Q1.

(a) magnetic field around the coil changes
or
the magnetic field (lines) cut by the coil
allow the generator effect

1

(b) because the magnet changes direction

1

(c) stationary

1

(i) any **two** from:

- stronger magnetic field
  allow stronger magnet
  allow heavier magnet
  bigger magnet is insufficient
- more turns on the coil
  bigger coil is insufficient
  *do **not** accept more coils of wire*
- turns pushed closer together
- spring with a lower spring constant
  allow less stiff spring
  allow weaker spring
  *do **not** accept add an iron core*

2

[13]

Q2.

(a) generator (effect)
allow electromagnetic induction

1

(b) wire cuts through the magnetic field (between the magnets)

1

a potential difference was <u>induced</u> (across the wire)

1

as it was part of <u>complete circuit</u> (there was a current in the circuit)

1

(c) the needle will deflect to –0.4 mA

1

[5]

Q3.

(a) 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

(b) new trace shows:

twice the frequency

1

twice the amplitude

1

(c) dynamo

dc generator is insufficient

1

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

1

[11]

Q4.

(a) which causes the magnet to turn / spin / rotate

1

(magnetic) field / lines of force / flux rotate(s) / move(s) / through / in / cut(s) the coil

*do **not** credit the idea that movement 'creates' the magnetic field*

1

potential difference / p.d. / voltage <u>induced</u> across the coil

*do **not** credit just 'current induced'*

1

(b) any **one** from:

- more powerful / stronger / lighter magnet
  *do **not** credit 'a bigger magnet'*
- larger / more / bigger / lighter cups / with a bigger surface area
- longer arms
- lubricate the spindle
- add more turns to the coil

1

[4]

Q5.

(a) *there is a* magnetic field *(around the magnet)*

1

(this magnetic field) changes / moves

1

and cuts through coil

accept links with coil

1

so a p.d. *induced* across coil

1

the coil forms *a* complete circuit

1

so a current (*is* induced)

1

(b) ammeter reading does not change

must be in this order

accept ammeter has a small reading / shows a current

1

zero

1

greater than before

accept a large(r) reading

1

same as originally but in the opposite direction

accept a small reading in the opposite direction

1

(c) 0.30

*allow **1** mark for correct substitution, ie 0.05 = Q / 6*

2

C / coulomb

allow A s

1

[13]

Q6.

(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

dependent on first marking point

1

(c) any **two** from:

- increase speed of coil
- strengthen magnetic field
- increase area of coil

*do **not** accept larger*

2

[8]

Q7.

(a) the coil moves through the magnetic field

or

the coil cuts magnetic field lines

1

a potential difference is induced (across the coil)

1

there is a complete circuit, so a current is induced (in the coil)

1

every half turn the potential difference reverses direction

1

so (every half turn) the current changes direction

1

(b) provides a continuous / moveable contact / connection (between the coil and the transformer / contacts / brushes)

or

stops the wires from twisting together

1

(c) (after disconnection) there is no induced current

1

so no magnetic field (produced around / by the coil)

1

to oppose the movement of the coil

1

[14]

Q8.

(a) the coil moves through the (magnetic) field
or
the coil cuts (magnetic) field lines

1

a potential difference is <u>induced</u> (across the coil)

1

there is a <u>complete circuit</u>, so a current is induced (in the coil)

1

(because) each half-revolution, the two ends of the coil swap from one brush to the other
or
each half-revolution, (the two halves of) the commutator switch brushes / contacts

(because) the half of the coil connected to each brush always moves in the same direction

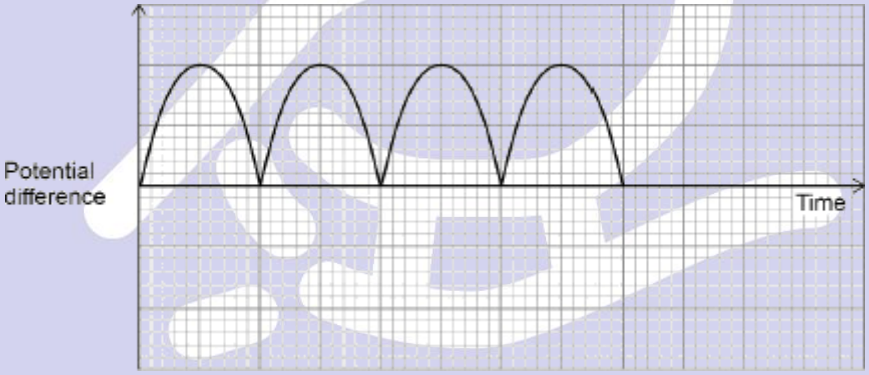
1

(so) the direction of the (induced) current / potential difference does not reverse every half rotation

allow the direction of the (induced) current / potential difference is the same every half rotation

1

(b)



allow a correct graph showing a negative output potential difference only

1

(c) (after disconnection) there is no (induced) current

1

(so) no magnetic field (produced around / by the coil)

1

to oppose the movement of the coil

allow no force opposes the movement of the coil

1

[9]