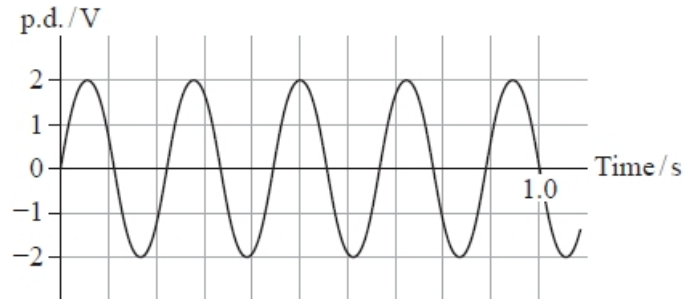


## Magnetic Fields and Alternating Current (MQC Only)

**Q1.**

The graph shows how a potential difference (p.d.) varies with time.



Which of the following is correct?

- A** The frequency is 4.5 Hz.
- B** The peak value is 4.0 V.
- C** The period is 0.20 s.
- D** The root mean square value of p.d. is 1.0 V.

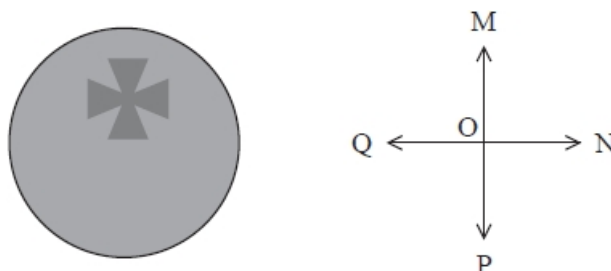
**(Total for question = 1 mark)**

**Q2.**

A demonstration is carried out using a beam of electrons in an evacuated tube.

When electrons hit a fluorescent screen, light is emitted. A piece of metal, in the shape of a Maltese cross, stops electrons and produces a shadow on the screen as shown.

The screen is viewed by an observer at point X in the diagram above. A magnetic field is directed at the beam of electrons. This causes the shadow to move upwards on the screen in the direction OM.



In which of the following directions is the magnetic field acting as seen by this observer?

(1)

- A OM
- B ON
- C OP
- D OQ

(Total for question = 1 mark)

**Q3.**

Mains electricity in the UK is 230 V rms.

The peak voltage of the mains supply is given by

- A  $\frac{230}{\sqrt{2}}$  V
- B  $230\sqrt{2}$  V
- C  $\frac{\sqrt{2}}{230}$  V
- D  $\frac{230}{2}$  V

(Total for question = 1 mark)

**Q4.**

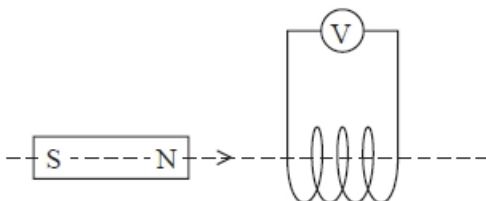
Which of the following is a unit of magnetic flux?

- A  $\text{N C}^{-1}$
- B  $\text{T m}^{-2}$
- C  $\text{V s}$
- D  $\text{Wb m}^2$

(Total for question = 1 mark)

**Q5.**

A magnet is passed along the axis of a short coil of wire.



An e.m.f. is induced across the ends of the coil.

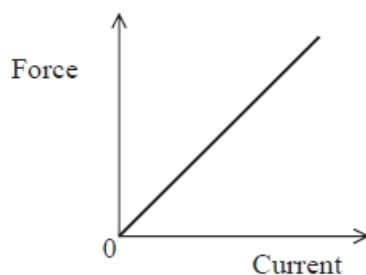
Which of the following would increase the maximum e.m.f. induced?

- A** decreasing the area of the coil
- B** decreasing the number of turns per metre in the coil
- C** increasing the speed of the magnet
- D** reversing the polarity of the magnet

**(Total for question = 1 mark)**

**Q6.**

A current-carrying conductor with length  $l$  is placed at right angles to a magnetic field with magnetic flux density  $B$ . The graph shows how the force on the wire varies with the current passing through it.



The gradient of the graph is equal to

- A**  $B$
- B**  $Bl$
- C**  $\frac{1}{B}$
- D**  $\frac{B}{l}$

**(Total for question = 1 mark)**

**Q7.**

A wire carries an alternating current of peak value 3 A.

