Q1.

When the current in the coil is 16 mA, the force on the coil is 0.013 N.

The length of the wire that makes up the coil is 6.5 m.

Calculate the magnetic flux density around the coil in the electromagnet.

Use the Physics Equations Sheet.

Magnetic flux density = _____ T

(4)

(Total 4 marks)

Q2.

The cable experiences a force of 0.045 N due to the Earth's magnetic field.

magnetic flux density = 60 μT

current = 50 A

Calculate the length of the cable between **A** and **B**.

Use the Physics Equations Sheet.

Length = _____ m

(4)

(f) State **one** assumption you made in your calculation.

_____

(1)

(Total 5 marks)

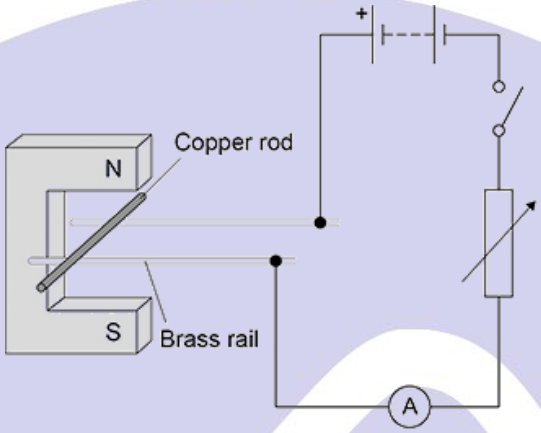
Q3.

A teacher demonstrated how a magnetic field can cause a copper rod to accelerate.

The teacher placed the copper rod on two brass rails in a magnetic field.

The copper rod was able to move.

The figure below shows the equipment used.



The teacher closed the switch and the copper rod accelerated uniformly from rest for 0.15 s.

The current in the copper rod was 1.7 A.

mass of copper rod = 4.0 g

length of copper rod in the magnetic field = 0.050 m

magnetic flux density = 0.30 T

Calculate the maximum possible velocity of the copper rod when it left the magnetic field.

Maximum velocity = _____ m/s

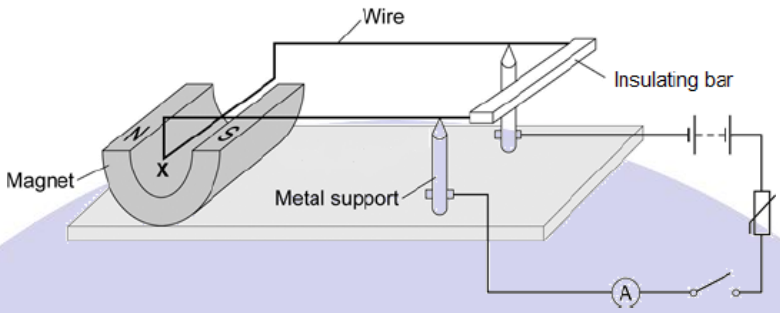
(6)

(Total 6 marks)

Q4.

Figure 1 shows a piece of apparatus called a current balance.

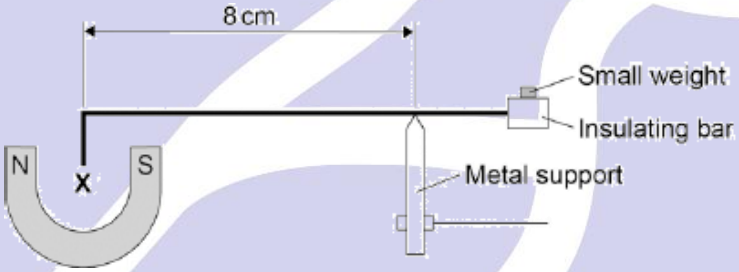
Figure 1



When the switch is closed, the part of the wire labelled **X** experiences a force and moves downwards.

Figure 2 shows how a small weight placed on the insulating bar makes the wire **X** go back and balance in its original position.

Figure 2



The wire **X** is 5 cm long and carries a current of 1.5 A.

The small weight causes a clockwise moment of 4.8×10^{-4} Nm.

Calculate the magnetic flux density where the wire **X** is positioned

Give the unit.

Magnetic flux density = _____ Unit _____

(6)

(Total 8 marks)