

Name of the Student: _____

Max. Marks : 17 Marks

Time : 17 Minutes

Mark Schemes

Q1.

Question number	Answer	Additional guidance	Mark
i	an explanation linking any three from (magnetic) field lines cut / intercepted by coil (1) induces a voltage / current (in the coil) (1) voltmeter measures (induced) voltage / potential difference (1) electrons (in the wire) experience a force / move in response to (a changing) field (1) (induced) voltage / current changes magnitude / direction as magnet passes through (1)	(magnetic) field lines interact with coil / act on coil coil experiences changing (magnetic) field / flux (linkage) produces magnetism or magnetic poles in the coil voltmeter reads / shows current voltmeter measures induced voltage scores 2	(3) AO2.2

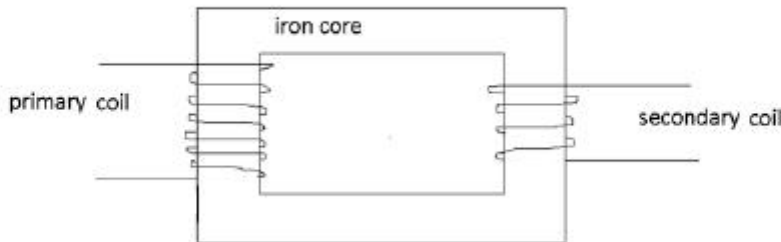
Question number	Answer	Additional guidance	Mark
ii	practical suggestions to include any four from drop magnet from different heights (1) use of metre rule (1) change height in steps (e.g. of 5 cm) (1) record (maximum) meter reading / voltage (1) repeat readings for each drop and take an average (1) set the digital voltmeter on a.c. (1) plot an appropriate graph – e.g. voltmeter reading against height (1)	move the coil to different positions use different length tubes allow ruler / tape measure	(4) exp AO3.3

Q2.

Question number	Answer	Additional guidance	Mark
i	D half the size of the voltage across the primary coil A and B are incorrect because the voltage will not necessarily be twice or half the value of the current C is incorrect because the voltage across secondary coil will be less than that across the primary coil		(1) AO2

Question number	Answer	Additional guidance	Mark
ii	an explanation linking three of magnetic field in primary / secondary coil / core (due to current) (1) magnetic field is alternating (1) (this magnetic) field cuts/links secondary coil (1) <u>induces</u> an alternating voltage (across secondary coil) (1)		(3) AO1

Q3.

SSQ NO:	CS NO :	Answer	Mark
★		Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. AO1 strand 1 (6 marks) Elements of physics understanding included in explaining the design: details of structure 	(6) Exp AO1.1

		credit diagram for construction as part of the explanation • (closed) iron core • primary and secondary coils • primary coils number (considerably) different from secondary coils number how a transformer works • a.c. in primary • causes changing magnetic field in (iron) core • induces a.c. voltage in secondary coil	
		• stepping down or reducing the voltage / more turns on primary than secondary how 230V is obtained • achieved by same ratios of $\frac{V_p}{V_s}$ and $\frac{N_p}{N_s}$ • ratio 11 000:230 i.e. $\approx 48:1$	

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1-2	• Demonstrates elements of physics understanding, some of which may be inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

Level	Mark	Additional Guidance	General additional guidance – the decision within levels Eg - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	<u>Additional guidance</u> basic ideas about construction OR how transformer works OR use of ratio equation	<u>Possible candidate responses</u> use of primary and secondary coils on iron core use of a.c. / iron core and (changing) magnetic field step down transformer with smaller number of turns for secondary
Level 2	3–4	<u>Additional guidance</u> more developed ideas about construction AND how transformer works OR use of ratio idea	<u>Possible candidate responses</u> use of different sized primary and secondary coils and iron core use of a.c. in primary which causes changing magnetic field in (iron) core use of $\frac{V_p}{V_s} = \frac{N_p}{N_s}$
Level 3	5–6	<u>Additional guidance</u> understanding is detailed and fully developed. includes detail about construction AND how transformer works AND use of ratio idea for transformers one aspect of the three treated weakly may be tolerated	<u>Possible candidate responses</u> use of primary and secondary coils and iron core with primary coils number (considerably) bigger than secondary coils number AND (alternating) current in primary coil produces changing magnetic field in (iron) core inducing an a.c. voltage in the secondary coil AND ratio is 11000 / 230 or 48:1