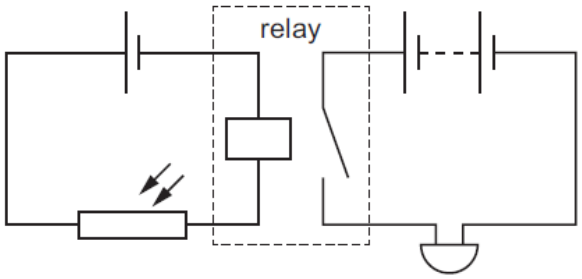
Electromagnetic Induction – 2020 IGCSE 0625

1. March/2020/Paper_12/No.34

The diagram shows a relay being used to control a buzzer.



What is the function of the circuit?

A The buzzer switches off when the circuit becomes cold.

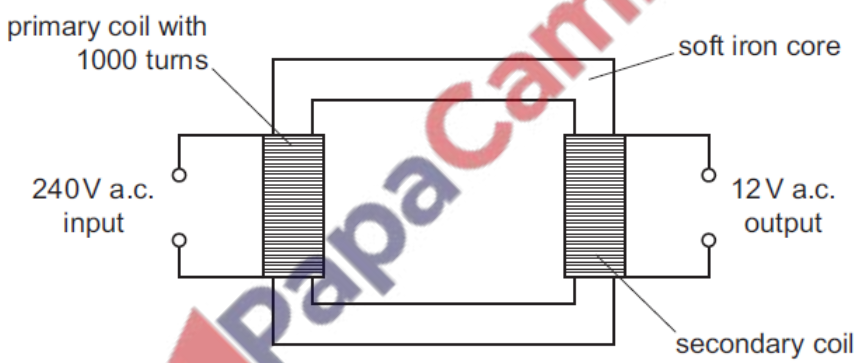
B The buzzer switches off when the circuit becomes light.

C The buzzer switches on when the circuit becomes cold.

D The buzzer switches on when the circuit becomes light.

2. March/2020/Paper_12/No.36

The diagram shows a transformer that has an output voltage of 12 V.

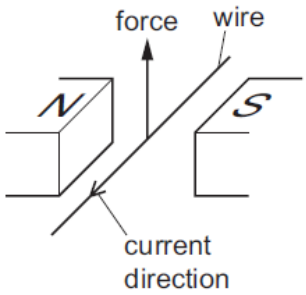


How many turns of wire are in the secondary coil?

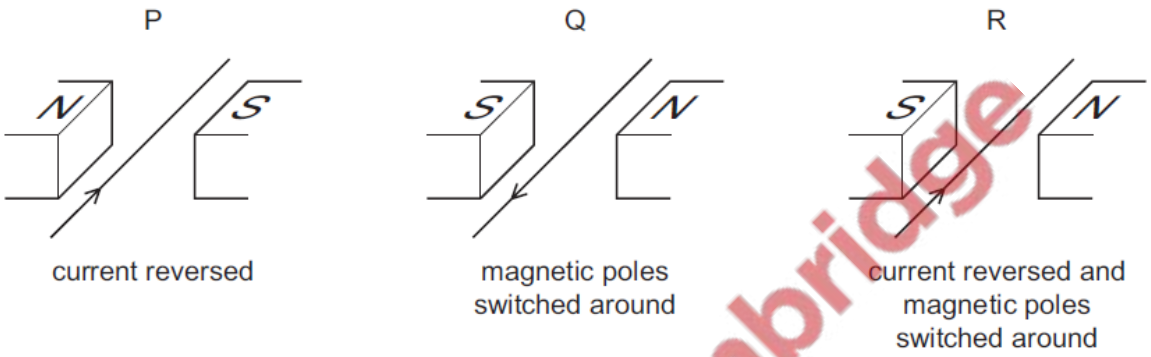
A 12 **B** 20 **C** 50 **D** 20 000

3. March/2020/Paper_12/No.37

A current-carrying conductor is placed between two magnetic poles. The current causes a force to act on the wire.



Three other arrangements P, Q and R, of the wire and magnetic poles are set up as shown.

