger	B1	
		at T - same (strength)	B1	
		at W - same (strength)	B1	3
				[8]