

Mark schemes

1	(a) (i)	generator	1
	(ii)	alternating current	1
	(iii)	voltmeter / CRO / oscilloscope / cathode ray oscilloscope	1
	(b) (i)	time	1
	(ii)	peaks and troughs in opposite directions	1
		amplitude remains constant	
		<i>dependent on first marking point</i>	1
	(c)	any two from:	
		<ul style="list-style-type: none">• increase speed of coil• strengthen magnetic field• increase area of coil	
		<i>do not accept larger</i>	2
2	(a)	gravity	1
	(b)	as the wire moves through the Earth's magnetic field	1
		a potential difference is induced between the ends of the wire	1
		the wire must be part of a complete circuit	1
	(c)	new trace shows:	
		twice the frequency	1
		twice the amplitude	1
	(d)	dynamo	
		<i>dc generator is insufficient</i>	1
			[8]

(e) the alternator pd changes polarity, the 2nd type of generator does not

1

(f) $\frac{230}{V_s} = \frac{690}{57}$

1

$$V_s = \frac{230 \times 57}{690}$$

1

$$V_s = 19 \text{ (V)}$$

an answer of 19 (V) scores 3 marks

1

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3

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also apply a 'best-fit' approach to the marking.

0 marks

No relevant / correct content.

Level 1 (1–2 marks)

Either there is an attempt at a description of the construction of a transformer

or

a correct statement of the effect of one type of transformer on the input p.d.

Level 2 (3–4 marks)

There is a description of the construction of a transformer

and

a correct statement of the effect of one type of transformer on the input p.d.

Level 3 (5–6 marks)

There is a clear description of the construction of a transformer

and

there is a correct description of how transformers affect the input p.d.

details of construction:

extra information

a (laminated) core

core is made from a magnetic material / iron

2 coils

the coils are made from an electrical conductor / copper

the coils are covered in plastic / insulation

the coils are (usually) on opposite sides

step-up transformer has more turns on secondary coil than (its) primary (or vice versa)

step-down transformer has fewer turns on secondary coil than (its) primary (or vice versa)

effect on input p.d. :

step-up transformer, the output p.d. is greater (than the input p.d.)

accept voltage for p.d.

step-down transformer, the output p.d. is lower (than the input p.d.)

6

[6]

4

(a) It is easily magnetised.

1

(b) p.d. across the secondary coil is smaller (than p.d. across the primary coil)

1

(c) ratio $\frac{V_p}{V_s} = \frac{6}{12}$

$$\frac{6}{12} = \frac{N_s}{N_p}$$

accept any other correct ratio taken from the graph

1

$$\frac{6}{12} = \frac{50}{N_p}$$

$$N_p = 100$$

use of the correct turns ratio and substitution or correct transformation and substitution

1

$$N_p = 100$$

allow 100 with no working shown for 3 marks

1

[5]

5

(a) a magnetic field

accept electromagnetic field

heat is insufficient

1

that is alternating / changing

1

(b) 20

allow 1 mark for correct

substitution, ie

$$\frac{230}{11.5}$$

provided no subsequent step

2

(c) (most) transformers are not 100% efficient

allow energy / power is lost to the surroundings

allow energy / power is lost as heat / sound

power is lost is insufficient

1

(d) (i) 0.01 (V)

1

because there is a change in p.d. each time (the number of turns changes)

allow because all the results (to 2 decimal places) are different

accept if results were to 1 decimal place, there might not be a difference

1

(ii) student 2 moved the coil more slowly (than student 1)
accept student 2 moved the coil at a different speed to student 1
do not accept student 2 moved the coil faster (than student 1)

1

(iii) both sets of results show the same pattern
accept trend for pattern
results are similar is insufficient
results follow a pattern is insufficient

1

(iv) (electromagnetic) induction
accept it is induced
do not accept electric / magnetic induction

1

(e) any **one** from:

- more economical / cheaper for the consumer
allow more convenient
- easier/cheaper to replace if broken/lost
allow in case one gets lost
- since fewer transformers need to be made less resources are used
allow fewer plug sockets are needed
allow fewer transformers are needed
environmentally friendly is insufficient

1

[11]