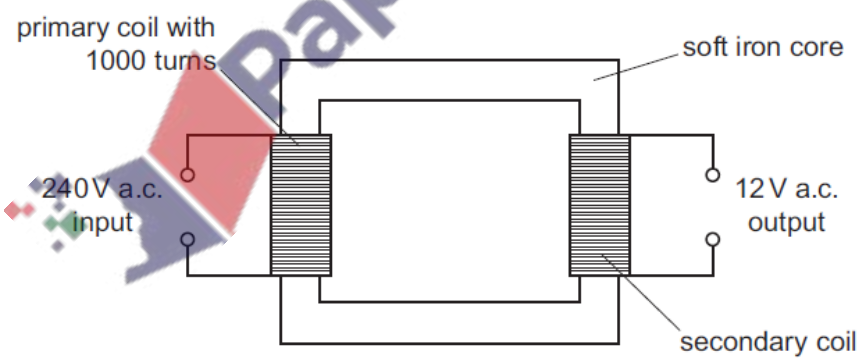


Which arrangements will cause a force in the opposite direction to that shown in the top diagram?

A P, Q and R **B** P and Q only **C** P only **D** R only

4. March/2020/Paper_22/No.36

The diagram shows a transformer that has an output voltage of 12 V.



How many turns of wire are in the secondary coil?

A 12 **B** 20 **C** 50 **D** 20 000

5. March/2020/Paper_42/No.10

(a) 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]

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

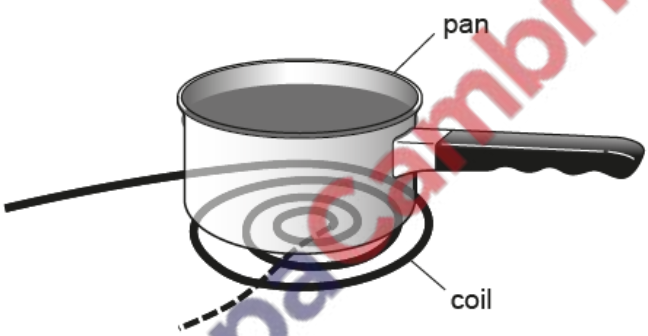


Fig. 10.2

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

..... [1]

(c) 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]

[Total: 6]

6. June/2020/Paper_11/No.35

A transformer has 200 turns on its primary coil and is connected to a 240 V a.c. supply.

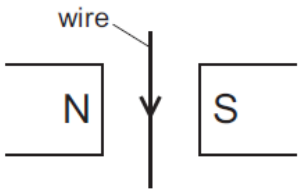
The output voltage of the transformer is 60 V a.c..

How many turns are on the secondary coil of the transformer?

A 20 **B** 50 **C** 72 **D** 800

7. June/2020/Paper_11/No.36

A conducting wire is placed between the poles of a magnet. When an electric current in the wire is in the direction shown, then the force on the wire acts out of the page.



Three statements of different conditions and how the wire is affected are given.

1 The current is towards the top of the page and the direction of the magnetic field is unchanged then the force produced acts into the page.

2 The current is towards the bottom of the page and the magnetic field is reversed then the force produced acts into the page.

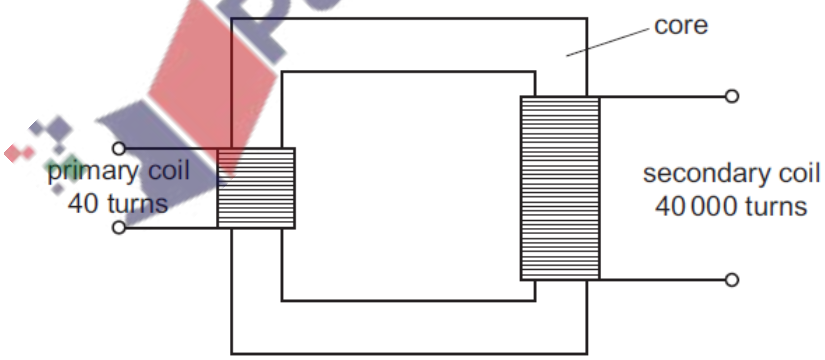
3 The current in the wire is alternating and the wire vibrates into and out of the page.

