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

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……

…… [1]

(b) A small coil is positioned so that its axis lies along the axis of a large bar magnet, as shown in Fig. 7.1.

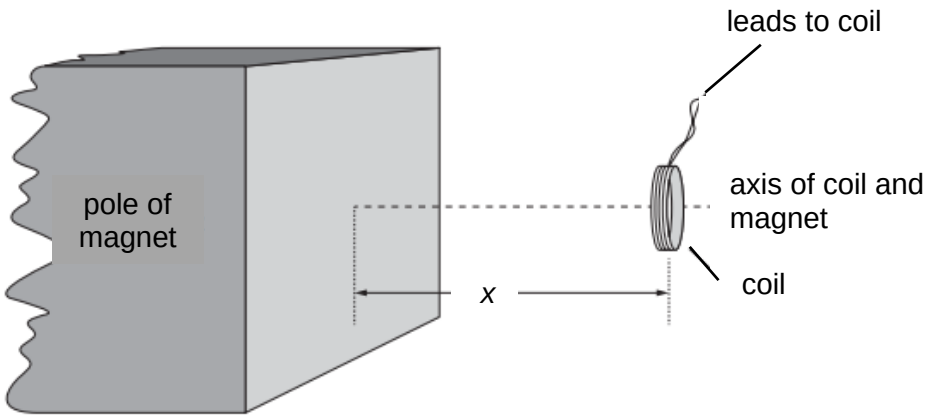

Fig. 7.1

The coil has a cross-sectional area of 0.40 cm^2 and contains 150 turns of wire. The average magnetic flux density *B* through the coil varies with the distance *x* between the face of the magnet and the plane of the coil, as shown in Fig. 7.2.

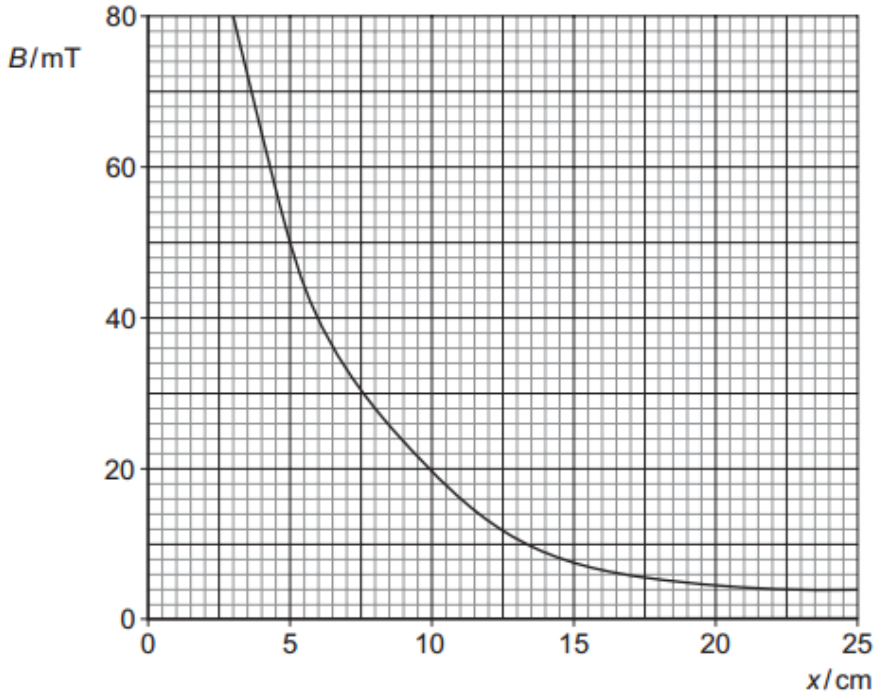

Fig. 7.2

The coil is moved along the axis of the magnet so that the distance x changes from x = 5.0 cm to x = 15.0 cm in a time of 0.30 s.

Calculate

(i) the change in magnetic flux linkage of the coil,

change in magnetic flux linkage = ... Wb [2]

(ii) the average e.m.f. induced in the coil.

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

(c) State and explain the variation, if any, of the speed of the coil so that the induced e.m.f. remains constant during the movement in **(b)(ii)**.

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……

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…… [3]

[Total : 8]