

5: Electromagnetism – Topic questions

Paper 4

The questions in this document have been compiled from a number of past papers, as indicated in the table below.

Use these questions to formatively assess your learners' understanding of this topic.

Question	Year	Series	Paper number
8	2016	June	41
8	2016	June	42
10	2016	November	41

The mark scheme for each question is provided at the end of the document.

You can find the complete question papers and the complete mark schemes (with additional notes where available) on the School Support Hub at www.cambridgeinternational.org/support

- 8 (a) Two straight, vertical wires X and Y pass through holes in a horizontal card.

Fig. 8.1 shows the card viewed from above.



Fig. 8.1

There is a current in each wire in a downward direction (into the page).

- (i) The magnetic field at Y due to the current in X produces a force on Y.

Place a tick in each blank column of the table to indicate the direction of this magnetic field and the direction of the force.

	magnetic field at Y	force on Y
towards the top of the page		
towards the bottom of the page		
to the left		
to the right		
into the page		
out of the page		

[2]

- (ii) State and explain whether there is also a force on wire X.

.....
.....

[1]

- (b) Fig. 8.2 shows a d.c. supply connected to the input of a transformer.

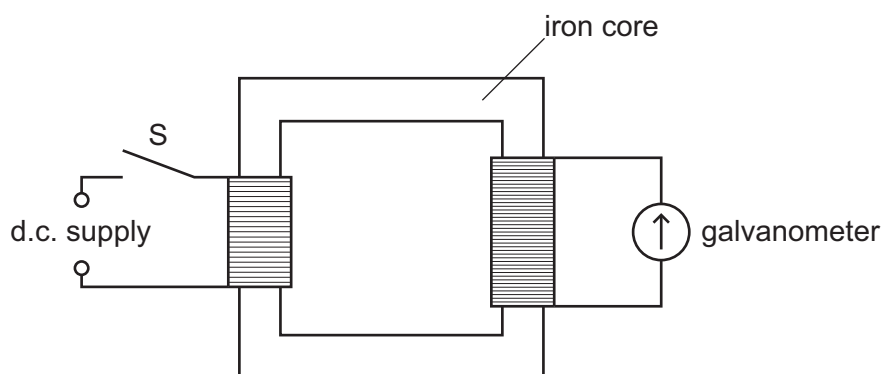


Fig. 8.2

When switch S is first closed, the needle of the galvanometer deflects briefly, then returns to zero.

Explain why the brief deflection occurs.

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.....
.....

[3]

[Total: 6]

- 8 (a) Fig. 8.1 shows a coil wound around a steel bar that is initially unmagnetised.

Any appropriate power supply can be connected between the terminals A and B. No other apparatus is available.

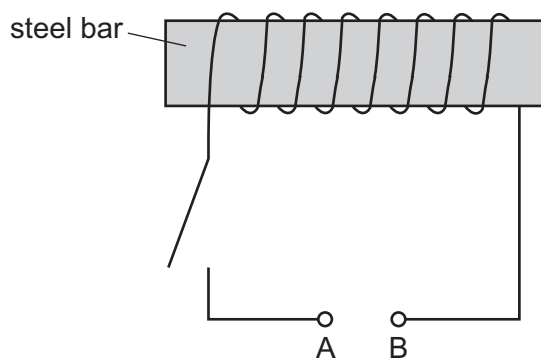


Fig. 8.1

Describe

- how the steel bar can be magnetised,
- how the steel bar can then be demagnetised.

magnetised:

.....

.....

demagnetised:

.....

.....

[4]

(b) Fig. 8.2 shows a transformer.