Which statements are correct?

A 1 and 2 only **B** 1 and 3 only **C** 2 and 3 only **D** 1, 2 and 3

8. June/2020/Paper_12/No.36

The diagram shows a transformer.



Which statement about this transformer is correct?

A It can operate from a 12 V battery.

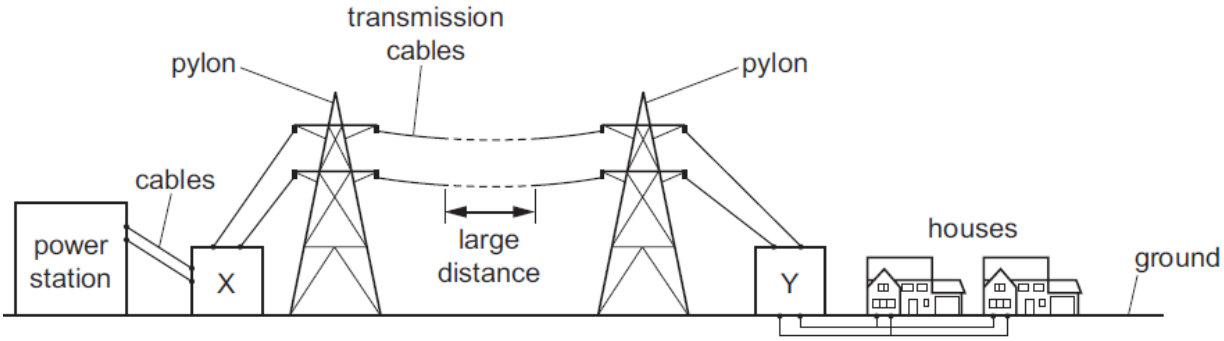
B It has a core which is made of steel.

C It steps the input voltage up by a factor of 1000.

D It steps the input voltage down by a factor of 1000.

9. June/2020/Paper_13/No.36

The diagram represents the transmission of electricity from a power station to homes that are many kilometres away. Two transformers are labelled X and Y.



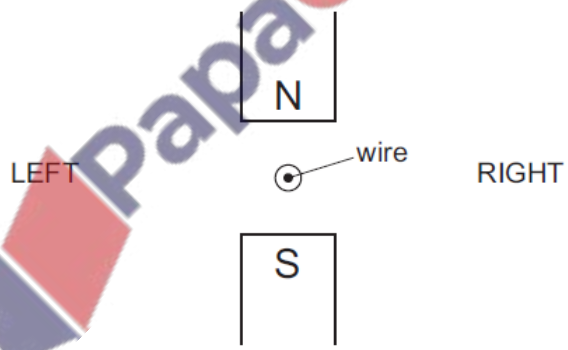
What type of transformers are X and Y?

	X	Y
A	step-down transformer	step-down transformer
B	step-down transformer	step-up transformer
C	step-up transformer	step-down transformer
D	step-up transformer	step-up transformer

10. June/2020/Paper_21/No.34

The diagram shows a wire between the poles of a magnet.

The wire is perpendicular to the page.



The wire is moved and a current is induced upwards, out of the paper.

In which direction is the wire moved?

A left to right

B right to left

C up the page

D down the page

11. June/2020/Paper_21/No.35

A 100% efficient transformer converts a 240 V input voltage to a 12 V output voltage. The output power of the transformer can be a maximum of 20 W.

The output is connected to two 0.30 A bulbs in parallel. One of the bulbs fails.

How does the current in the primary coil change?

A It decreases by 0.30 A.

