Mark schemes

Q1.

(a) Q N M

all three in correct boxes

*one statement in correct box gains **1** mark*

2

(c) any **two** from:

- increase the current / p.d. (supplied to the coil)
  *accept reduce the resistance of the coil **or** increase cross sectional area of wire*
  *accept more cells / batteries **or** turn up the power supply*
  increase power is insufficient
- increase number of turns (on the coil)
- increase the area (of the coil)
  accept increase the width of the coil
  increase width / size is insufficient
- increase the (strength of the permanent) magnetic field
  accept move the magnets closer to the coil
  accept use stronger magnets
  *do **not** accept use larger magnets*

2

[4]

Q2.

(a) (i) arrow pointing vertically downwards

1

(ii) increase current / p.d.
accept voltage for p.d.

1

increase strength of magnetic field
accept move poles closer together

1

(iii) reverse (poles of) magnets

1

reverse battery / current

1

[5]

Q3.

(a) electric drill, electric fan, electric food mixer and electric screwdriver

all four ticked and no others (2)

either *all four of these ticked and only one other (1)*

or *any three of these ticked and none/one/two of the others (1)*

2

(b) (i) reverse (the direction of the) current (1)

or *reverse the connections (to the battery)*

reverse (the direction of the) magnetic field (1)

or *reverse the (magnetic) poles /ends*

*do **not** credit 'swap the magnets (around)'*

2

(ii) any **two** from:

- increase the strength of the magnet(s)/(magnetic) field

  *do **not** credit 'use a bigger magnet'*

- increase the current

  allow 'increase the voltage/p.d.'
  allow add cells/batteries
  allow increase the (electrical) energy
  allow increase the power supply
  allow 'decrease the resistance'
  allow 'increase charge'
  allow ' increase the electricity'

  *do **not** credit 'use a bigger battery'*

- reduce the gap (between coil/armature and poles/magnets)

  allow increase the (number of) coils

- increase the turns (on the coil/armature)

  *do **not** credit 'use a bigger coil'*

2

[6]

Q4.

(a) the sides of the coil (parallel to the magnet) experience a force (in opposite directions)

allow the current creates a magnetic field
ignore Fleming's Left Hand Rule

1

the forces cause moments that act in the same (clockwise / anticlockwise) direction
or
the moments cause the coil to rotate (clockwise / anticlockwise)

allow the magnetic fields interact to create a pair of forces (acting in opposite directions)
or
allow the magnetic fields interact causing the coil to rotate

1

(each half-revolution) the two halves of the (rotating) commutator swap from one (carbon) brush to the other

1

(each half-revolution) the commutator reverses the current (in the coil)
or
keeping the forces in the same direction (keeping the coil rotating)

allow keeps the current in the same direction relative to the (permanent) magnetic field

1

[7]

Q5.

(a) (i) it moves or experiences a force horizontally to the right

for 1 mark

1

(ii) A – moves in opposite direction or force reversed e.c.f.
B – faster movement or larger force
(**not** move further)

for 1 mark each

2

(b) turns clockwise
oscillates/reverses
comes to rest facing field/at 90° to field/vertically

for 1 mark each

3

(c) number of turns or linear number density of turns current core

for 1 mark each

3

[9]