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

Q1.

Figure 13 shows two metal rods carrying a current.

A metal roller touches both rods and completes the circuit.
The roller is in the magnetic field produced by a magnet.

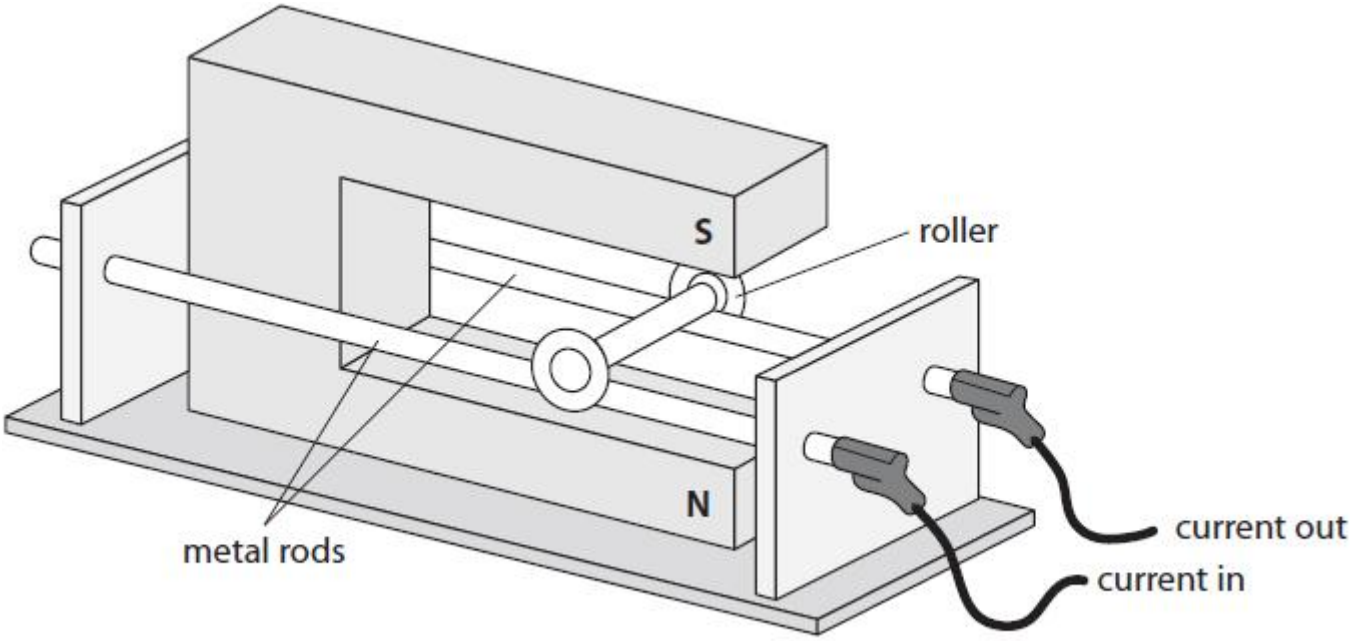

Figure 13

(i) The magnetic flux density of the magnetic field at the roller is 1.2 T.

The current in the roller is 2.5 A.
The length of the roller carrying the current is 0.060 m.
Calculate the force on the roller.
Use the equation

$$F = B \times I \times l$$

(2)

force on the roller = ... N

(ii) Describe how Fleming's left-hand rule can be used to determine the direction of the force acting on the roller. You may draw a diagram to help your answer.

(3)

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(iii) Draw an arrow on Figure 13 to show the direction of the force acting on the roller.

(1)

(Total for question = 6 marks)

Q2.

Figure 8 shows two metal rods carrying a current.

A metal roller touches both rods and completes the circuit.
The roller is in the magnetic field produced by a magnet.

