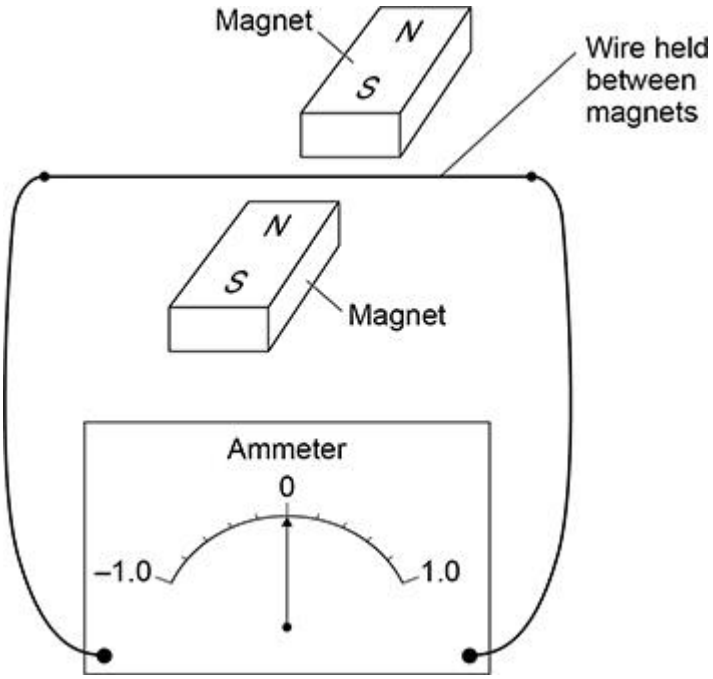
Questions are for separate science students only

Q1.

Figure 1 shows some apparatus used by a teacher in a demonstration. **(HT only) (Physics only)**

Figure 1



The teacher moved the wire upwards between the magnets.

The needle on the ammeter deflected to a value of +0.4 mA and then returned to zero.

(a) What effect did this demonstrate?

_____

(1)

(b) Explain why a current was detected when the wire in **Figure 1** was moved upwards.

_____

_____

_____

_____

_____

_____

(3)

(c) The teacher reversed the direction of the magnetic field.

The teacher replaced the wire in its original position.

The teacher moved the wire upwards in the same way as before.

What was the deflection of the needle on the ammeter?

Tick (✓) **one** box.

The needle will deflect to –0.4 mA. ☐

The needle will not move. ☐

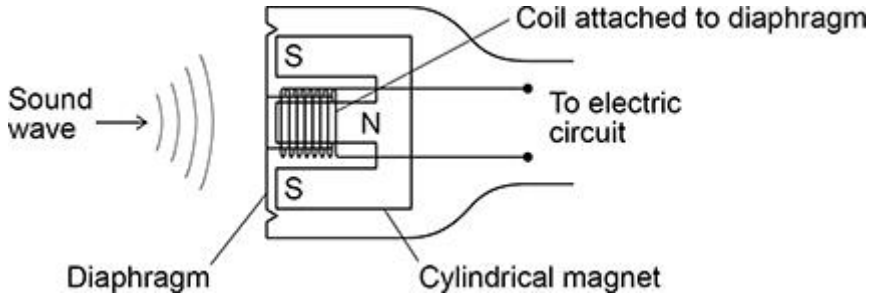
The needle will deflect to +0.4 mA. ☐

(1)

(d) **Figure 2** shows a sound wave incident on the diaphragm of a moving-coil microphone.

The inside of the microphone includes a small coil of wire and a magnet.

Figure 2



Explain why the sound waves have an effect on the electric circuit.

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_____

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_____

_____

_____

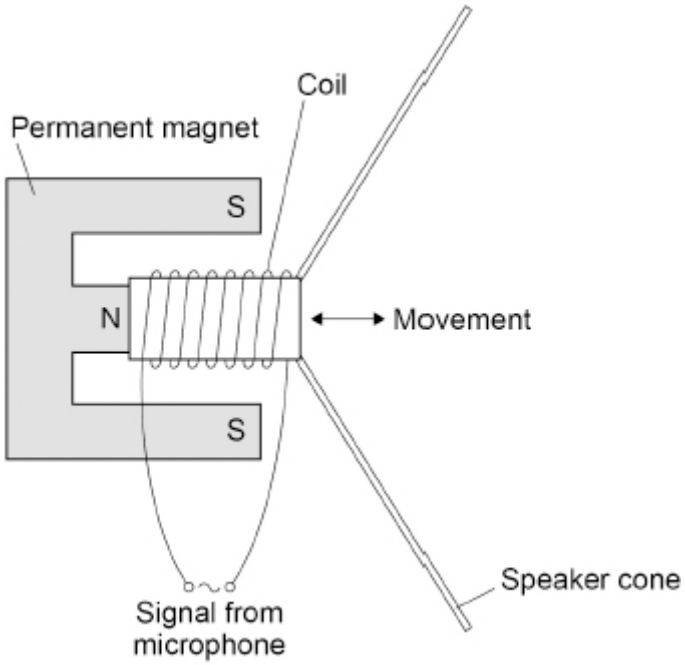
(3)

