9 **(a)** A coil of wire is situated in a uniform magnetic field of flux density B.
The coil has diameter 3.6 cm and consists of 350 turns of wire, as illustrated in Fig. 9.1.

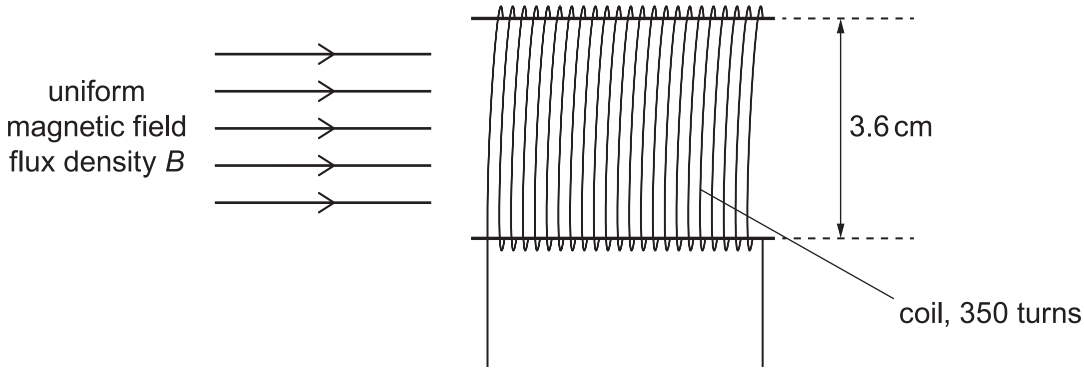

Fig. 9.1

The variation with time t of B is shown in Fig. 9.2.

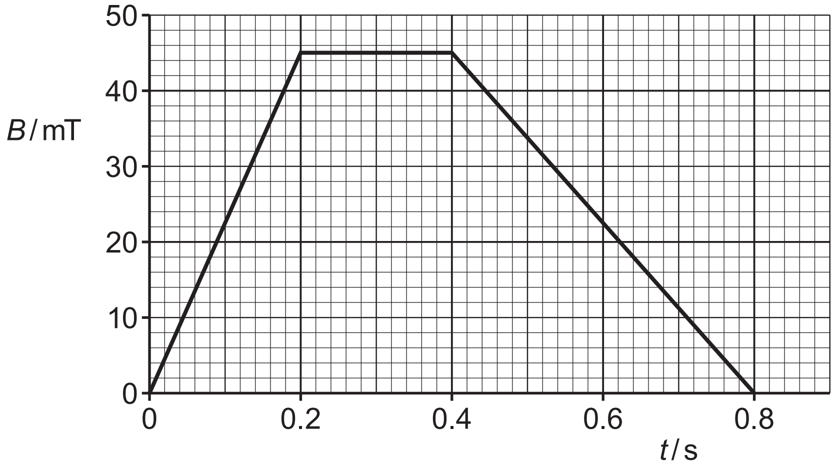

Fig. 9.2

(i) Show that, for the time t = 0 to time t = 0.20 s, the electromotive force (e.m.f.) induced in the coil is 0.080 V.

[2]

(ii) On the axes of Fig. 9.3, show the variation with time t of the induced e.m.f. E for time t = 0 to time t = 0.80 s.

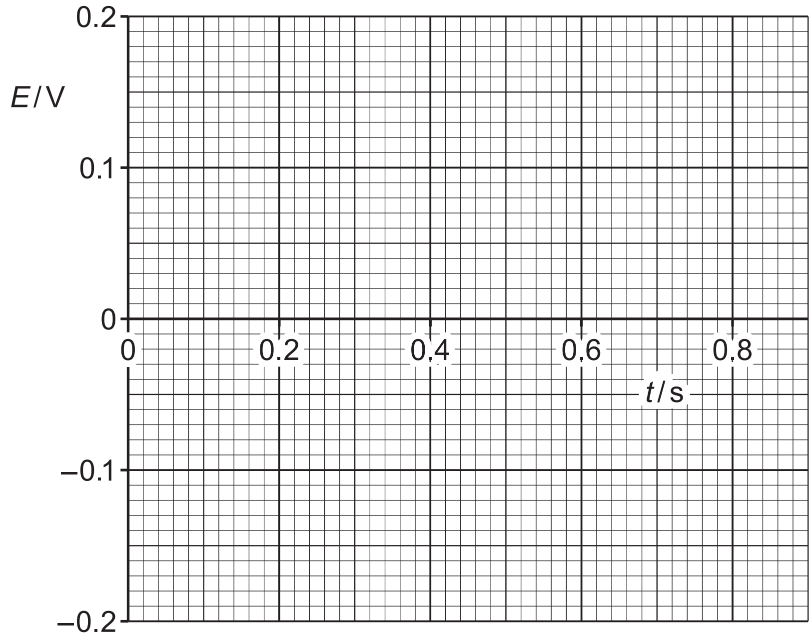

Fig. 9.3

[4]

(b) A bar magnet is held a small distance above the surface of an aluminium disc by means of a rod, as illustrated in Fig. 9.4.

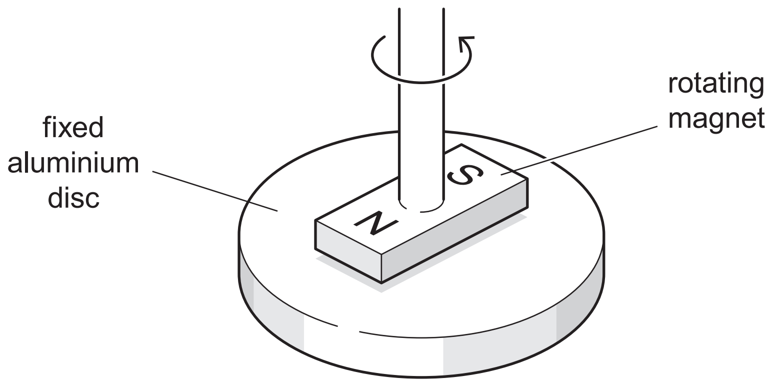

Fig. 9.4

The aluminium disc is supported horizontally and held stationary.

The magnet is rotated about a vertical axis at constant speed.

Use laws of electromagnetic induction to explain why there is a torque acting on the aluminium disc.

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.... [4]

[Total: 10]