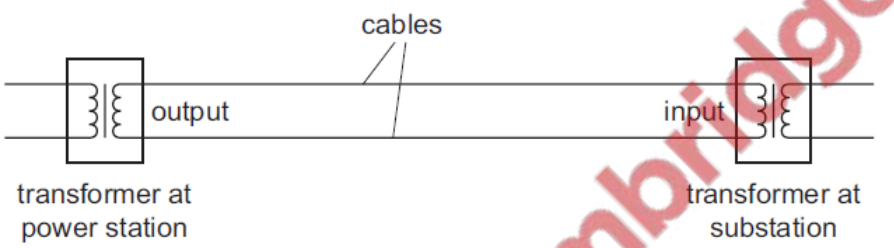
B It decreases by 0.015 A.

C It increases by 0.15 A.

D It remains unchanged.

12. June/2020/Paper_21/No.36

Cables transmit electrical power from the output of the transformer at a power station to the input of the transformer at a substation.



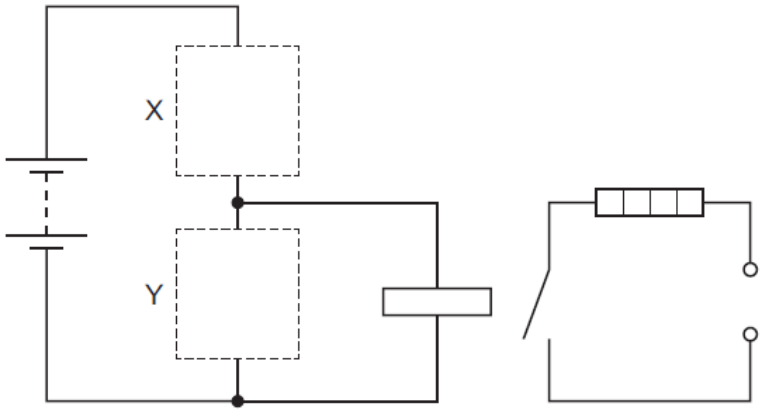
The power at the output of the transformer at the power station is 400 MW.

Which situation delivers the most power to the input of the transformer at the substation?

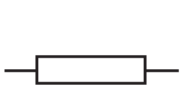
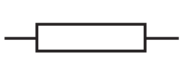
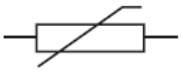
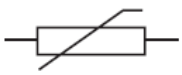
	potential difference at power station transformer output / kV	diameter of cables
A	200	large
B	200	small
C	400	large
D	400	small

13. June/2020/Paper_22/No.34

The diagram shows a circuit used to switch on a heater when the temperature drops below a certain value.



