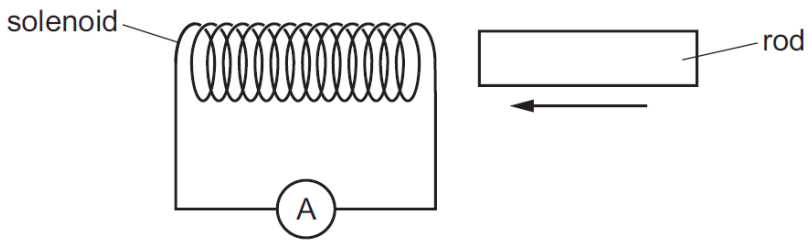
Electromagnetic Induction – 2021 IGCSE 0625

1. June/2021/Paper_11,12,13,21,22&23/No.34,35

A solenoid is connected to a very sensitive ammeter. A rod is inserted into one end of the solenoid. The ammeter shows that there is a small electric current in the solenoid while the rod is moving.



Which rod is being inserted?

A a heated copper rod

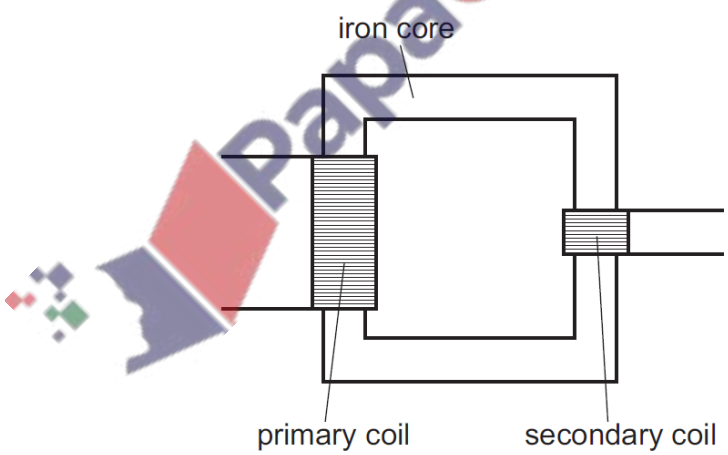
B a magnetised steel rod

C an uncharged nylon rod

D a radioactive uranium rod

2. June/2021/Paper_11&21/No.35.36

The diagram shows a transformer. There are 460 turns on the primary coil and 24 turns on the secondary coil. The primary voltage is 230 V.



What is the secondary voltage?

A 2.0 V **B** 12 V **C** 48 V **D** 4400 V

3. June/2021/Paper_11/No.36

A class is designing a d.c. motor. To achieve a greater turning effect, three suggestions are made.

1 Have a larger current in the coil of the motor.

2 Have a stronger magnet in the motor.

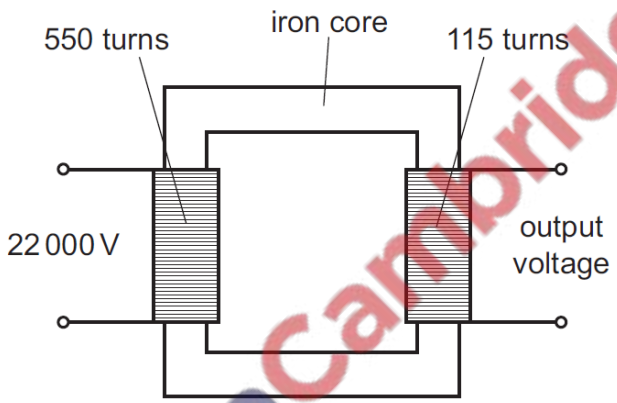
3 Put a larger number of turns on the coil.

Which suggestions will help to increase the turning effect?

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

4. June/2021/Paper_12&22/No.35,36

The diagram shows a transformer.

