

Electromagnetic Effects

Question Paper

Course	CIE IGCSE Physics
Section	4. Electricity & Magnetism
Topic	Electromagnetic Effects
Difficulty	Medium

Time Allowed 50

Score /36

Percentage /100

Question 1a**Extended tier only**

Fig. 10.1 is a simplified top view of a flat coil. There is an alternating current (a.c.) in the coil.



Fig. 10.1

Describe the magnetic effect of this alternating current.

[2 marks]

Question 1b**Extended tier only**

Fig. 10.2 shows a pan placed above the coil. The base of the pan is made of steel.

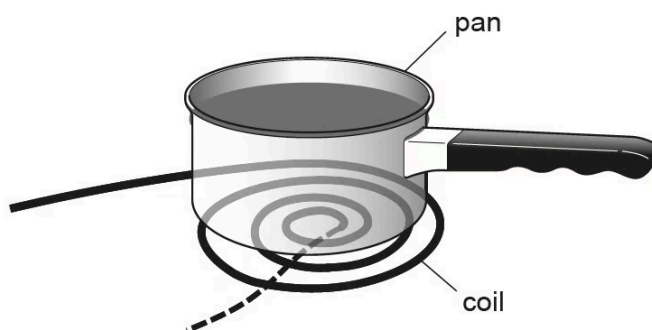


Fig. 10.2

State what quantity is induced in the base of the pan.

[1 mark]

Question 1c

The pan contains water.

State and explain the effect of the quantity induced in part (b) on the temperature of the water in the pan.

[3 marks]

Question 2a

Fig. 11.1 shows in each of the diagrams a current-carrying conductor and a magnetic field pattern.

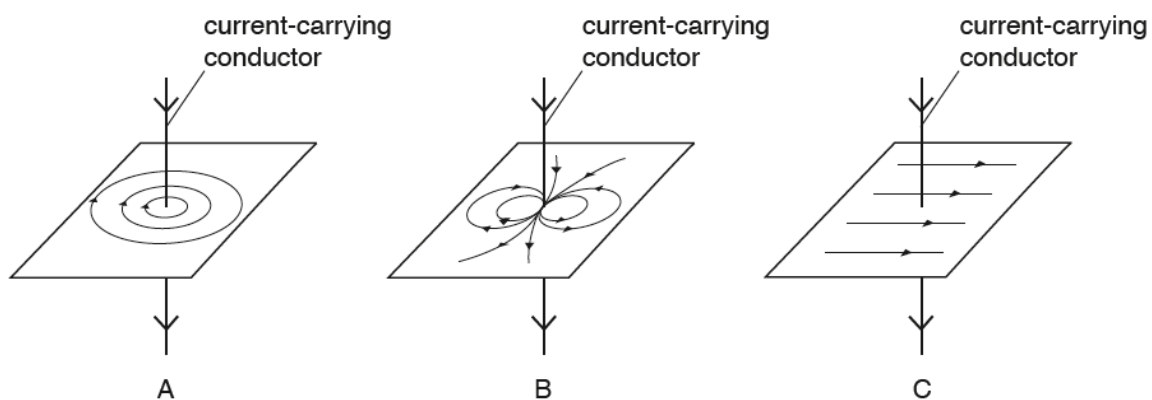


Fig. 11.1

State the diagram which correctly shows the magnetic field around a current-carrying conductor.

[1 mark]

Question 2b

Fig. 11.2 shows three pieces of equipment.

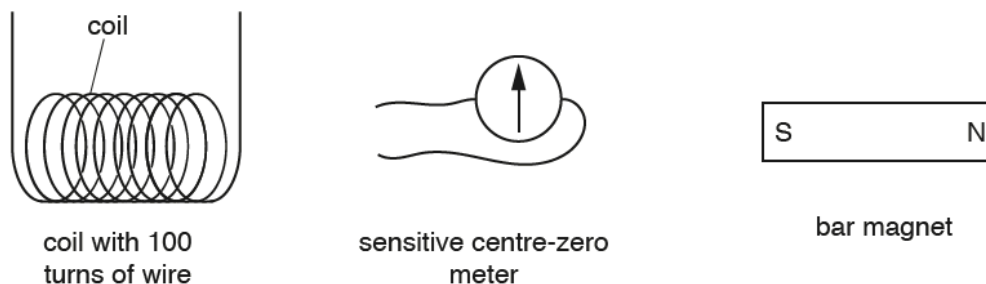


Fig. 11.2

- (i) Describe how to generate and detect an electromotive force (e.m.f.) using the equipment in Fig. 11.2. You may draw a diagram.

[3]

- (ii) Describe two changes that will generate a larger e.m.f. using similar equipment to that in Fig. 11.2.

[2]

[5 marks]

Question 2c**Extended tier only**

A student connects a lamp and centre-zero galvanometer in series with a generator, as shown in Fig. 11.3.

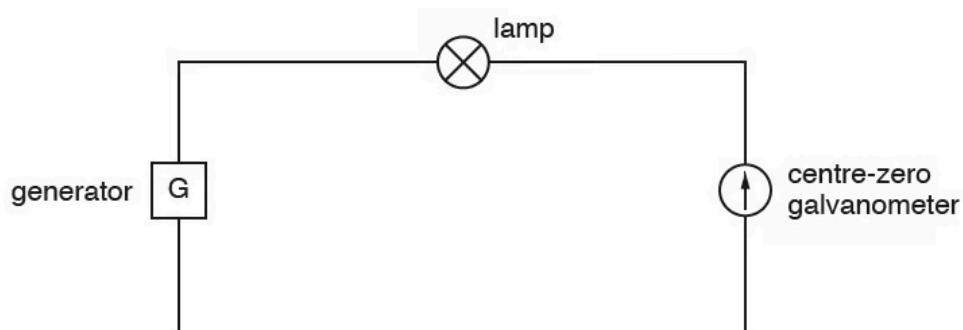


Fig. 11.3

The student observes the galvanometer needle moving from side to side repeatedly.