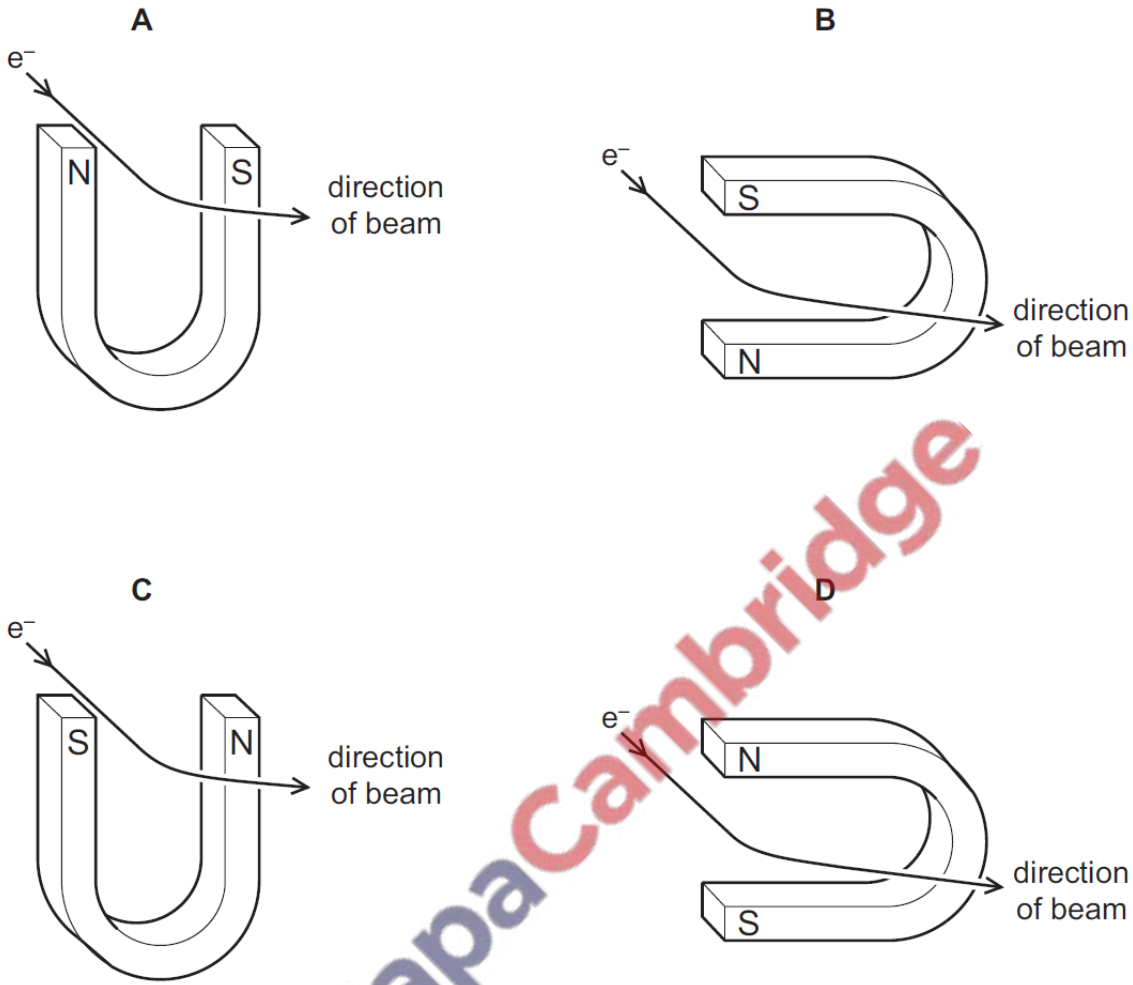
Which row shows the components that should be connected at X and at Y?

	X	Y
A		
B		
C		
D		

14. June/2020/Paper_22/No.36

A beam of electrons is passed through the magnetic field of a magnet.

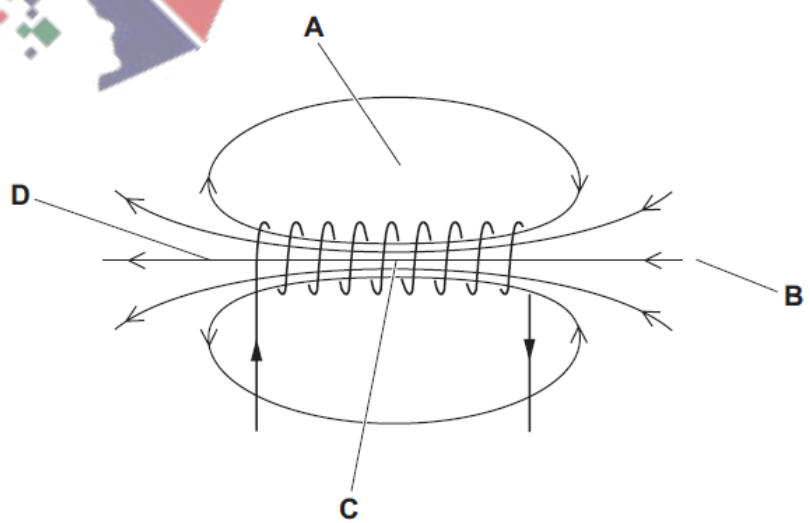
How must the magnet be positioned to deflect the beam in the direction shown?



15. June/2020/Paper_22/No.35

The diagram shows the magnetic field due to a current in a solenoid.

