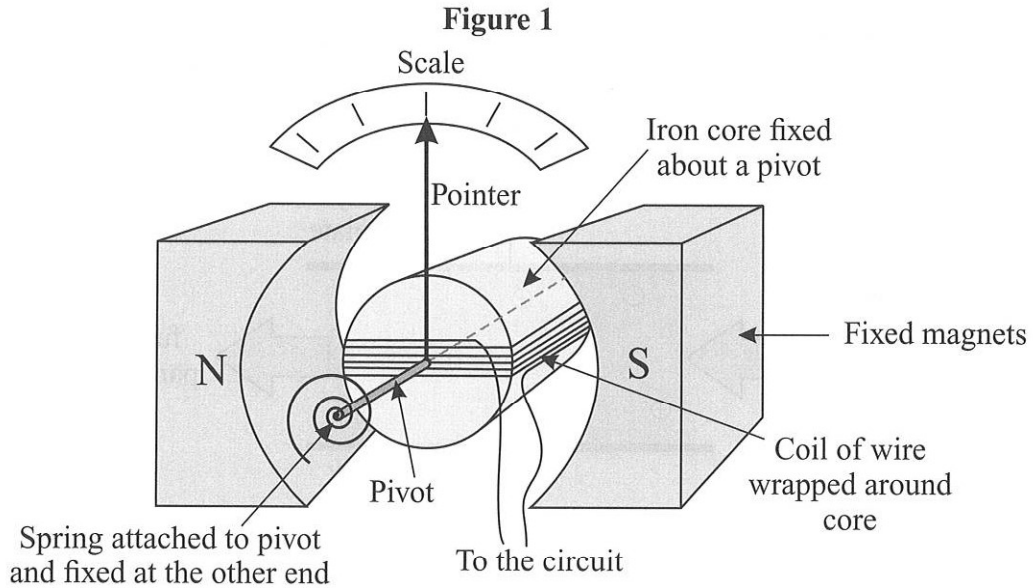


Magnetism and Transformers

- 1 Before digital ammeters were invented, analogue ammeters were used instead. Analogue ammeters are based on a device called a moving-coil galvanometer. The basic design of a moving-coil galvanometer is shown in **Figure 1**.



- a)* Explain how the moving-coil galvanometer could be used to detect a current in the circuit. Include an explanation of what happens when the current is increased, removed and reversed.

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[6]

- b) The length of the side of the coil facing the fixed magnets in **Figure 1** is 25 mm. When the coil carries a current of 2 A, the force on one wire along the side of the coil is 10 mN. Calculate the magnetic flux density of the magnetic field of the permanent magnets. Give the unit.

Magnetic flux density = Unit =

[4]

c) When a student tries to measure a larger current, the pointer moves off the end of the scale. Suggest **two** changes the student could make to the equipment to allow the galvanometer to measure larger currents on the same sized scale.

1.

2.

[2]

[Total 12 marks]

2 Transformers are used in the national grid to change the potential difference and current of the electricity supply.

a) Which combination of potential difference and current should be used in the national grid to transmit electricity efficiently and effectively? Tick **one** box.

- A Low potential difference and high current.
- B Low potential difference and low current.
- C High potential difference and high current.
- D High potential difference and low current.

Explain your answer.

.....

[4]

b) A transformer used in the national grid has 60 000 turns of wire on the primary coil and 45 000 turns of wire on the secondary coil. The input current is 1.2 kA. Calculate the output current. Assume the transformer is 100% efficient.

Current = A

[3]

[Total 7 marks]

Exam Practice Tip

When it comes to sussing out a question with an unfamiliar context, diagrams can be just as handy as the text around them — they can help you visualise a tonne of useful information and even help you make more sense of the text. Take a moment to look over any diagrams and take it all in.

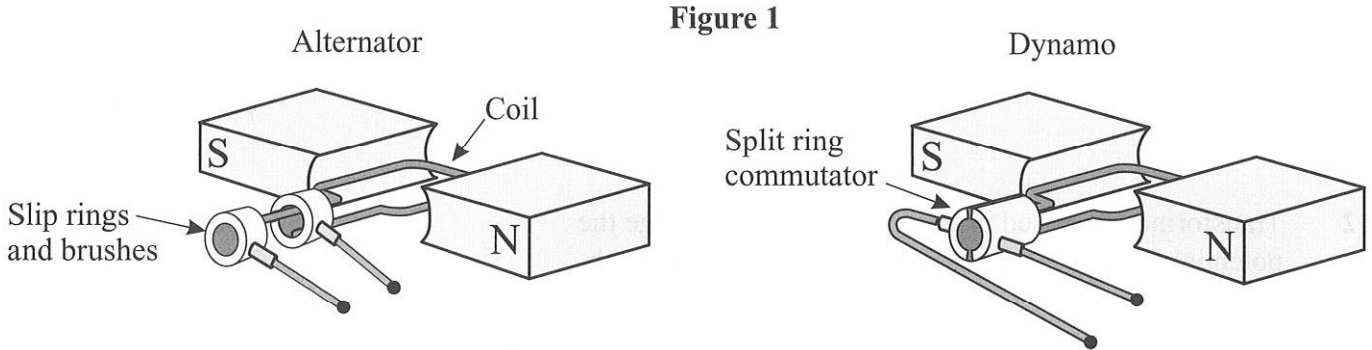
Score:

19



Electromagnetic Induction

- 1 Generators use the principles of the generator effect to produce an electric current. **Figure 1** shows two different types of generator, an alternator and a dynamo.



a)* When the coil is turned each generator produces an electric current. Explain how the generator can be used to produce a current and why the currents produced by the different types of generator are different.

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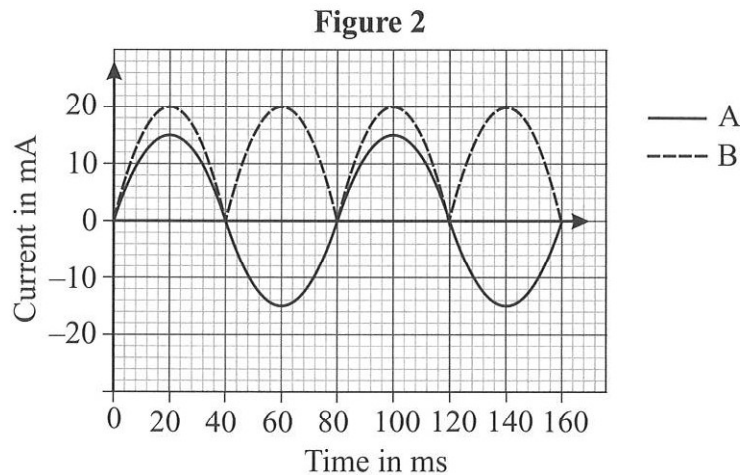
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[6]

Figure 2 shows the output currents from the two different generators.



b) Explain which line on **Figure 2** shows the output current of the alternator.

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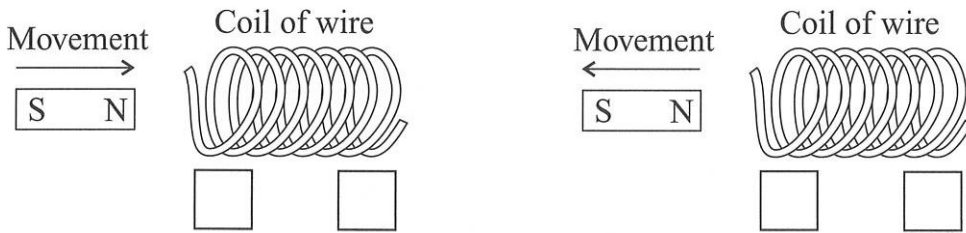
[1]

c) Suggest why generator A produces a higher current than generator B.

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 [1]
 [Total 8 marks]

2 **Figure 3** shows a magnet being moved into a coil of wire, which is part of a complete circuit. A current is induced in the wire. The induced current generates a magnetic field around the coil.

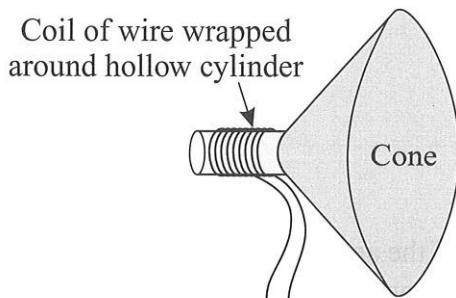
Figure 3



a) In the boxes in **Figure 3**, write N or S to show the North and South poles of the coil in each case. [2]

b) **Figure 4** shows a cone attached to a coil of wire. This can be used as part of a simple intercom system to convert between sound waves and electrical signals. Explain how the equipment in **Figure 4** can be used to convert sound waves into electrical signals.

Figure 4



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[4]
 [Total 6 marks]

Exam Practice Tip

When you answer extended open response questions like 1 (a), you'll get credit for the quality of your writing. Jot down a quick plan before you start writing to make sure you'll cover everything in a logical order. That way your answer will flow well and you'll scoop top marks.

Score:
 14