Explain why the needle moves in this way.

[1 mark]

Question 3a

Fig. 9.1 shows a simple direct current (d.c.) electric motor. The coil rotates about the axis when there is a current in the coil. The coil is connected to the rest of the circuit by the brushes.

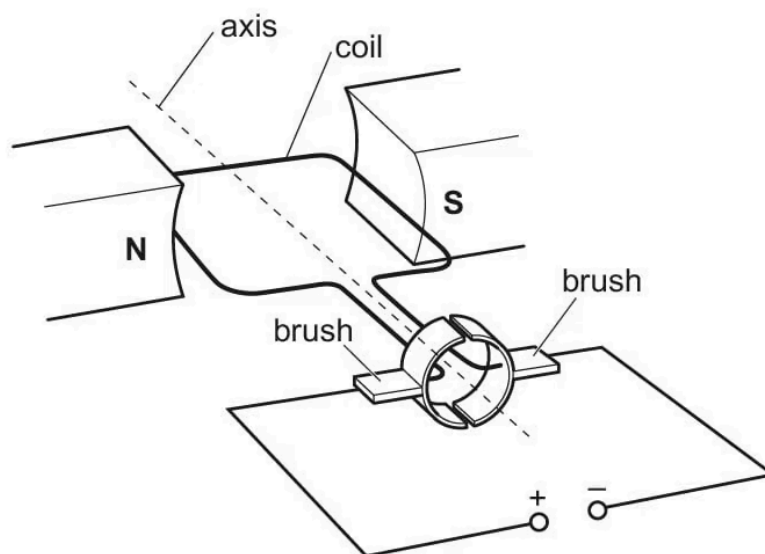


Fig. 9.1

- (i) On Fig. 9.1, draw a pair of arrows to show which way the coil rotates. Explain the direction you have chosen. [3]
- (ii) On Fig. 9.1, draw an arrow to show the direction in which electrons flow through the coil. [1]
- (iii) Explain why the electrons flow in the direction you have shown in **(a)(ii)**. [1]

[5 marks]

Question 3b

State any difference each of the following changes makes to the rotation of the coil in Fig. 9.1:

- (i) changing the polarity of the power supply to that shown in Fig. 9.2

[1]

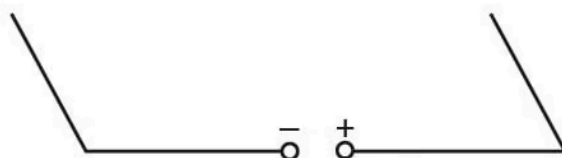


Fig. 9.2

- (ii) changing the coil to the new coil shown in Fig. 9.3

[1]



Fig. 9.3

- (iii) using a stronger magnetic field.

[1]

[3 marks]

Question 4a

A student has a model electric railway. The model railway uses a step-down transformer.

The input voltage is 230 V. The transformer has 1710 turns on the input coil and 90 turns on the output coil.

Calculate the output voltage of the transformer.

output voltage = V
[3 marks]

Question 4b

A step-up transformer is used to increase voltage.

Step-up transformers and step-down transformers have different coil arrangements.

Describe the differences in the coil arrangement for the two types of transformer.

[2 marks]

Question 4c

Explain the advantage of transmitting electricity at high voltages, rather than at low voltages.

[2 marks]

Question 5a

A transformer consists of two coils of wire wound on a metal core. Fig. 10.1 represents the transformer.

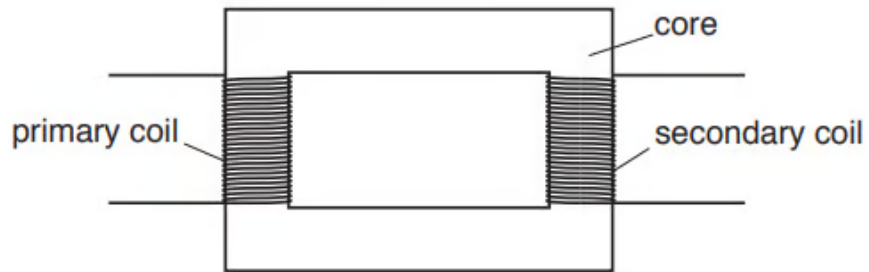


Fig. 10.1

State the name of the metal from which the core is made.

[1 mark]

Question 5b**Extended tier only**

The primary coil of the transformer is connected to the output voltage of an a.c. generator which supplies an alternating current.

- (i) Explain why there is a voltage between the two terminals of the secondary coil. [3]
- (ii) There are 560 turns on the primary coil and 910 turns on the secondary coil of the transformer. The voltage between the two terminals of the secondary coil is 78 V.

Calculate the voltage supplied by the a.c. generator.

generator voltage =[2]

[5 marks]

Question 5c**Extended tier only**

Transformers are used to increase the voltage when electrical energy is transmitted in cables across long distances.

Explain why power losses in the cables are lower when the voltage is high.

[2 marks]