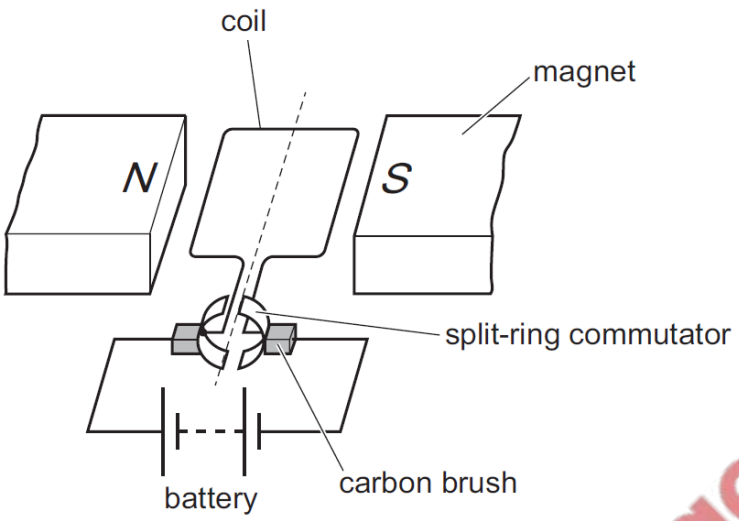


What is the output voltage?

A 0.35 V **B** 2.9 V **C** 4600 V **D** 105 000 V

5. June/2021/Paper_12/No.36

The diagram shows a d.c. motor.



Which two changes together will always make the coil spin more slowly?

A Decrease the current in the coil and use a magnet of less strength.

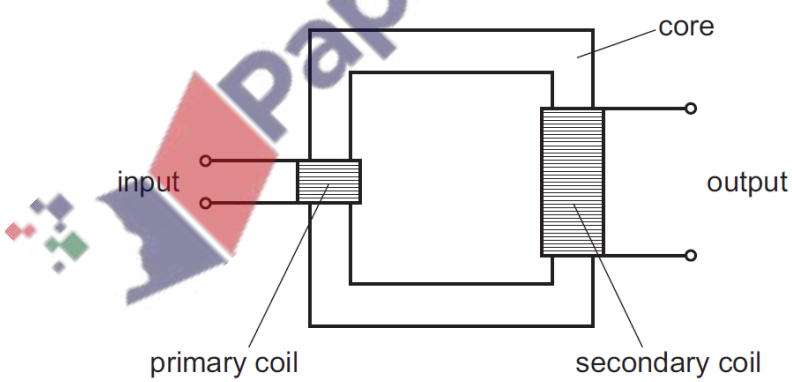
B Decrease the current in the coil and increase the number of turns on the coil.

C Increase the current in the coil and use a magnet of less strength.

D Increase the current in the coil and decrease the number of turns on the coil.

6. June/2021/Paper_13/No.35

The diagram shows a transformer with more turns on the secondary coil than on the primary coil.



Which row is correct?

	material of core	material of coils	type of transformer
A	copper	iron	step-up
B	copper	iron	step-down
C	iron	copper	step-up
D	iron	copper	step-down

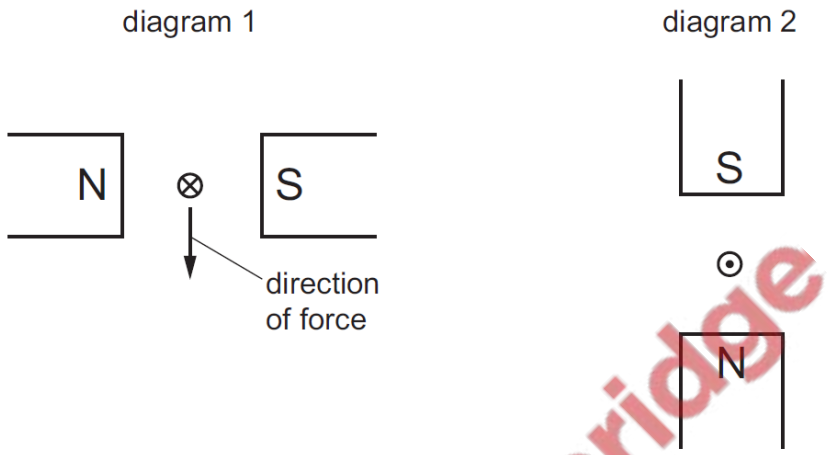
7. June/2021/Paper_13/No.36

Diagram 1 shows a wire carrying an electric current into the page.

The wire is between the poles of a magnet.

A force is produced on the wire acting down towards the bottom of the page.

Diagram 2 shows the situation after the current is reversed and the magnet is turned through 90°.



