5 (a) State Faraday's law of electromagnetic induction.

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....

.... [2]

(b) Two coils of insulated wire are wound on an iron bar, as shown in Fig. 5.1.

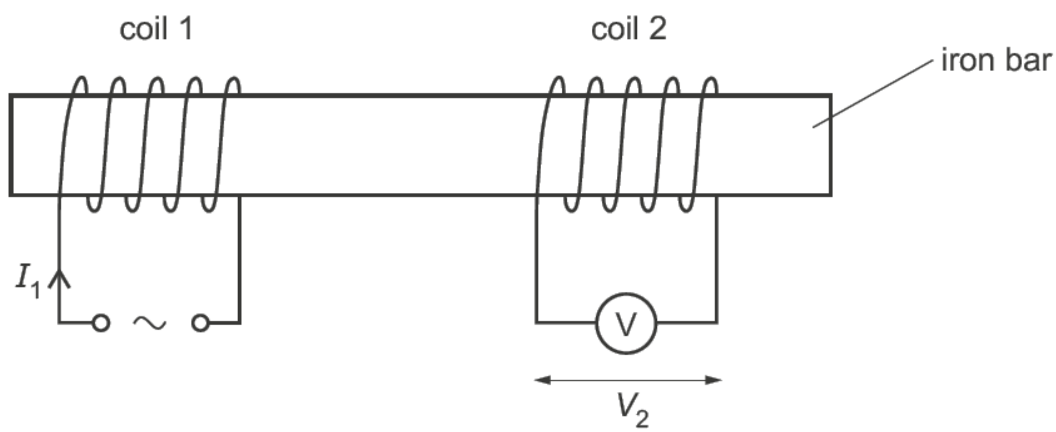

Fig. 5.1

There is a current I_1 in coil 1 that varies with time t as shown in Fig. 5.2.

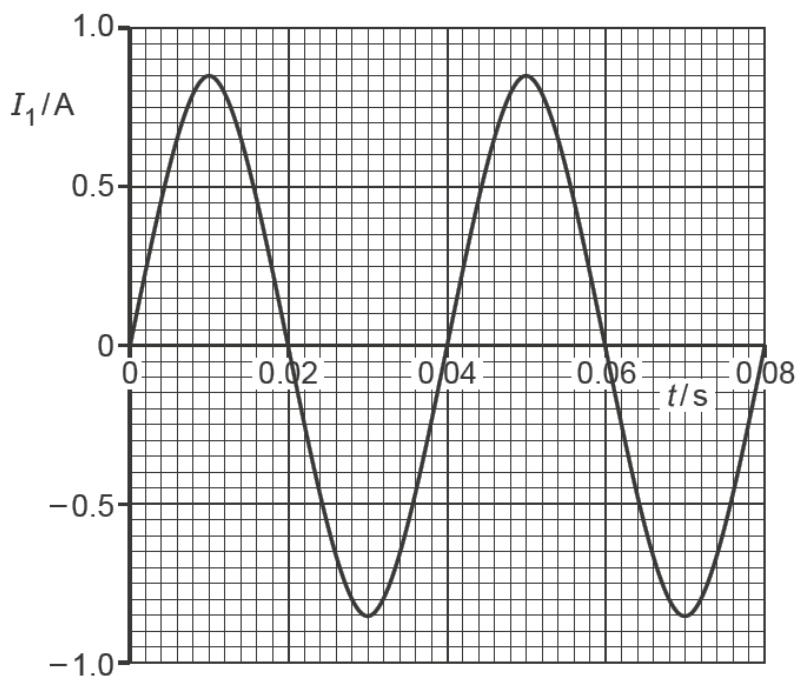

Fig. 5.2

[Turn over

(i) The variation with t of I_1 can be represented by the equation

$$I_1 = A \sin B(t)$$

where A and B are constants.

Use Fig. 5.2 to determine the values of A and B. Give units to your answers.

A = ... unit ....

B = ... unit .... [2]

(ii) The current in coil 1 gives rise to a magnetic field with a flux density that is proportional to I_1.

An electromotive force (e.m.f.) is induced across coil 2. The potential difference (p.d.) across coil 2 is measured using a voltmeter that gives a root-mean-square (r.m.s.) value of 4.6 V.

On Fig. 5.3, sketch a graph to show the variation with t of V_2 between t = 0 and t = 0.08 s.

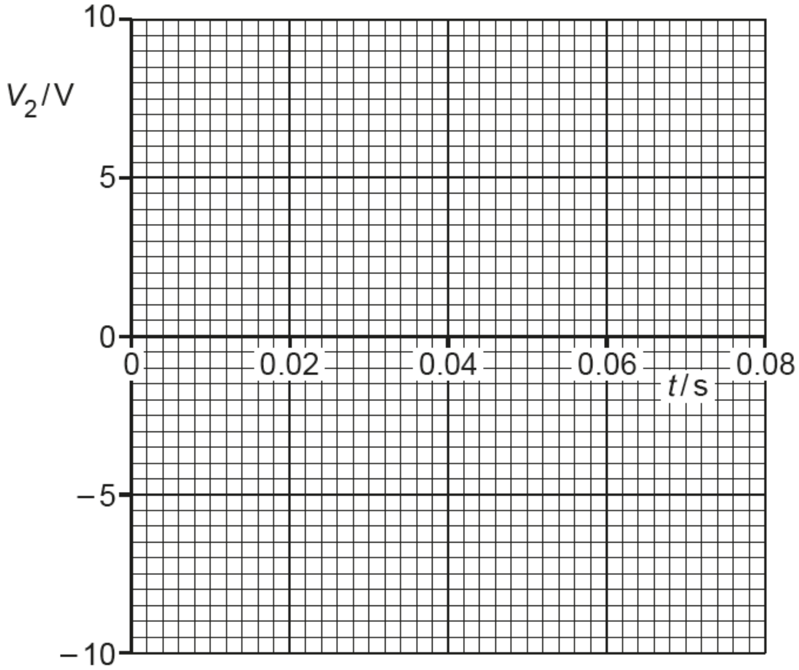

Fig. 5.3

[3]

(iii) Use the laws of electromagnetic induction to explain the shape of your graph in **(b)(ii)**.

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....

....

.... [3]

[Total: 10]