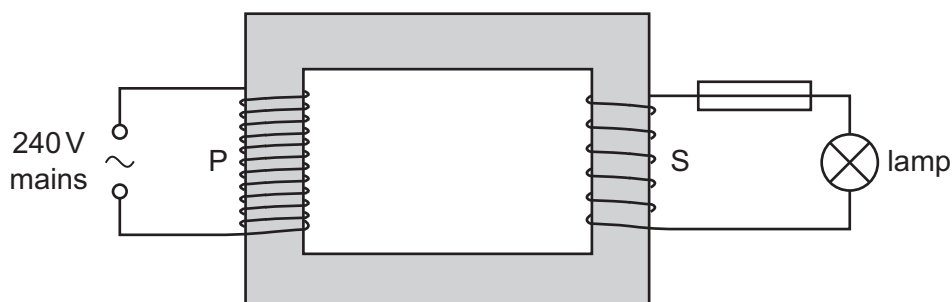


Fig. 8.2

A 240 V mains supply is connected to the primary coil P. The voltage across the secondary coil S is 12 V. A lamp, in series with a 3.0 A fuse, is connected to S.

The number of turns in the coils of the transformer is not shown accurately in Fig. 8.2.

Predict, with a suitable calculation, whether the fuse blows when there is a current of 0.20 A in the primary coil.

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[3]

[Total: 7]

- 10 Fig. 10.1 shows a wire AB suspended on two supports so that it is between the poles of a strong magnet.

The wire AB is loosely held so that it is free to move.

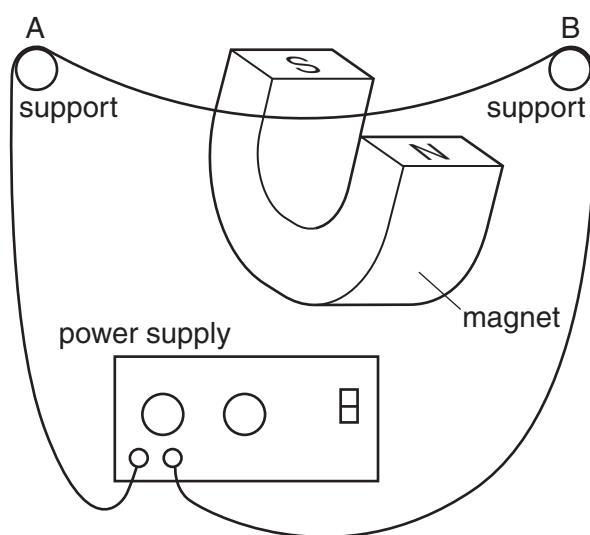


Fig. 10.1

Describe and explain any movement of the wire AB when there is

- (a) a large direct current (d.c.) in the wire in the direction from A to B,

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.....[3]

- (b) a large alternating current (a.c.) in the wire.

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.....[2]

[Total: 5]

Question	Answer	Mark
8 (a) (i)	Magnetic field at Y: 'towards the bottom of the page' ticked Force at Y: 'to the left' ticked	B1 B1
8 (a) (ii)	There is a force on X because of the (magnetic) field caused by Y OR due to the (magnetic) field around / of Y OR the (magnetic) fields due to X and Y interacting	B1
8 (b)	Change in current / field is brief / for short time / occurs as switch closes Changing magnetic field / flux links with secondary coil / other coil / core OR field / flux lines cut coil Causes induced voltage / current	B1 B1 B1
		Total: 6
8 (a)	connect d.c. supply (to terminals / circuit) switch on connect a.c. supply (to terminals / circuit) withdraw rod from solenoid / reduce current	B1 B1 M1 A1
8 (b)	$I_p V_p = I_s V_s$ OR ($I_s =$) $I_p V_p / V_s$ ($0.2 \times 240 / 12 =$) 4.0 (A) fuse blows / does not blow	C1 A1 B1
		Total: 7
10 (a)	(Wire) moves vertically or down (page) Moves up (page) OR Magnetic field is into the page OR (Fleming's) left hand-rule applies	C1 A1 B1
10 (b)	Moves up and down (page) / vibrates up and down (page) (Vertical) force on wire alternates OR due to interaction of field of magnet and alternating field (of current)	B1 B1
		Total: 5

Notes about the mark scheme are available separately.