7 A solenoid is connected in series with a battery and a switch. A Hall probe is placed close to one end of the solenoid, as illustrated in Fig. 7.1.

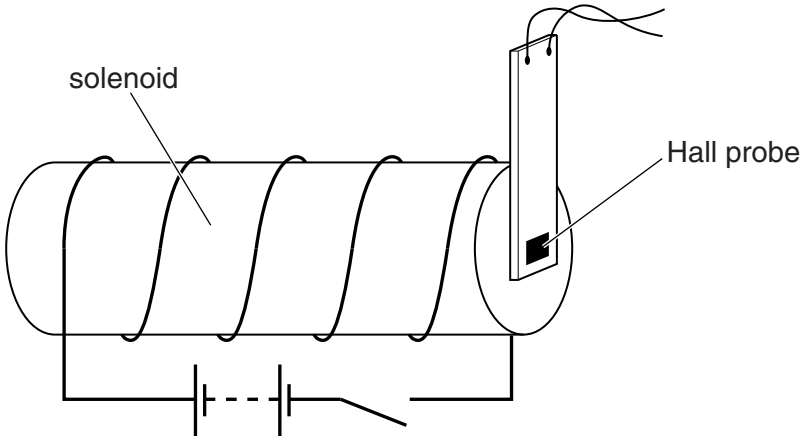

Fig. 7.1

The current in the solenoid is switched on. The Hall probe is adjusted in position to give the maximum reading. The current is then switched off.

(a) The current in the solenoid is now switched on again. Several seconds later, it is switched off. The Hall probe is not moved.

On the axes of Fig. 7.2, sketch a graph to show the variation with time t of the Hall voltage V_H.

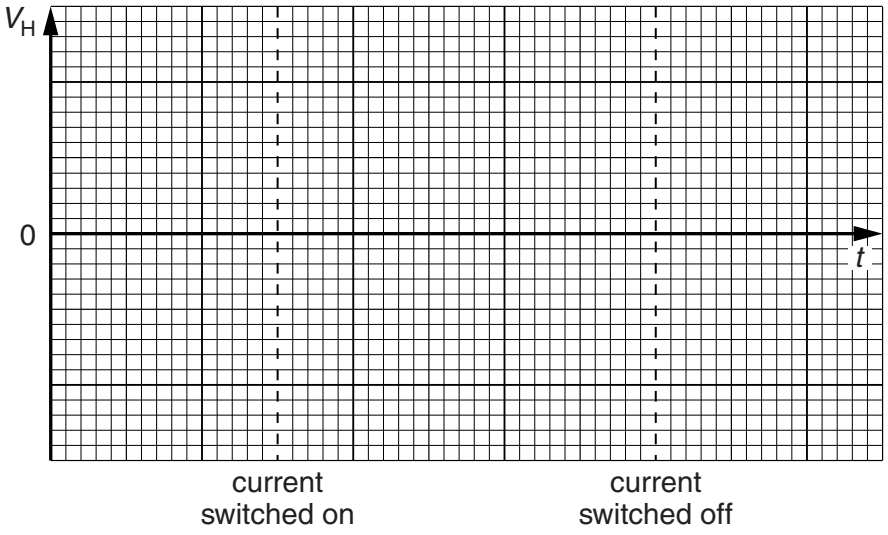

Fig. 7.2

[3]

(b) The Hall probe is now replaced by a small coil. The plane of the coil is parallel to the end of the solenoid.

(i) State Faraday's law of electromagnetic induction.

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..... [2]

(ii) On the axes of Fig. 7.3, sketch a graph to show the variation with time t of the e.m.f. E induced in the coil when the current in the solenoid is switched on and then switched off.

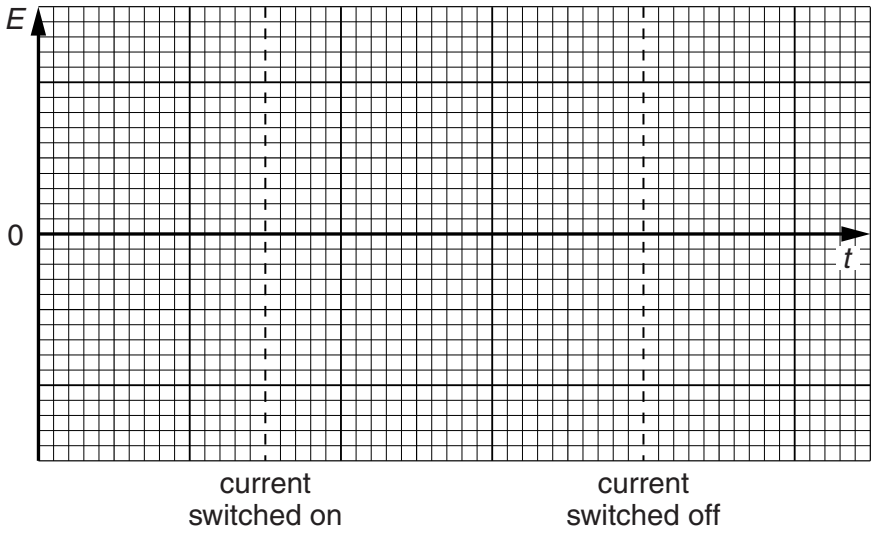

Fig. 7.3

[3]