In which direction does the force act after these changes?

A towards the top of the page

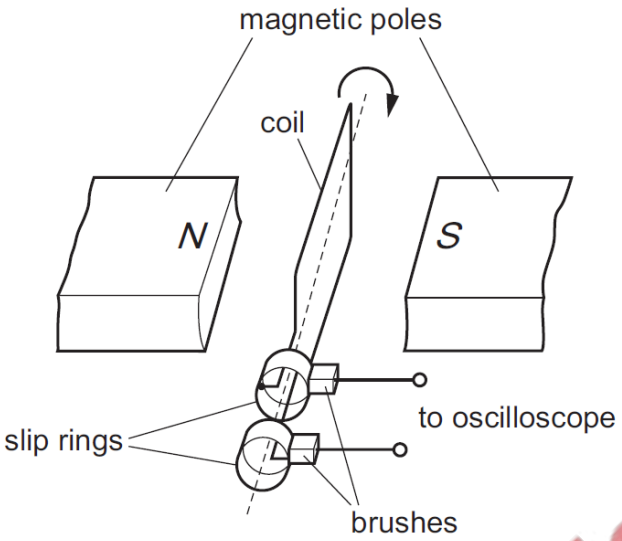
B towards the bottom of the page

C towards the left-hand side of the page

D towards the right-hand side of the page

8. June/2021/Paper_21/No.35

The diagram shows an electric generator with the coil in a vertical position.



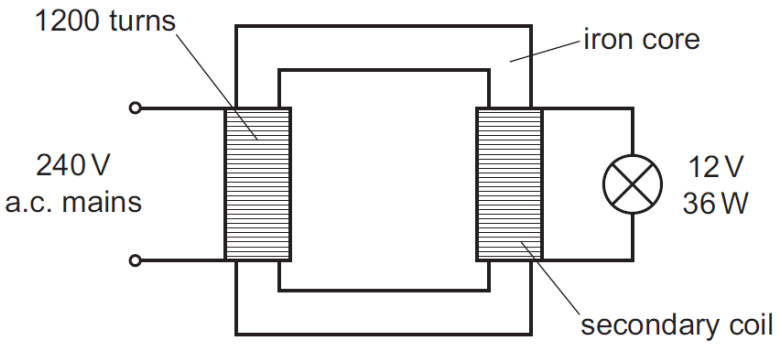
Which row describes the generator?

	the generator produces	the voltage output will be zero when
A	a.c.	the coil is horizontal
B	a.c.	the coil is vertical
C	d.c.	the coil is horizontal
D	d.c.	the coil is vertical

9. June/2021/Paper_23/No.35

A 12 V, 36 W lamp shines at normal brightness when connected to a mains transformer.

Assume the transformer is 100% efficient.

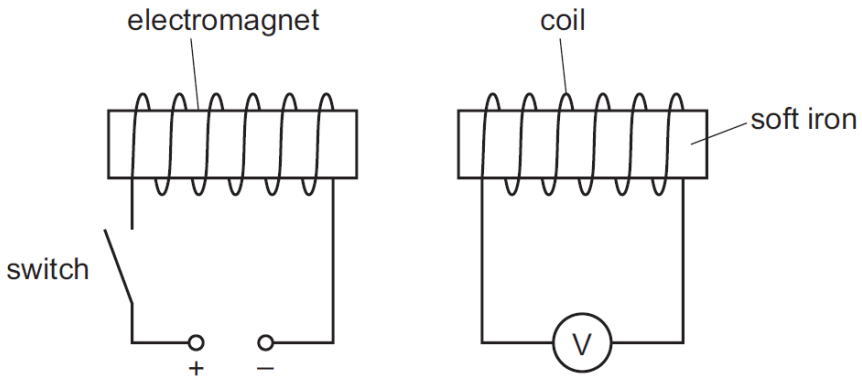


Which row shows the number of turns in the secondary coil and the current in the mains wires?

	number of turns in secondary coil	current in the mains wire / A
A	60	0.15
B	60	3.0
C	180	0.15
D	180	3.0

10. March/2021/Paper_12&22/No.35

The diagram shows an electromagnet near a coil of wire connected to a voltmeter. The reading on the voltmeter is zero.