(Total 8 marks)

Q2.

Figure 3 shows the parts of the loudspeaker in the megaphone. **(HT only)** **(Physics only)**

Figure 3



A current in the coil of the loudspeaker causes the coil to move.

(a) 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.

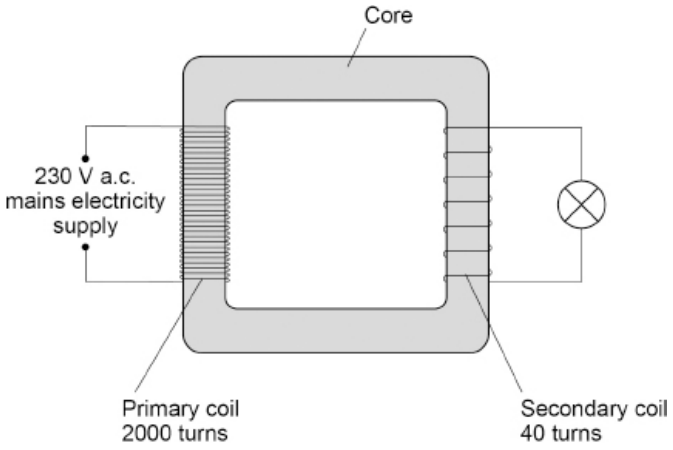
Magnetic flux density = _____ T

(4)

(Total 4 marks)

Q3.

The figure below shows a transformer used to power a lamp using the mains electricity supply. **(HT only) (Physics only)**



(a) What material is used to make the core of the transformer?

Give the reason for using this material.

Material _____

Reason _____

_____

(2)

(b) Determine the current in the secondary coil when the power output of the transformer is 6.9 W.

The transformer is 100% efficient.

Use the Physics Equations Sheet.

_____

_____

_____

_____

_____

_____

_____

_____

Current in the secondary coil = _____ A

(5)

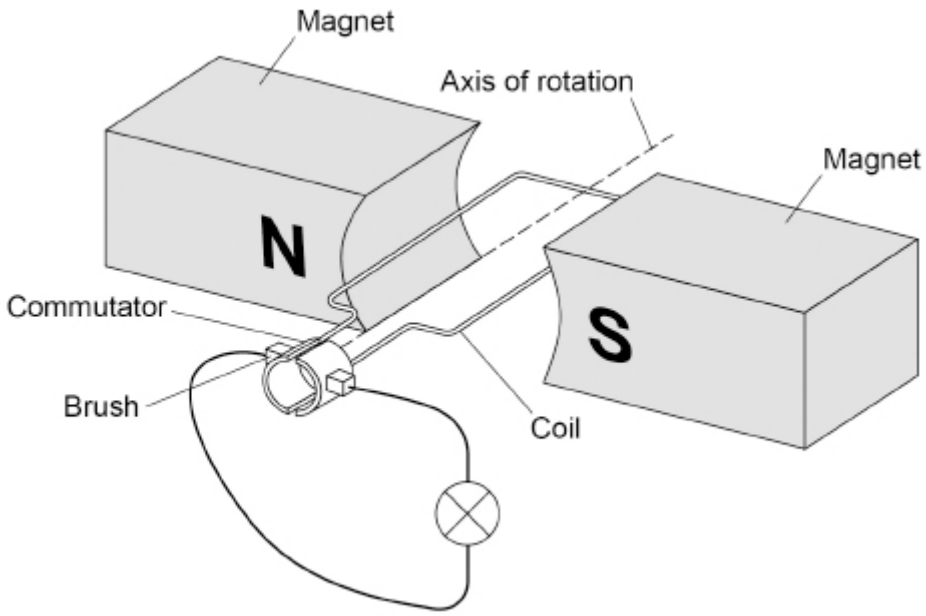
(Total 7 marks)

Q4.

