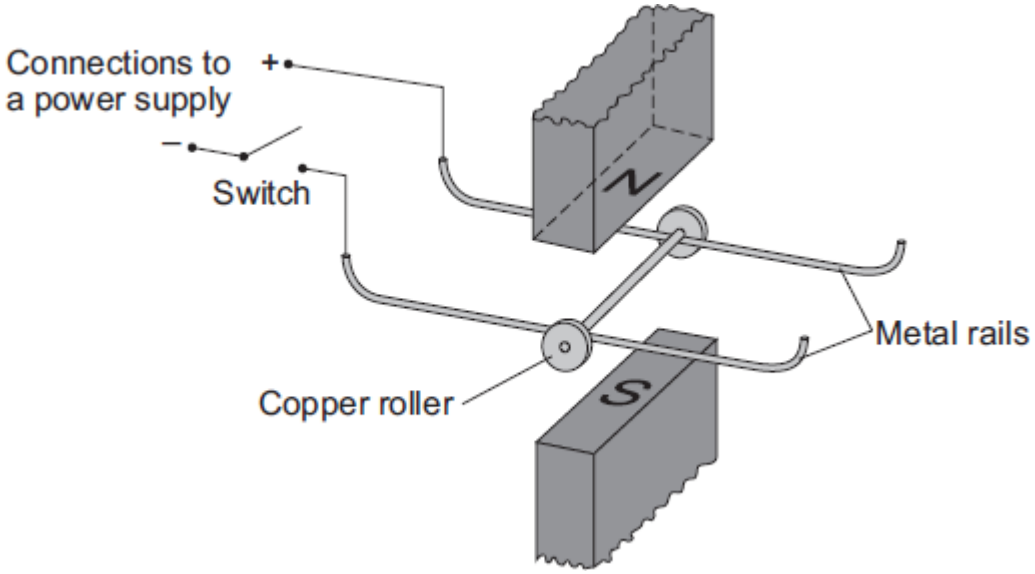
Name of the Student:_____
Max. Marks : 17 Marks **Time : 17 Minutes**

Q1.

(a) A science technician sets up the apparatus shown below to demonstrate the motor effect. He uses a powerful permanent magnet.



The copper roller is placed across the metal rails. When the switch is closed, the copper roller moves to the right.

(i) Complete the sentence by drawing a ring around the correct line in the box.

This happens because copper is

an electrical conductor.
an electrical insulator.
a magnetic material.

(1)

(ii) Suggest **one** change that the technician can make which will cause the copper roller to move faster.

_____

_____

(1)

(iii) Suggest **two** changes which the technician can make, each of which will separately cause the copper roller to move to the left.

1. _____

_____

2. _____

_____

(2)

(b) Many electrical appliances, such as vacuum cleaners, drills and CD players, contain electric motors. As more electrical appliances are developed, more electricity needs to be generated. Generating electricity often produces pollutant gases.

(i) Complete the sentence by drawing a ring around the correct line in the box.

Generating more electricity to power the increasing number of electrical appliances used raises

an ethical
an environmental
a political

issue.

(1)

(ii) The number of electrical appliances used in the world's richest countries is increasing yet many people in the world's poorest countries have no access to electricity.

What type of issue does this inequality between people in different countries raise?

_____

(1)

(Total 6 marks)

Q2.

The diagram shows a USB power adapter which plugs into a 230 V a.c. mains socket.

The adapter contains a small step-down transformer.

(a) The core of the transformer is made of laminated soft iron.

Why is iron used?

_____

_____

(1)

(b) The coils of the transformers are made of insulated copper wire.

Why is the wire insulated?

_____

_____

(1)

(c) There are 500 turns on one coil of the transformer and 20 000 turns on the other coil.

Use the equation in the box to calculate the p.d. across the secondary coil.

$$\frac{\text{p.d. across primary}}{\text{p.d. across secondary}} = \frac{\text{number of turns on primary}}{\text{number of turns on secondary}}$$

Show clearly how you work out your answer and give the unit.

_____

_____

_____

p.d. across the secondary = _____

(3)

(Total 5 marks)

Q3.

Many electrical appliances use the circular motion produced by their electric motor.

(a) Put ticks (✓) in the boxes next to **all** the appliances in the list which have an electric motor.

electric drill ☐

electric fan ☐

electric food mixer ☐

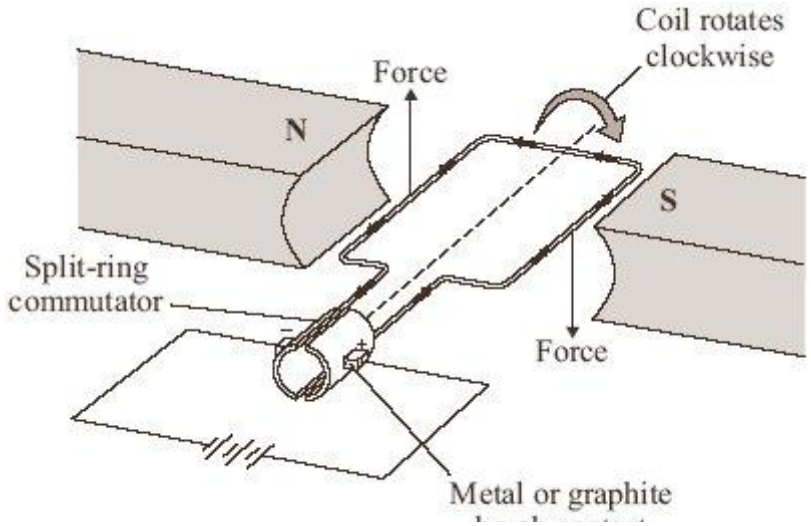
electric iron ☐

electric kettle ☐

electric screwdriver ☐

(2)

(b) One simple design of an electric motor is shown in the diagram. It has a coil which spins between the ends of a magnet.



(i) Give **two** ways of reversing the direction of the forces on the coil in the electric motor.

1. _____

_____

2. _____

_____

(2)

(ii) Give **two** ways of increasing the forces on the coil in the electric motor.

1. _____

_____

2. _____

_____

(2)

(Total 6 marks)