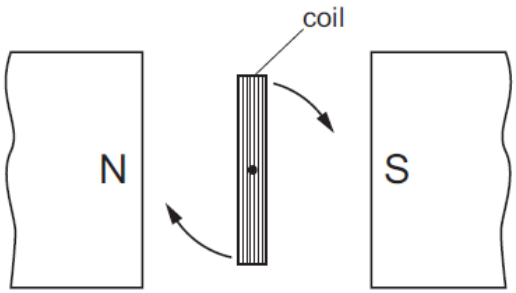
Where is the magnetic field the strongest?



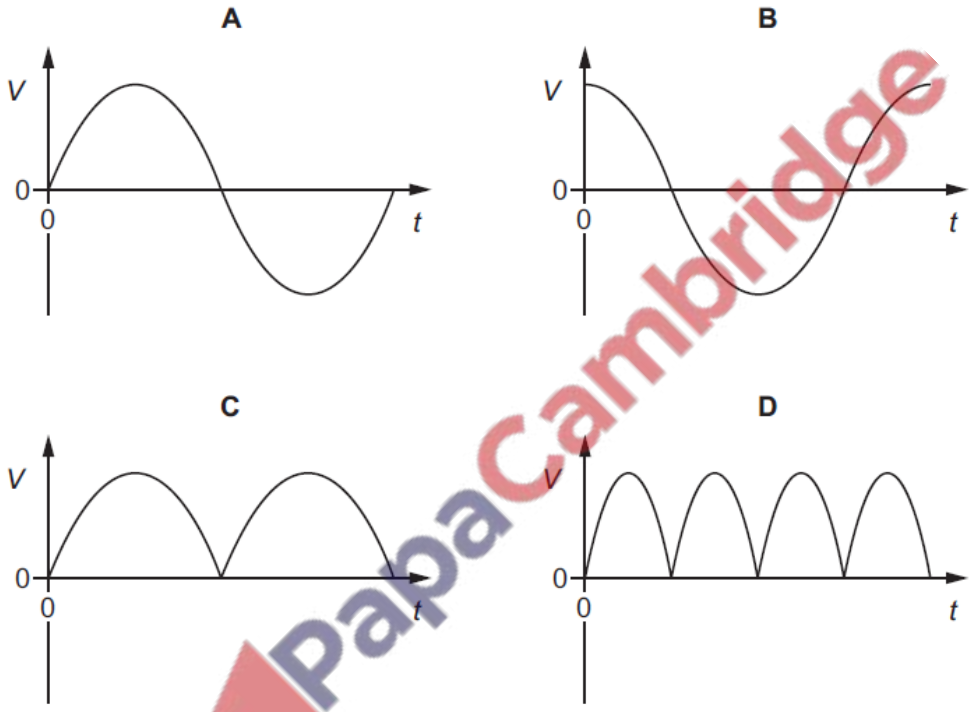
16. June/2020/Paper_23/No.36

The coil of a simple a.c. generator rotates steadily in a uniform magnetic field.

The diagram shows the position of the coil at time $t = 0$.



Which graph shows the output voltage for one revolution of the coil?



17. June/2020/Paper_31/No.11(b)

(b) The power supply circuit includes a transformer. Its input voltage is 240 V. There are 960 turns on the input coil and 64 turns on the output coil.

Calculate the output voltage of the transformer.

output voltage = ... V [3]

18. June/2020/Paper_32/No.11

A model train uses an electric motor. The motor has a coil of wire in a magnetic field.

(a) Fig. 11.1 shows a coil of wire in a magnetic field.