A dynamo is used to generate an electric current.

Figure 1 shows the inside parts of the dynamo connected to a lamp. **(HT only) (Physics only)**

Figure 1



(a) The coil is rotated.

Explain why a direct current is induced in the coil.

(5)

(b) Sketch a graph on **Figure 2** to show how the potential difference generated across the lamp varies for **two** complete revolutions of the dynamo coil.

Figure 2

(1)

(c) The lamp is disconnected from the dynamo.

Explain why the dynamo becomes much easier to turn.

_____

_____

_____

_____

_____

_____

(3)

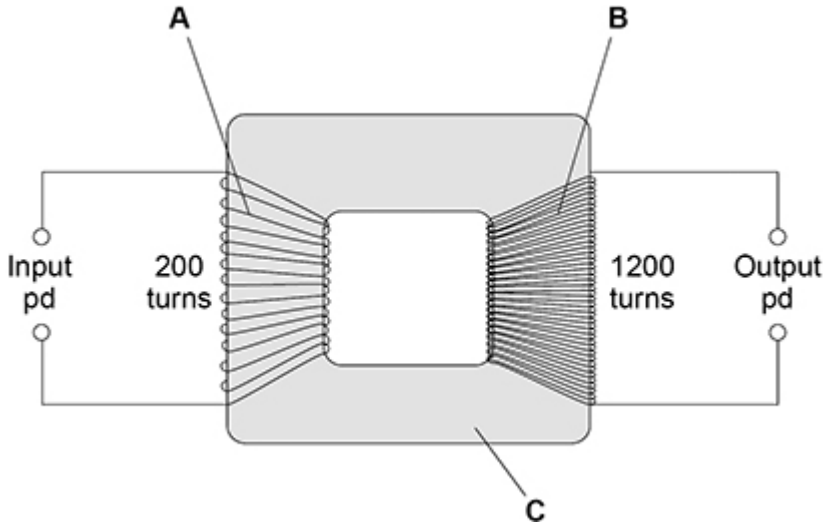
(Total 9 marks)

Q5.

The National Grid uses transformers to change potential difference (pd).

Figure 1 shows a transformer. **(HT only) (Physics only)**

Figure 1



(a) Identify the parts of the transformer labelled in **Figure 1**.

A _____

B _____

C _____

(2)

(b) There is an alternating input pd of 230 V.

Determine the output pd.

Use the Physics Equations Sheet.

_____

_____

_____

_____

_____

Output pd = _____ V

(3)

(c) The input pd causes an alternating current.

Explain why there is an alternating current in the output when the transformer is connected to a circuit.

_____

_____

_____

_____

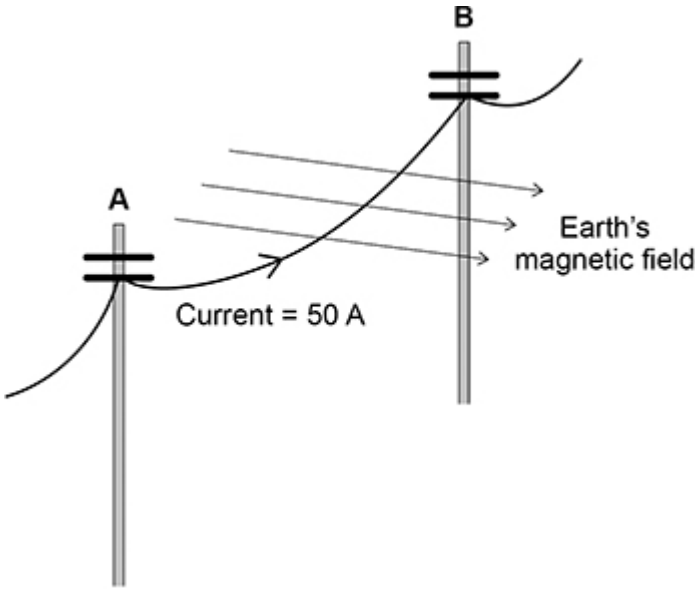
_____

_____

(3)

Figure 2 shows a large cable supported by two wooden poles. The cable is connected to an electricity supply.

Figure 2



(d) There is a force on the cable due to the Earth's magnetic field when the current is in the direction **A** to **B**.

What is the direction of this force?

Tick (✓) **one** box.

Down ☐

Left ☐

Right ☐

Up ☐

(1)

(e) 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 14 marks)