Trans formers GCSE AQA Higher Physics Past Papers Answers

01.

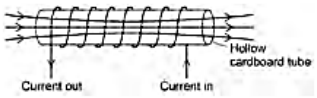
Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	It is easily magnetised.		1	AO1/1 4.7.3.3
2	p.d. across the secondary coil is smaller (than p.d. across the primary coil)		1	AO3/2a 4.7.3.3 WS3.5
3	ratio $\frac{V_p}{V_s} = \frac{6}{12}$ $\frac{6}{12} = \frac{50}{N_p}$ $N_p = 100$	accept any other correct ratio taken from the graph use of the correct turns ratio and substitution or correct transformation and substitution allow 100 with no working shown for **3** marks	1 1 1	AO2/1 4.7.3.3
Total			**5**	

02.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	any **one** from: • too few turns / coils on the secondary • p.d. across the primary was reduced	allow number of turns / coils on the primary was increased ignore human error	1	AO3 4.7.3.4
2	the p.d. (across the secondary) goes above 2V	allow p.d. across secondary is higher than p.d. across primary after 20 turns	1	AO3 4.7.3.4
3	it increases (until the nails reach a constant temperature)		1	AO1 4.6.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4		an answer of 1.2 (A) scores **5** marks		AO2 4.7.3.4
	$\frac{640}{4} = \frac{V_p}{1.75}$		1	
	$V_p = \frac{640 \times 1.75}{4}$		1	
	$V_p = 280$ (V)		1	
	$280 \times I_p = 336$	allow their calculated $V_p \times I_p = 336$	1	
	$I_p = 1.2$ (A)	allow an answer that is consistent with their calculated value of V_p	1	
	or			
	$336 = I_s \times 1.75$ (1)			
	$I_s = \frac{336}{1.75}$ (1)			
	$I_s = 192$ (A) (1)			
	$I_p = 192 \times \frac{4}{640}$ (1)	allow I_p= their calculated $I_s \times \frac{4}{640}$		
	$I_p = 1.2$ (A) (1)	allow an answer that is consistent with their calculated value of I_s		
Total			**8**	

03.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	field lines going in, (through) and out of the solenoid	 allow field lines only visible outside the cardboard tube allow a bar magnet shaped field with lines above and below the solenoid	1	AO1/1 4.7.2.1
	arrow(s) in correct direction		1	
2	the rods become (induced) magnets	allow the rods are (temporarily) magnetised ignore rods repel do not accept rods become charged	1	AO1/1 4.7.1.1
	with the same polarity (at each end)		1	
3	changed two (independent) variables (at the same time)	allow need to keep current or number of turns constant allow should only change one variable (at a time) allow current and number of turns both changed ignore fair test	1	AO3/1b 4.7.2.1 WS2.7
	so it is not possible to know the effect of one (independent) variable or the other		1	
4	(increasing the current) increases the strength until the strength reaches a maximum value	allow weight (held) for strength of electromagnet ignore a given current value for when maximum strength happens	1	AO3/2b 4.7.2.1 WS3.5
5	increasing the number of turns from 10 to 20 increases the strength more than increasing from 20 to 30	a general trend is required	1	AO3/2b 4.7.2.1 WS3.5
Total			**8**	

04.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	to vary the (output) potential difference so that you don't need a different generator for each type of device	allow different devices require different potential differences allow so that it is compatible with different devices do **not** allow answers in terms of power	1 1	AO3 4.7.3.4
2	$\frac{1.5}{5.0} = \frac{150}{N_s}$ $N_s = \frac{150}{0.3}$ $N_s = 500$		1 1 1	AO2 4.7.3.4
3	the coil moves through the magnetic field **or** the coil cuts magnetic field lines a potential difference is induced (across the coil) there is a complete circuit, so a current is induced (in the coil) every half turn the potential difference reverses direction so (every half turn) the current changes direction		1 1 1 1 1	AO1 4.7.3.1 4.7.3.2
4	provides a continuous / moveable contact / connection (between the coil and the transformer / contacts / brushes) **or** stops the wires from twisting together		1	AO3 4.7.3.2

5	(after disconnection) there is no induced current so no magnetic field (produced around / by the coil) to oppose the movement of the coil		1 1 1	AO1 4.7.3.1
Total			**14**	

05.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	motor (effect)		1	AO1 4.7.2.4
2	current creates a magnetic field (around the coil) (which) interacts with the permanent magnet field producing a (resultant) force causing the coil/cone to move (when the) direction of the current reverses, the direction of the (resultant) force reverses (producing a sound wave)	 allow coil/cone for force allow backwards for reverses	1 1 1 1	AO1 4.7.2.4
3	the student changed two variables at the same time (so) it is not possible to know the effect of each variable	allow only one variable should be changed at a time	1 1	AO3 4.6.1.2
Total			**7**	

06.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	**A** primary coil **and** **B** secondary coil		1	AO1 4.7.3.4
	C iron core		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2	$\frac{230}{V_s} = \frac{200}{1200}$		1	AO2 4.7.3.4
	$V_s = \frac{1200 \times 230}{200}$		1	
	$V_s = 1380$ (V)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3	(the alternating current causes) a changing magnetic field around the primary (coil)		1	AO2 4.7.3.4
	creates magnetic field that changes direction in the core	allow creates a changing magnetic field in the core	1	
	this induces an alternating potential difference across the secondary (coil causing an alternating current)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4	down		1	AO2 4.7.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5	$B = 60 \times 10^{-6}$ (T)		1	AO2 4.7.2.2
	$0.045 = 60 \times 10^{-6} \times 50 \times l$	allow correct substitution of incorrectly / not converted value of B	1	
	$l = \dfrac{0.045}{60 \times 10^{-6} \times 50}$	allow correct rearrangement using an incorrectly / not converted value of B	1	
	$l = 15$ (m)	allow a correct calculation using an incorrectly / not converted value of B	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6	the wire / force is at right angles to the magnetic field	allow the current is constant allow the cable is straight allow the field is uniform allow the force is constant	1	AO3 4.7.2.2

Total Question		14

07.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1	iron	allow nickel / cobalt do not allow steel	1	AO1 4.7.3.4
	it is easily magnetised (and demagnetised)	allow it is a magnetic material MP 2 is dependent on MP 1	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2	$\frac{230}{V_s} = \frac{2000}{40}$		1	AO2 4.7.3.4
	$V_s = \frac{40}{2000} \times 230$	subsequent marks can only be awarded if the first equation is correct and has been used	1	
	$V_s = 4.6$ (V)		1	
	$4.6 \times I_s = 6.9$	this mark may be awarded if the pd is incorrectly calculated	1	
	$I_s = 1.5$ A	allow a correctly calculated I_s using an incorrectly calculated pd	1	
	OR			
	$6.9 = I_p \times 230$ (1)			
	$I_p = \frac{6.9}{230}$ (1)	subsequent marks can only be awarded if the first equation is correct and has been used		
	$I_p = 0.03$ (A) (1)			
	$I_s = 0.03 \times \frac{2000}{40}$ (1)	this mark may be awarded if I_p is incorrectly calculated		
	$I_s = 1.5$ (A) (1)	allow a correctly calculated I_s using an incorrectly calculated I_p		

Total Question 7	7