The switch is closed. The electromagnet magnetises quickly.

What happens to the reading on the voltmeter?

A It keeps increasing.

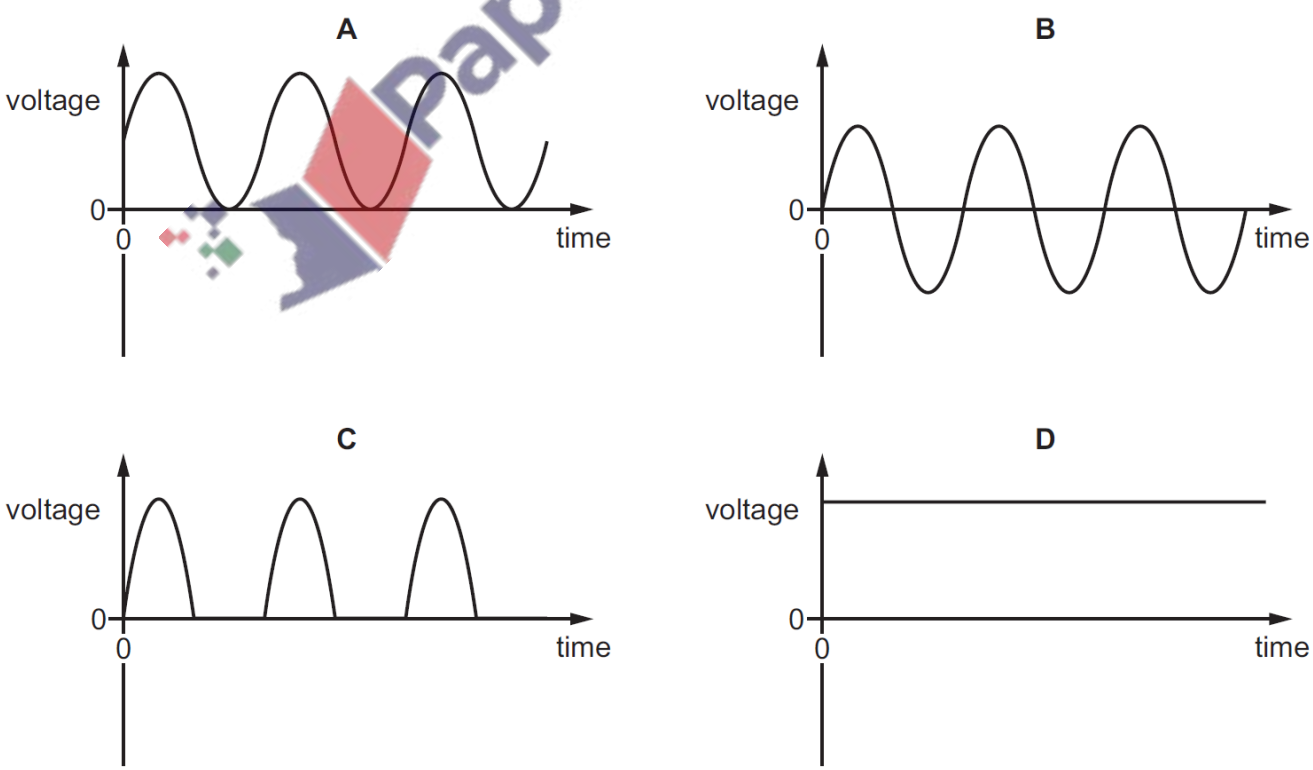
B It quickly increases and stays at maximum.

C It quickly increases and then decreases.

D It stays on zero.

11. March/2021/Paper_12/No.36

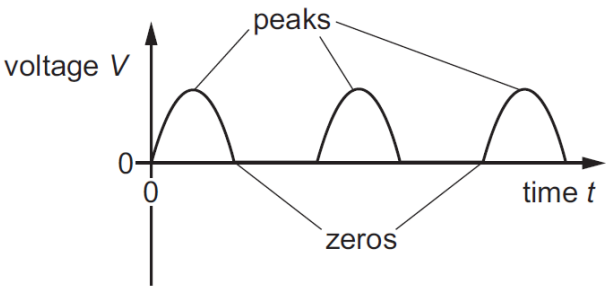
Which diagram represents the voltage output of a simple a.c. generator?



