

Electromagnetic effects

Mark Scheme 6

Level	IGCSE
Subject	Physics
ExamBoard	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electromagnetic effects
Paper Type	(Extended) Theory Paper
Booklet	Mark Scheme 6

Time Allowed: 58 minutes

Score: /48

Percentage: /100

1	(a)	magnetic field and current at right angles causes force on wire which deflects it or field around wire (B1) interacts with the field of the magnet (B1)	B1 B1	2
	(b)	normal to/between poles, either way however expressed out of paper	C1 A1	2
	(c)	converts electrical energy to work/k.e./movement energy	B1	1
	(d)	split rings and brushes or equivalent (e.g. leaning wires)	B1	
	(ii)	every half turn current passes from one ring to the other so current flows opposite way around coil or commutates	B1 B1	3 [8]

2	(a (i))	a.c. input causes constantly changing current through coil magnetic field formed in or around coil constantly changing magnetic field	B1 B1 B1	[M2]
	(ii)	(changing) magnetic field transferred to secondary coil	B1	
	(iii)	(changing) magnetic field cuts secondary coil induces e.m.f.	B1 B1	[3]
	(b)	more turns on secondary (than on primary)	B1	[1]
	(c)	no transfer of magnetic field from primary to secondary	B1	[1]
	(d)	$V_p I_p = V_s I_s$ or $100 \times 0.4 = 200 \times I_s$ $I_s = 0.2 \text{ A}$	C1 A1	[2]
				Total [9]

3	(a)	Solenoid ends connected to meter, both labelled <u>One</u> magnet in correct position to enter / leave solenoid, labelled	B1 B1	2
	(b)	Push magnet into coil / pull out / move near end of coil	B1	1
	(c)	(magnet has / produces) magnetic lines of force / magnetic field lines cut (coils of) solenoid / coils / wires	B1 B1	2
	(d)	(i) Pull magnet out of coil / <u>reverse</u> effect to answer (b) (ii) Move magnet faster or effect in (a) faster	B1 B1	2
				[7]
4	(a)	(i) two coils on continuous core (not allow coils joined) primary coil to 240 V, secondary coil to 6 V <u>iron</u> core, primary/input and secondary/output labelled	1 1 1	
		(ii) any values with <u>correct</u> 40:1 ratio, accept here or on diagram	1	4
	(b)	power in = power out or $240 \times I = 12$ current = 0.05 A	1 1	2
	(c)	must be a changing magnetic field, only from a.c. so that induction can take place	1 1	(8)

5	(a)	(i)	power = VI or 24×2 power is 48 W	C1 A1	
		(ii)	voltage = power/current or $48/0.4$ voltage is 120 V	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 changing magnetic field field passes through core or secondary coil induces voltage in secondary coil number of turns on secondary determines voltage output	B1 B1 B1 B1 B1	
				B1	max 4 [8]
6	(a)	(i)	0-6 (V) positive and negati	A1	
		(ii)	all waves roughly 6V amplitude 3 waves approx. one wave every 0.1 s	B1 B1	3
	(b)		any mention of magnetic field coils (forced to) cut magnetic field <u>includes</u> e.m.f./voltage/current in the coils as in Fleming's R.H. rule	B1 B1 B1 B1	M3
	(c)		mechanical energy/work (in)/kinetic energy electrical (out) (+ heat) (ignore sound)	B1 B1	2
					[8]