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

.....

.....

..... [2]

(b) Fig. 7.1 shows a coil at rest in a uniform magnetic field that is parallel to the axis of the coil.

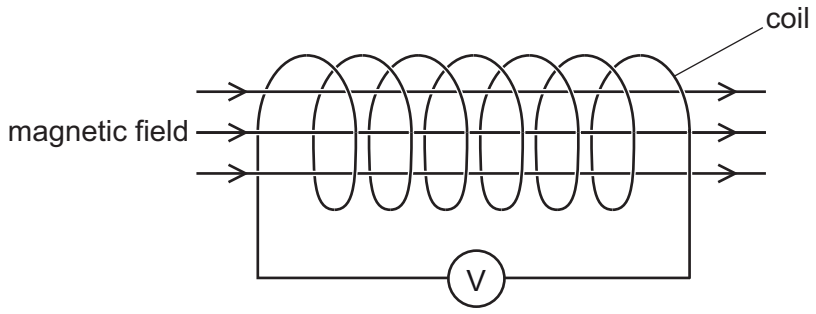

Fig. 7.1

The coil is connected to a centre-zero voltmeter.

The flux density B of the uniform magnetic field varies with time t as shown in Fig. 7.2.

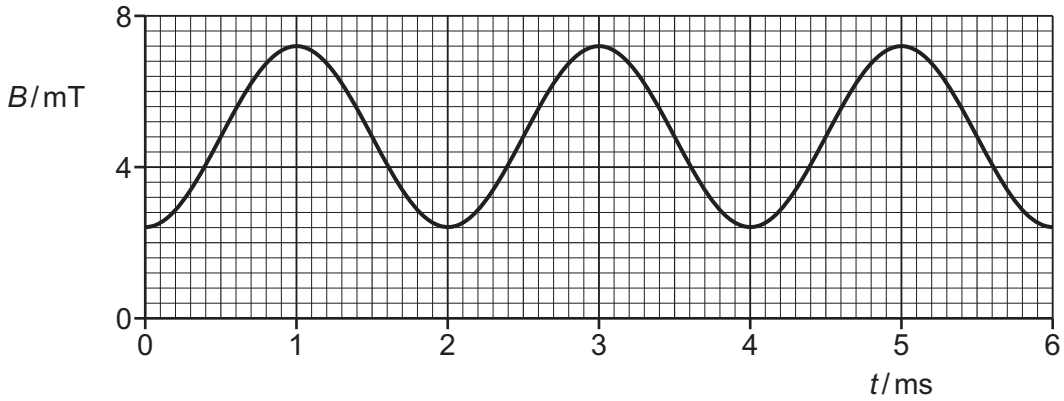

Fig. 7.2

The coil consists of 340 turns, each of cross-sectional area $3.2 \times 10^{-4}\,m^2$.

(i) Calculate the maximum magnetic flux through **one** turn of the coil.

maximum magnetic flux = ... Wb [2]

(ii) Determine the maximum rate of change of magnetic flux linkage in the coil.

maximum rate of change of flux linkage = ... $Wb\,s^{-1}$ [3]

(iii) State the maximum electromotive force (e.m.f.) V_0 induced across the coil.

V_0 = ... V [1]

(iv) On Fig. 7.3, sketch the variation of the e.m.f. V induced across the coil with t from $t = 0$ to $t = 6.0$ ms.

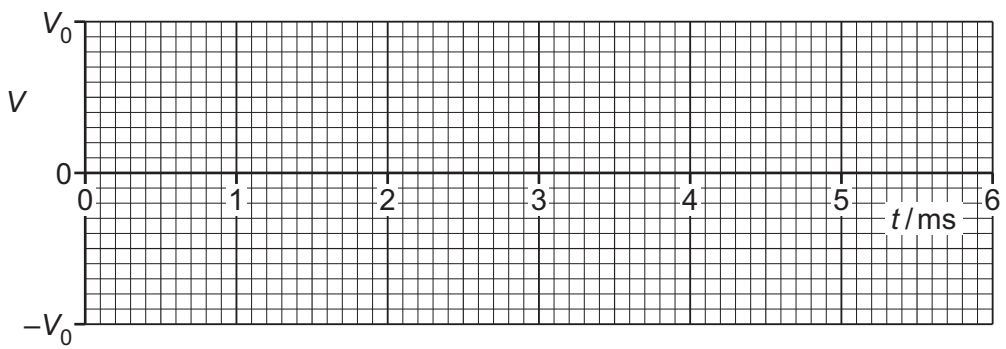

Fig. 7.3

[3]

(v) The variation of V with t can be described by

$$V = A \sin Bt$$

where A and B are constants.

Determine the values of A and B. Give units with your answers.

A = ... unit .....

B = ... unit .....

[3]

[Total: 14]