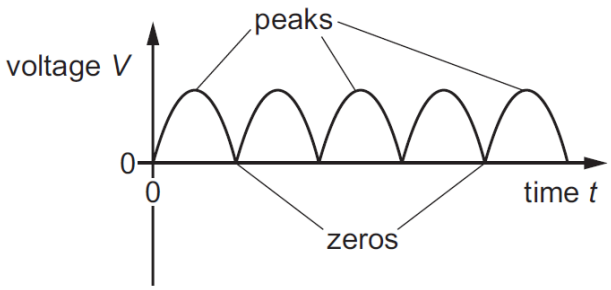
12. March/2021/Paper_22/No.37

Which graph shows the voltage output of an a.c. generator with the peaks and zeros correctly labelled?

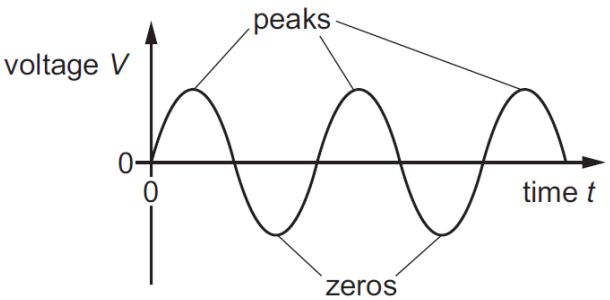
A



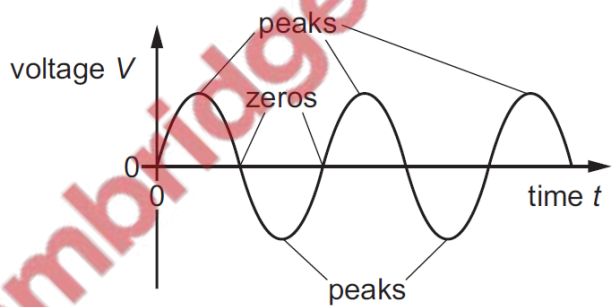
B



C



D



13. June/2021/Paper_31/No.11

A student uses a coil and a magnet on a spring to generate an electromotive force (e.m.f.) that varies. He suspends the magnet above a coil as shown in Fig. 11.1.

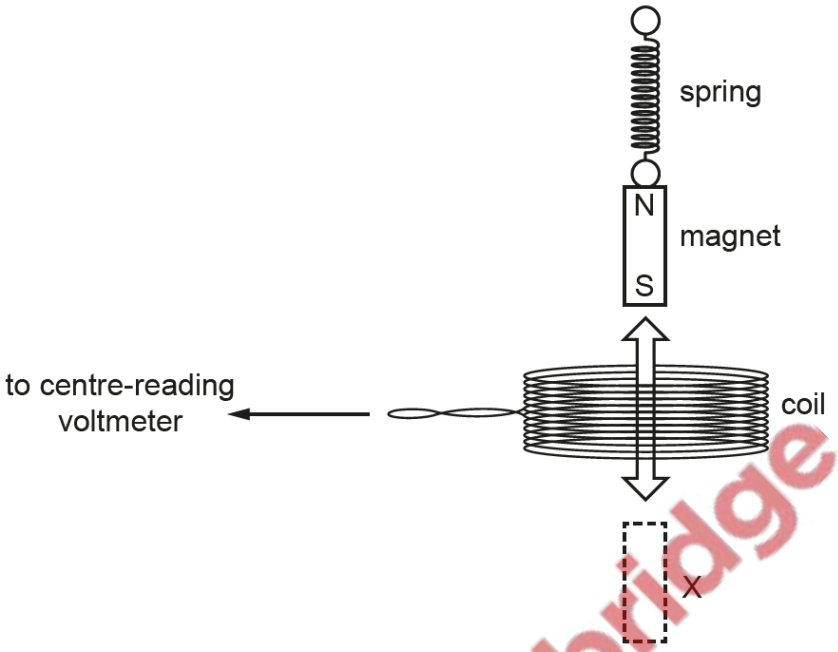


Fig. 11.1

(a) The student pulls the magnet through the coil to X and then releases it. The magnet moves up and down through the coil.

