6 **(a)** State Faraday's Law of electromagnetic induction.

……………………………………………………………………………………………………

……………………………………………………………………………………………………

…………………………………………………………………………………………… [1]

(b) Fig. 6.1 shows a magnet being used as the bob for a simple pendulum. The magnet oscillates with a small amplitude along the axis of a 240 turn coil that has a cross-sectional area of 2.5×10^{-4} m^2.

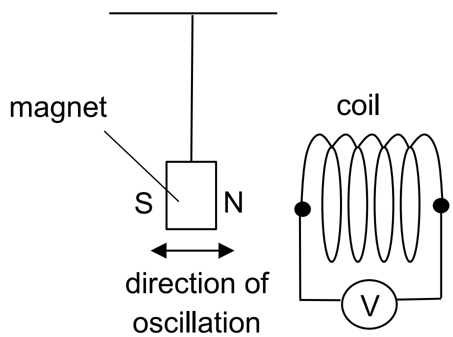

Fig. 6.1

The variation with time t of the magnetic flux density B in the coil for one complete oscillation of the magnet is shown in Fig. 6.2.

B / 10^{-2} T

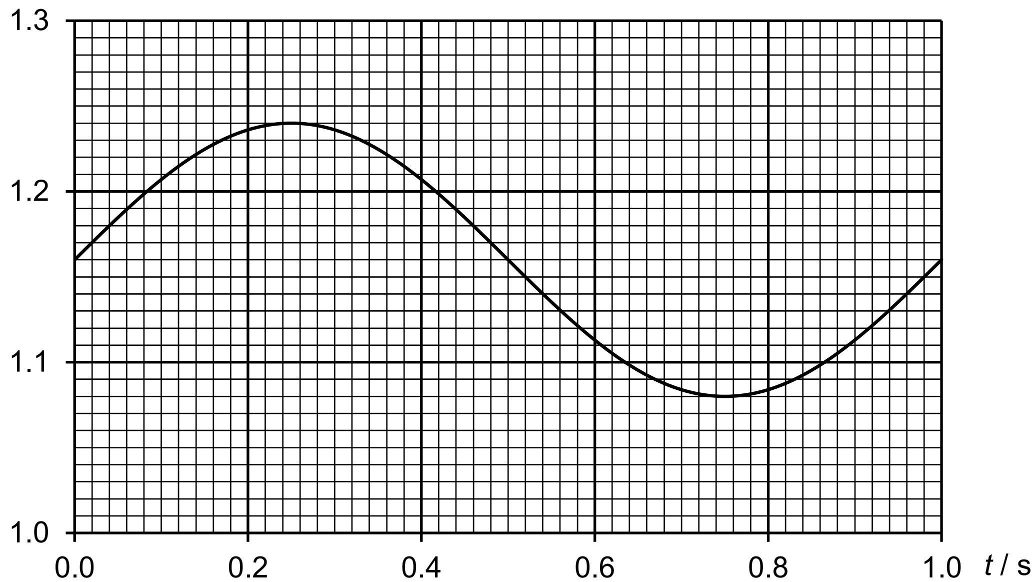

Fig. 6.2

(i) Determine the average e.m.f. induced across the coil between t = 0 s and t = 0.25 s.

e.m.f. = ………………… V [3]

(ii) State the feature of the graph in Fig. 6.2 that allows you to find the maximum e.m.f. induced in the coil.

………………………………………………………………………………………..

……………………………………………………………………………… [1]

(iii) On Fig. 6.3, sketch the variation with time t of e.m.f. V induced across the coil. (Numerical values of V are not expected.)

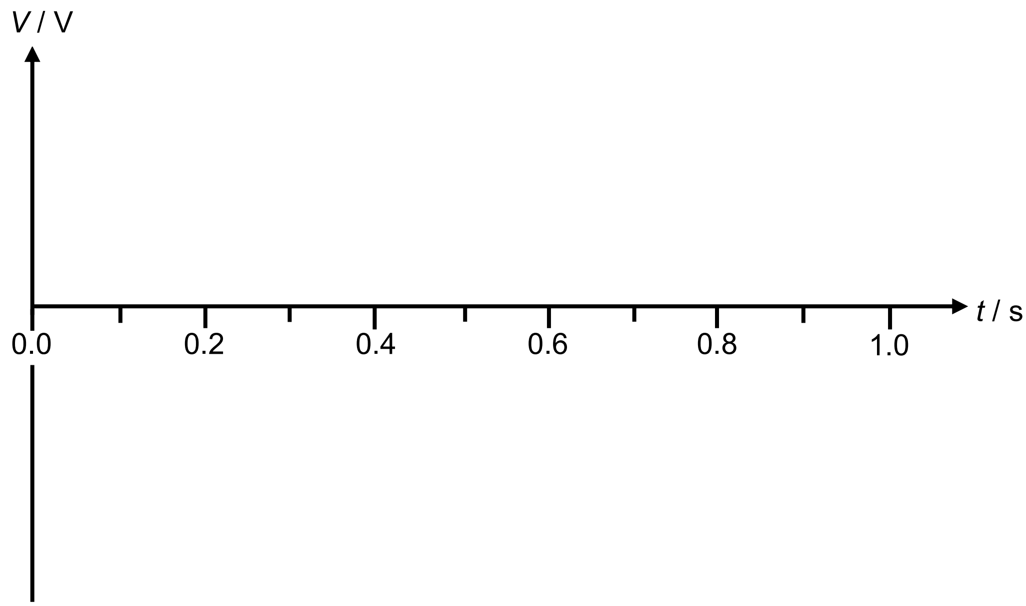

Fig. 6.3 [2]

(iv) A resistor is now connected across the coil.

Explain what happens to the oscillations of the magnet.

……………………………………………………………………………………..

……………………………………………………………………………………..

……………………………………………………………………………………..

……………………………………………………………………………………..

……………………………………………………………………………………..

…………………………………………………………………………………… [3]