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

.....

.....

..... [2]

(b) A coil is placed in a uniform magnetic field, as shown in Fig. 6.1.

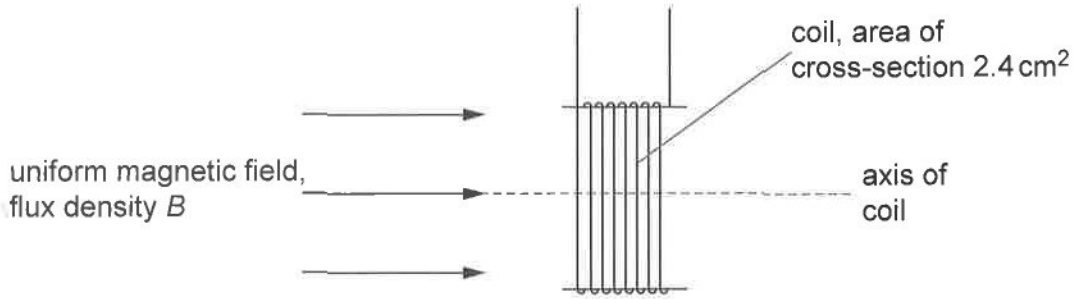

Fig. 6.1

The coil contains 140 turns of wire and has a cross-sectional area of 2.4 cm^2.

The uniform magnetic field of flux density B is directed through the coil, along the axis of the coil.

The magnetic flux density B changes with time t as shown in Fig. 6.2.

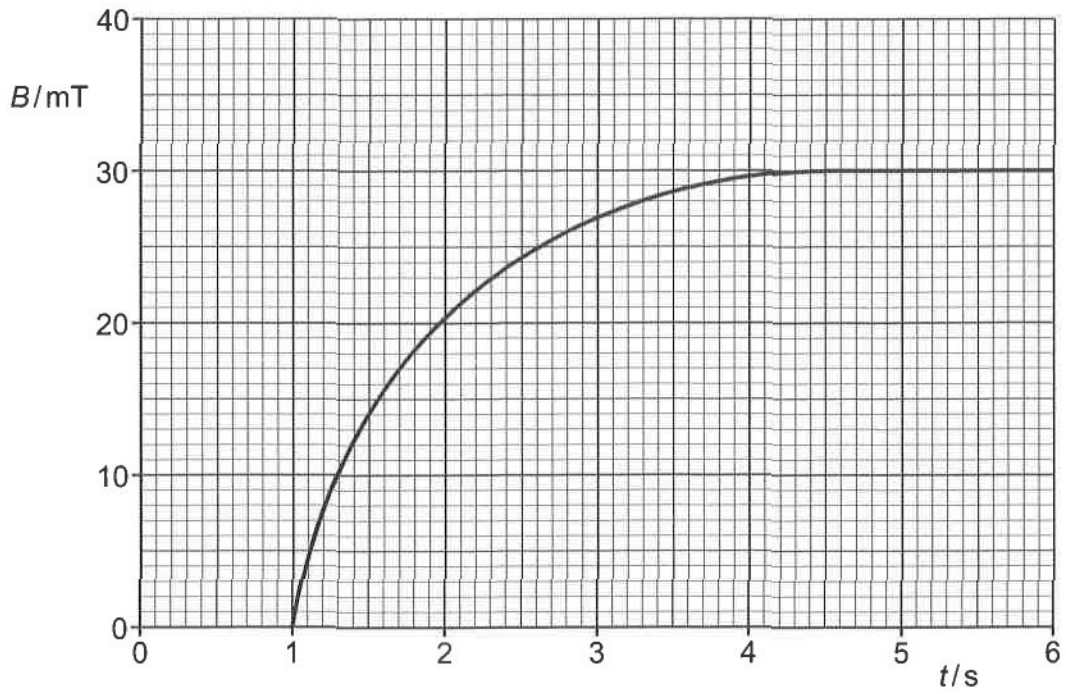

Fig. 6.2

(i) Show that the initial rate of change of magnetic flux density at time t = 1.0 s is $6.0 \times 10^{-2}\,\text{T s}^{-1}$.

[2]

(ii) Determine the electromotive force (e.m.f.) induced in the coil at time t = 1.0 s.

e.m.f. = ... V [2]

(iii) On the axes of Fig. 6.3, sketch a graph to show the variation with time t of the magnitude of the e.m.f. E induced in the coil for time t = 0 to time t = 6 s.

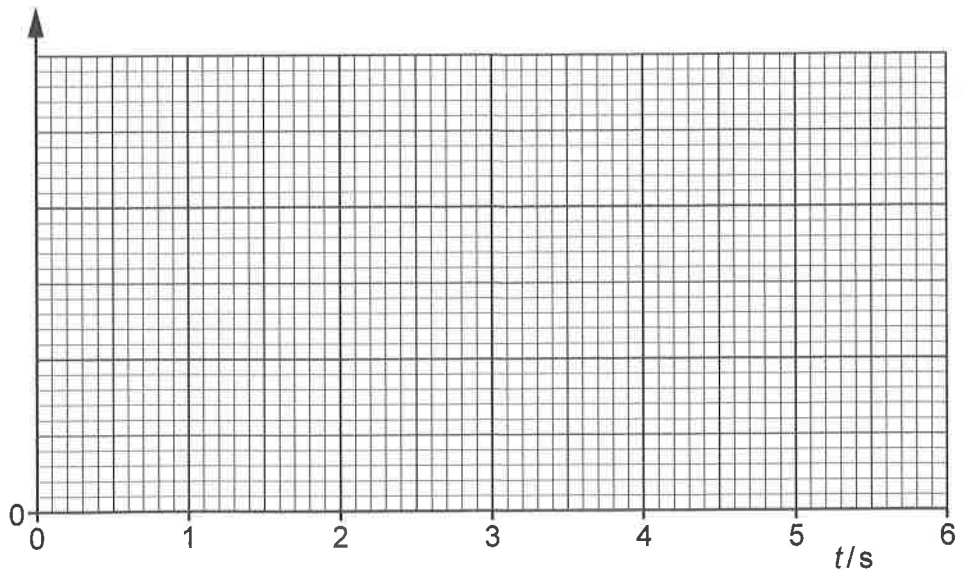

Fig. 6.3

[3]

[Total: 9]