State the type of voltage induced in the coil. Tick (✓) **one** box.

alternating ☐

digital ☐

direct ☐

[1]

(b) State **two** ways of increasing the voltage induced in the coil.

1. .....

2. .....

[2]

[Total: 3]

14. June/2021/Paper_32/No.10

Fig. 10.1 shows an electric screwdriver which has an electric motor and a battery.

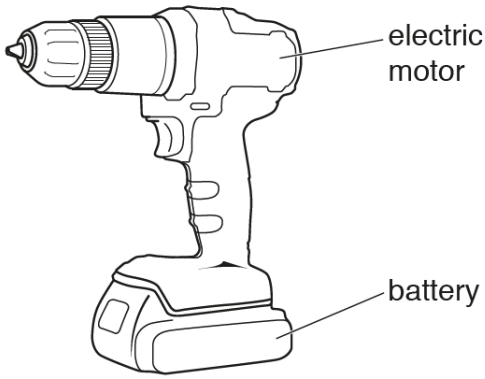


Fig. 10.1

(a) **(i)** The electric motor has a current-carrying coil in a magnetic field. The screwdriver's manufacturer decides that the turning effect of the coil is too small.

State **three** ways of increasing the turning effect of the coil.

1. .....

2. .....

3. .....

[3]

(ii) The coil in the motor can rotate in either direction.

State what happens in the coil to reverse the direction of rotation.

..... [1]

(b) The battery is charged using a transformer connected to an a.c. power supply.

The primary voltage V_p to the transformer is 234 V and the secondary voltage V_s of the transformer is 18 V.

The number of turns on the primary coil N_p is 2470 turns.

Calculate the number of turns on the secondary coil N_s.

N_s = ... [3]

[Total: 7]

15. June/2021/Paper_41/No.7

Fig. 7.1 represents an alternating current (a.c.) generator.

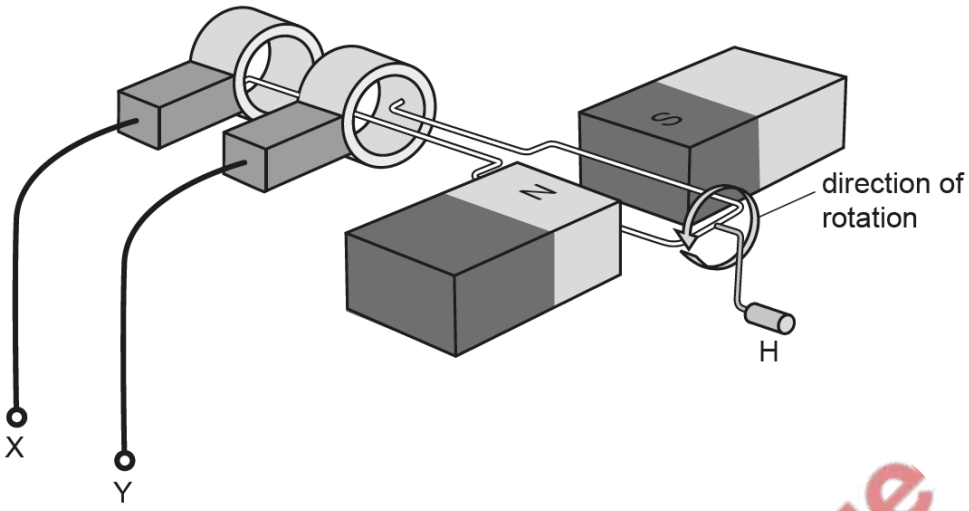


Fig. 7.1

(a) A student rotates the handle H, as shown in Fig. 7.1.

(i) On Fig. 7.2, sketch a graph to show how the electromotive force (e.m.f.) between terminals X and Y varies with time during **two** complete revolutions of the coil.

Fig. 7.2

[3]

(ii) On Fig. 7.2, mark and label a point P, for the e.m.f. when the coil is horizontal, as shown in Fig. 7.1. [1]

(iii) The student turns the handle more quickly.

State **two** ways in which the e.m.f. between terminals X and Y changes.

1. .....

2. .....

[2]

(b) Terminals X and Y are connected to the primary coil of a transformer.

State and explain what happens in the transformer as the student turns the handle of the a.c. generator.

