Name of the Student:_____
Max. Marks : 19 Marks **Time : 19 Minutes**

Mark Schemes

Q1.

(a) an electromagnet can be switched off

accept a permanent magnet cannot be switched off

or
an electromagnet is stronger

accept control the strength

1

(b) 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 apply a 'best-fit' approach to the marking.

Level 3 (5 – 6 marks):
there is a description of how the electromagnet is made
and
there is a description of how the strength of the electromagnet can be varied
and
there is a description of how the strength of the electromagnet can be tested

Level 2 (3 – 4 marks):
there is a description of how the electromagnet is made
and either
there is a description of how the strength of the electromagnet can be varied
or
there is a description of how the electromagnet can be tested

Level 1 (1 – 2 marks):
there is a basic description of how to make an electromagnet
or
there is a basic description of how the strength of the electromagnet can be varied
or
there is a basic description of how the electromagnet can be tested

Level 0 (0 marks):
No relevant / correct content

examples of the points made in the response

Details of how to make an electromagnet
- wrap the wire around the nail
- connect the wire to the power supply (with connecting leads and croc clips)
- switch on the power supply

accept a current should be sent along the wire

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Details of how to vary the strength of the electromagnet

- change the number of turns (on the coil)
- change the current (through the coil)
- change the separation of the turns

allow change the potential difference (across the coil)

accept wrap the coil more tightly

Details of how to test the electromagnet

- suspend paperclips from the electromagnet
- the more paperclips suspended, the stronger the electromagnet is
- clamp the electromagnet at different distances from the paperclip(s)
- the further the distance from which paperclips can be attracted the stronger the electromagnet is
- test before and after making alterations to change the strength
- compare the results from before and after making alterations
- use de-magnetised paper clips

accept count the number of paperclips

*with different current **or** p.d. **or** no. of turns*

***or** core and see if the number changes/increases*

6

[7]

Q2.

(a) induced

1

(b) any **two** from:

- use the same (strength) magnet

  same size magnet is insufficient
- the speed that the magnet is moved

  accept movement of the magnet
- the area of the turns

  same type / length of wire is insufficient
- the magnetic pole being moved towards the coil (of wire).

  use the same voltmeter is insufficient

2

(c) (i) voltmeter misread

or

number of turns miscounted

result misread is insufficient

human error is insufficient

allow the magnet was moved at a (slightly) different speed (into the coil) than for the other readings

allow spacing between the turns had changed

1

(ii) line of best fit passing through all points except (100, 0.034)

line does not need to go back to origin

1

(d) any **one** from:

- can re-check data / readings.

  accept can go back to data
- can take more readings (in a given time)

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can store data is insufficient

- easier to identify maximum value.

  automatically records data is insufficient

  accept is more accurate

  accept eliminates human error

1

[6]

Q3.

(a) (i) an electric motor

1

(ii) force

1

(b) any **two** from:

- more powerful magnet

  *do **not** allow 'bigger magnet'*

- reduce the gap (between magnet and coil)

- increase the area of the coil

- more powerful cell

  *do **not** allow 'bigger cell'*

  accept battery for cell

  accept add a cell

  accept increase current / potential difference

- more turns (on the coil)

  allow 'more coils on the coil'

  *do **not** allow 'bigger coil'*

2

(c) reverse the (polarity) of the cell

allow 'turn the cell the other way round'

accept battery for cell

1

reverse the (polarity) of the magnet

allow 'turn the magnet the other way up'

1

[6]

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