

Electromagnetic effects

Mark Scheme 7

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electromagnetic effects
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 7

Time Allowed: 66 minutes

Score: /55

Percentage: /100

Question	Answer	Mark
1(a)(i)	Magnetic field at Y: 'towards the bottom of the page' ticked Force at Y: 'to the left' ticked	B1 B1
(a)(ii)	There is a force on X because of the (magnetic) field caused by Y OR due to the (magnetic) field around/of Y OR the (magnetic) fields due to X and Y interacting	B1
(b)	Change in current/ field is brief/ for short time/ occurs as switch closes Changing magnetic field/ flux links with secondary coil/ other coil/ core OR field/ flux lines cut coil Causes induced voltage/ current	B1 B1 B1
		Total: 6

- 2 (a) (i) $(I =)P/V$ OR $18\,000/120$ OR $18/120$ C1
 150 A A1
- (ii) $(E =)Pt$ OR $18\,000 \times 30 \times 60$ OR $18\,000 \times 1800$ OR $18\,000 \times 30$ OR 5.4×10^5 C1
 3.2×10^7 J OR 9.0 kWh A
- (b) any three of:
 (high voltage means) low(er) current
 for given supply power
 (low(er) current means) less heat/thermal energy (generated in cables) OR $P = I^2R$
 for given resistance (of cables)
 cables heated by current B3 [7]
- 3 (a) (i) changing magnetic field (in coil) **or** field lines cut coil (**or vice versa**) B
 e.m.f./current induced B1
- (ii) smaller deflection/current/reading/voltage **or** deflection lasts longer (ignore B1
 slower) B1
 rate of cutting field lines/change of magnetic field reduced B1
- (iii) deflection/current in opposite direction B1
- (b) alternating/changing current (in primary coil) B1
 alternating/changing magnetic field clearly in core B1
 field channelled from primary to secondary by core (somehow
 expressed) **or** core increases effect B1
induced e.m.f. in secondary B1 [9]

- 4 (a) first finger – field / magnetism / flux)
second finger – current / charge flow (NOT electron flow)) both B1
- (b) brush OR contact OR sliding connector B1
split ring OR commutator NOT slip ring B1
- (ii) clockwise OR right side down OR left side up OR correct arrows
on figure NOT turn to the right B1
- (iii) more current / more voltage / “stronger battery” / more power)
more turns on coil / more coils)
stronger magnet Ignore bigger magnets)
closer magnet / magnetic poles) any 2 B1, B1
more magnets)
iron core) [6]

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

6	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) $R = 12/4$		C1	
	$= 3 \text{ ohms}^*$	2	A1	
	(ii) $P = 12 \times 4$		C1	
	$= 48 \text{ W}^*$	2	A1	
	(iii) $E = 48 \times 5$		C1	
	$= 240 \text{ J}^*$	2	A1	6
	c(i) 5 (V)	1	A1	
	(ii) sum of p.d.'s = circuit supply p.d.		C1	
	above + detail eq across each component/ in closed circuit etc	2	A1	3
				QT 12
7	a (magnetic field) from left to right/ N to S	1	B1	1
	b(i) movement at right angles/between poles, up or down		C1	
	(vertically) down, stated or reference to arrow on diagram or label	2	A1	
	(ii) mention of Fleming's L.H.R. or interacting fields		C1	
	full explanation leading to correct direction e.g. that fingers show	2	A1	4
	c use coil instead of single wire		B1	
	mount coil on bearings		B1	
	arrange suitable contacts e.g. slip/slit rings and commutator	2	B1 M2	
				QT 7