.....

.....

.....

..... [3]

(c) Explain why the power losses in transmission cables are lower when electrical energy is transmitted at higher voltages.

.....

.....

..... [2]

[Total: 11]

16. June/2021/Paper_42/No.8(b)

(b) Fig. 8.3 shows a simple direct current (d.c.) electric motor with a split-ring commutator.

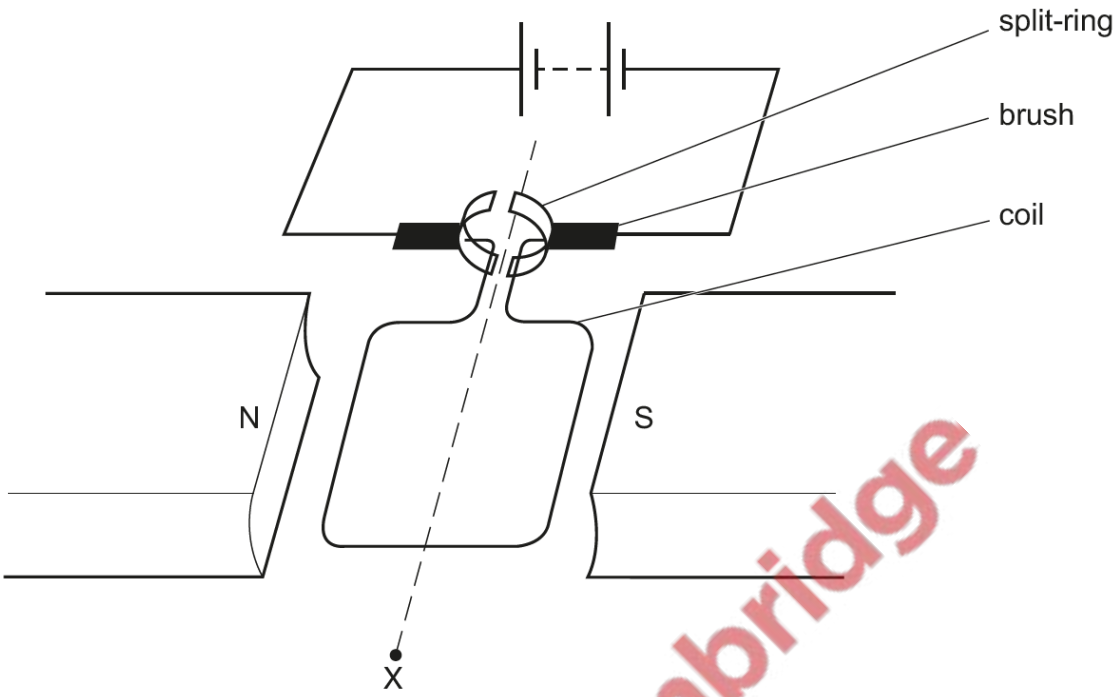


Fig. 8.3

(i) State and explain the direction of rotation of the coil as seen from point X.

statement .....

explanation .....

..... [3]

(ii) The coil rotates through 90° from the position shown.

State what happens to the moment in this position.

..... [1]

(iii) The coil is rotated through 180° from the position shown. By considering the forces on the coil, explain how the split-ring commutator enables the motor to turn continuously.

.....

..... [2]

[Total: 10]

17. June/2021/Paper_43/No.9

(a) An X-ray machine requires a supply of 110 kV. The mains electricity supply is 230 V. A transformer is used to supply the correct voltage to the X-ray machine. There are 50 turns on the primary coil of the transformer.

Calculate the number of turns on the secondary coil.

number of turns = ... [2]

(b) Draw a labelled diagram of a step-down transformer. On the labels, state a suitable material for each of the components.

[3]

(c) Explain how a transformer operates.

.....

.....

.....

..... [3]

[Total: 8]

18. March/2021/Paper_32/No.10

A student uses a laptop computer. The student notices that the cable connecting the power adapter for a laptop to the mains electricity supply is damaged as shown in Fig. 10.1.