Which of the following is the root-mean-square value of this current?

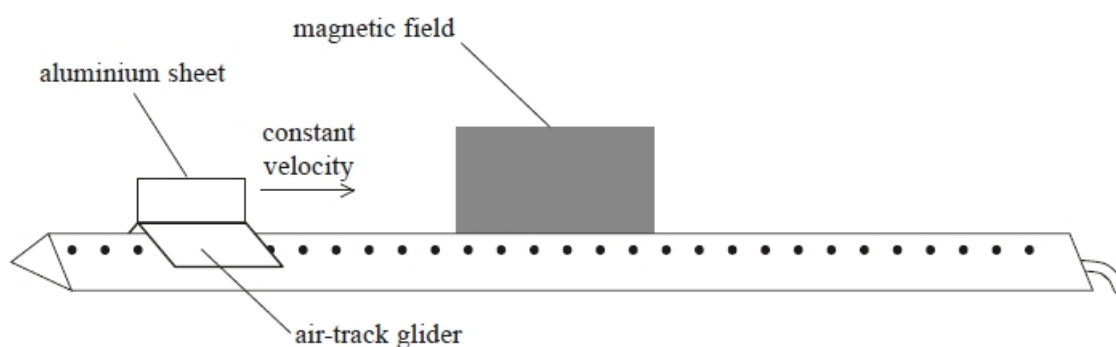
- A** 1.5 A
- B** 2.1 A
- C** 4.2 A
- D** 9.0 A

**(Total for question = 1 mark)**

**Q8.**

A rectangular sheet of aluminium is attached to an air-track glider as shown.

The glider moves towards a region of uniform magnetic field at a constant velocity. When the glider enters the magnetic field, the magnetic flux is perpendicular to the aluminium sheet.



Which row of the table describes the velocity of the glider as it enters the magnetic field, when it is completely within the magnetic field and as it leaves the magnetic field?

	Enters the magnetic field	Within the magnetic field	Leaves the magnetic field
<input type="checkbox"/> <b>A</b>	constant	decreasing	constant
<input type="checkbox"/> <b>B</b>	decreasing	constant	increasing
<input type="checkbox"/> <b>C</b>	decreasing	constant	decreasing
<input type="checkbox"/> <b>D</b>	decreasing	decreasing	decreasing

**(Total for question = 1 mark)**

## Mark Scheme – Magnetic Fields and Alternating Current (MCQ Only)

Q1.

Question Number	Acceptable answers	Additional guidance	Mark
	<p><b>The only correct answer is A</b>            B is not correct as the peak value is 2 V            C is not correct as the period is 0.22 s            D is not correct as r.m.s. value of p.d. is 1.4 V</p>		<b>1</b>

Q2.

Question Number	Acceptable answers	Additional guidance	Mark
	<p><b>The only correct answer is D</b>  <i>A is not correct because FLHR gives the direction as OQ</i>  <i>B is not correct because FLHR gives the direction as OQ</i>  <i>C is not correct because FLHR gives the direction as OQ</i></p>		<b>1</b>

Q3.

Question number	Acceptable answers	Additional guidance	Mark
	B		<b>1</b>

Q4.

Question Number	Acceptable answers	Additional guidance	Mark
	<p><b>The only correct answer is C</b>            A is not correct as this is a unit of electric field strength            B is not correct as units <math>T\ m^2</math> could be used as a unit of flux            D is not correct as Wb is a unit of flux</p>		<b>1</b>

Q5.

Question Number	Acceptable Answer	Additional guidance	Mark
	C	increasing the speed of the magnet	<b>(1)</b>

Q6.

Question Number	Acceptable Answer	Additional guidance	Mark
	B	<i>B/</i>	<b>(1)</b>

Q7.

Question Number	Acceptable answers	Additional guidance	Mark
	<p><b>The only correct answer is B</b></p> <p><i>A is not correct because it is 3 divided by 2</i></p> <p><i>C is not correct because it is 3 x root 2</i></p> <p><i>D is not correct because it is 3<sup>2</sup></i></p>	2.1 A	<b>1</b>

Q8.

Question Number	Acceptable answers	Additional guidance	Mark
	C		<b>1</b>