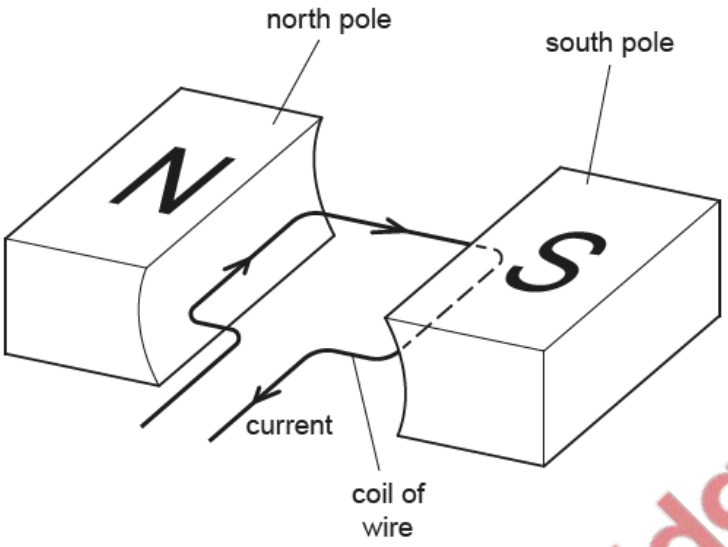


Fig. 11.1

Describe **two** ways of increasing the turning effect on the coil.

.....

..... [2]

(b) The motor for the model train uses an alternating voltage of 12 V. This is supplied by the secondary coil of a transformer.

The primary coil of the transformer is connected to a mains voltage of 240 V.

The primary coil has 900 turns.

Calculate the number of turns on the secondary coil.

number of turns on the secondary coil = ... [3]

[Total: 5]

19. June/2020/Paper_42/No.7

(a) A student makes a transformer that uses an alternating current (a.c.) supply with an electromotive force (e.m.f.) of 12.0 V to induce an output potential difference (p.d.) of 2.0 V.

The student is provided with two lengths of insulated wire and the U-shaped piece of iron shown in Fig. 7.1.

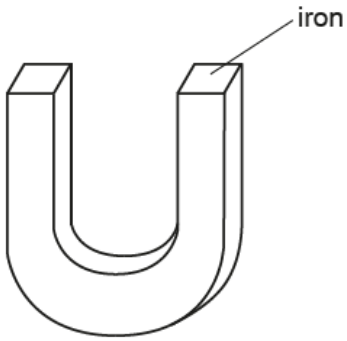


Fig. 7.1

(i) Complete and label Fig. 7.1 to show the transformer connected to the supply and the output from the transformer. [3]

(ii) Explain the function of the piece of iron in the transformer.

.....

.....

..... [2]

(iii) The output of the transformer is connected to a lamp. The current in the lamp is 100 mA. The transformer is 100% efficient.

Calculate the input current to the transformer.

current = ... [2]

(b) Another transformer is used in a school laboratory to step down a mains supply with a p.d. of 110 V to 12 V. This transformer is mounted in a metal case.

State and explain an essential safety feature required for this arrangement.

.....

..... [2]

[Total: 9]

20. June/2020/Paper_43/No.9

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.

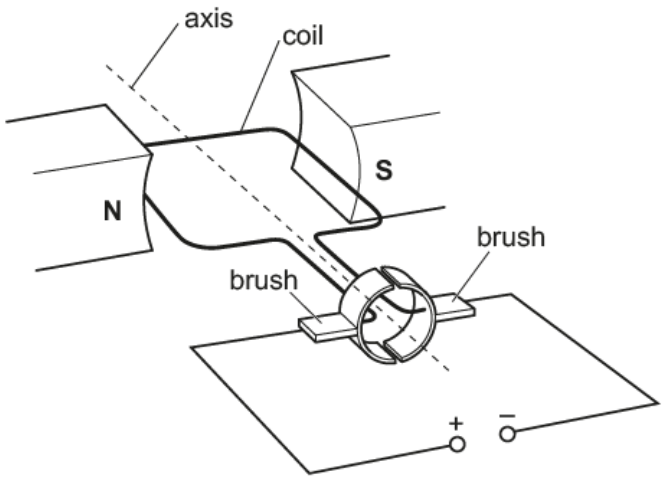


Fig. 9.1

(a) (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]

(b) 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

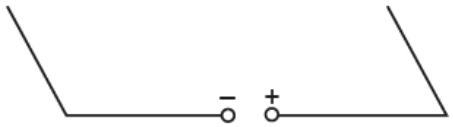


Fig. 9.2

..... [1]

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

Fig. 9.3

..... [1]

(iii) using a stronger magnetic field.

..... [1]

[Total: 8]