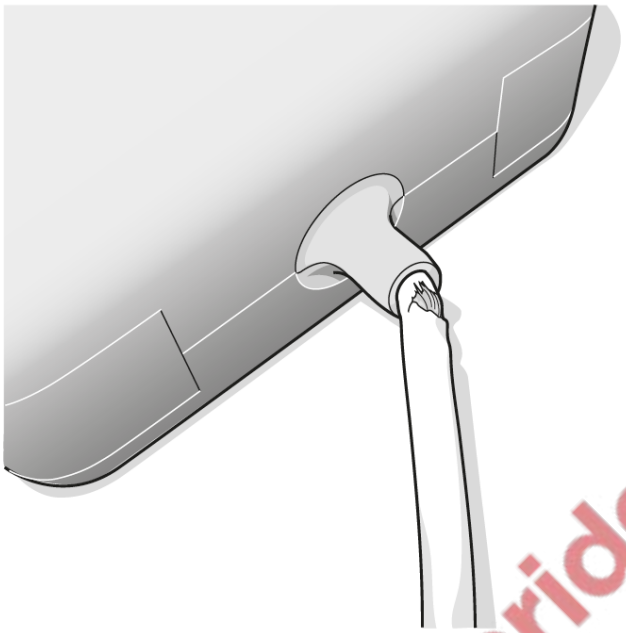


Fig. 10.1

(a) State the hazard of using mains equipment with damaged insulation.

..... [1]

(b) Describe how a fuse protects a mains electrical appliance.

.....

.....

..... [3]

(c) The laptop computer uses a transformer to change the voltage of the mains electricity supply.

The input (primary) voltage is 120 V.

The input (primary) coil has 2000 turns and the output (secondary) coil has 200 turns.

Calculate the output (secondary) voltage from the transformer.

output (secondary) voltage = ... V [3]

(d) State the name of the material used in the core of the transformer.

..... [1]

[Total: 8]

19. March/2021/Paper_42/No.7

Fig. 7.1 shows a horizontal conducting wire XY between two opposite magnetic poles. Wire XY forms a circuit with an ammeter.

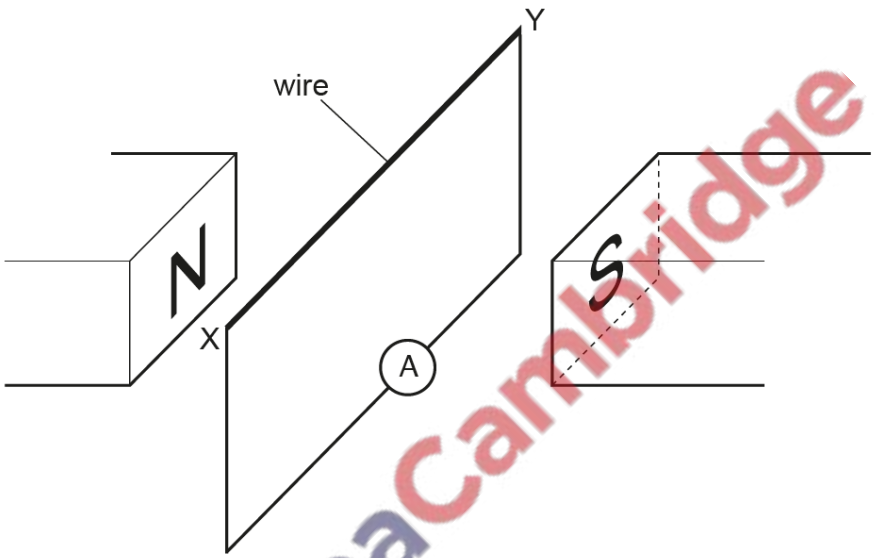


Fig. 7.1

(a) Explain why the reading on the ammeter is zero when the wire XY is not moving.

.....

..... [1]

(b) The wire XY is moved and there is a deflection on the ammeter that indicates there is a current in the wire from X to Y.

On Table 7.1, tick **one** box to indicate the direction of the movement of the wire XY and explain your answer.

Table 7.1

into page	out of page	to the left	to the right	to the bottom of the page	to the top of the page

explanation .....

.....

.....

[3]

(c) State what is observed on the ammeter when the wire XY is moved

(i) in the opposite direction to part **(b)** ..... [1]

(ii) in the same direction as part **(b)** but at a greater speed ..... [1]

[Total: 6]