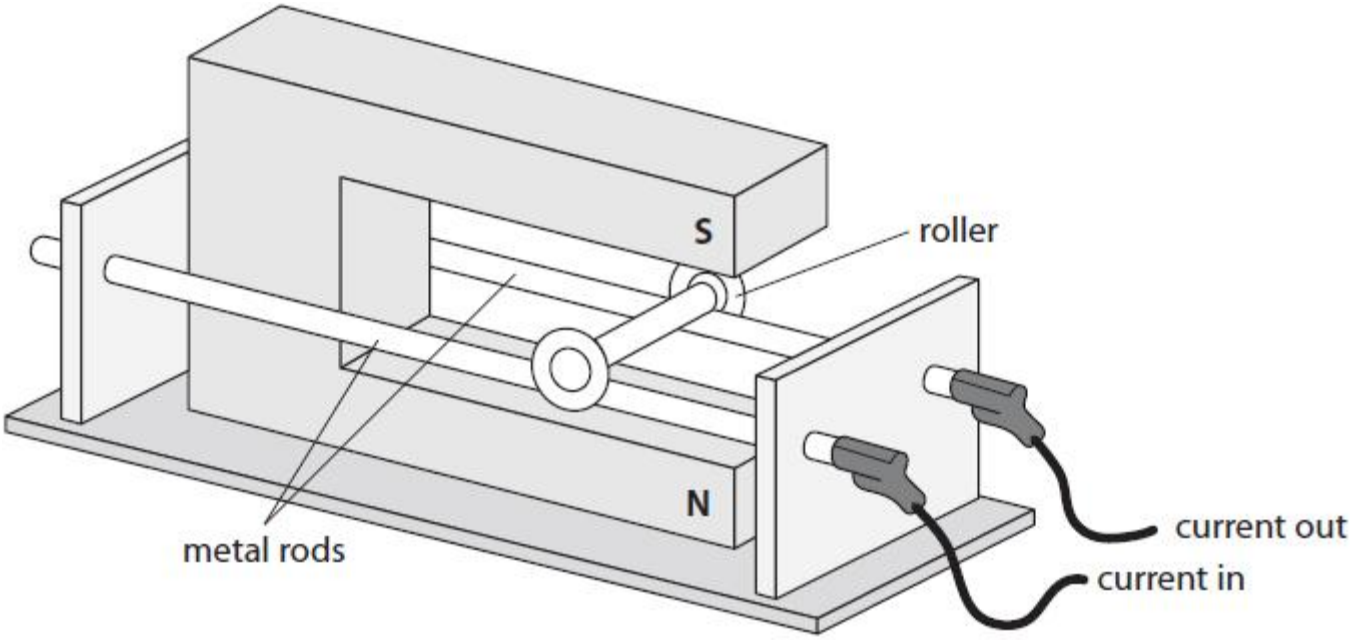

Figure 8

(i) The magnetic flux density of the magnetic field at the roller is 1.2 T.

The current in the roller is 2.5 A.
The length of the roller carrying the current is 0.060 m.
Calculate the force on the roller.
Use the equation

$$F = B \times I \times l$$

(2)

force on the roller = ... N

(ii) Describe how Fleming's left-hand rule can be used to determine the direction of the force acting on the roller.

You may draw a diagram to help your answer.

(3)

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(iii) Draw an arrow on Figure 8 to show the direction of the force acting on the roller.

(1)

(Total for question = 6 marks)

Q3.

A wire is placed at right angles to the Earth's magnetic field.

The wire is 0.600 m long and carries a current of 93.1 mA.

The force on the wire is 1.11×10^{-5} N.

Calculate the magnetic flux density of the Earth's magnetic field.

Use the equation

$$F = B \times I \times l$$

(2)

magnetic flux density = ... T

(Total for question = 2 marks)

Q4.

A wire is placed at right angles to the Earth's magnetic field.

The wire is 0.600 m long and carries a current of 93.1 mA.

The force on the wire is 1.11×10^{-5} N.

Calculate the magnetic flux density of the Earth's magnetic field.

Use the equation

$$F = B \times I \times l$$

(2)

magnetic flux density = ... T

(Total for question = 2 marks)

Q5.

Figure 9 shows a toy that has a plastic cylinder, a plastic base and two similar magnets. Each of the two magnets is in the shape of a ring.

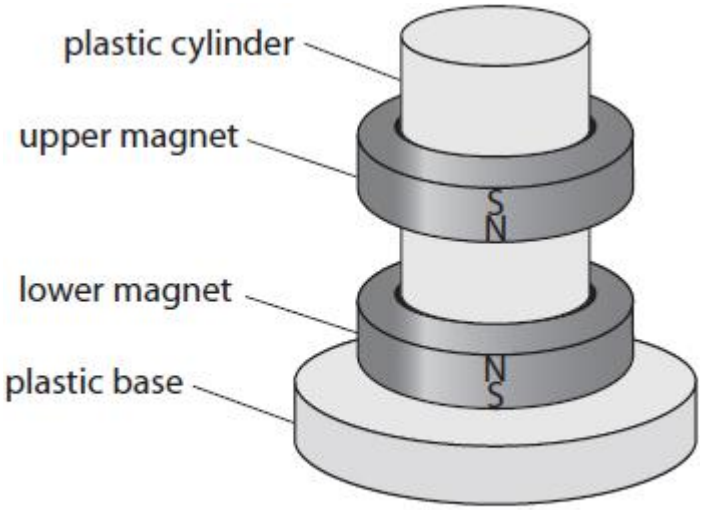

Figure 9

The upper magnet seems to float in the air above the lower magnet.

Describe the forces acting on the upper magnet.

Use the idea of magnetic fields in your answer.

(3)

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(Total for question = 3 marks)