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

.....

.....

.....[1]

(b) A pair of concentric coils is shown in Fig. 5.1.

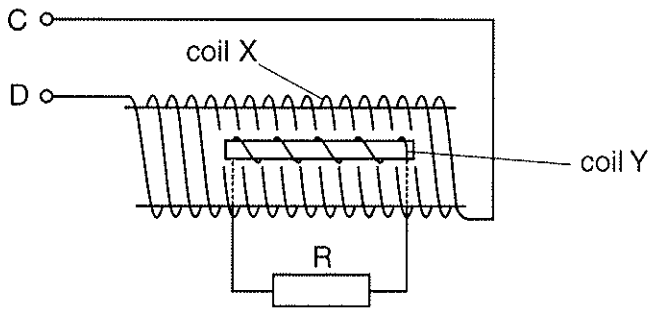

Fig. 5.1

The outer coil X has 2500 turns and is connected to a variable power supply by the terminals CD. The inner coil Y has 500 turns, a cross-sectional area of $7.25 \times 10^{-4}\,m^2$ and a resistance of 5.00 Ω. Coil Y is connected to a resistor R of resistance 10.0 Ω.

The variation with time t of the magnetic flux density B in coil Y is shown in Fig. 5.2.

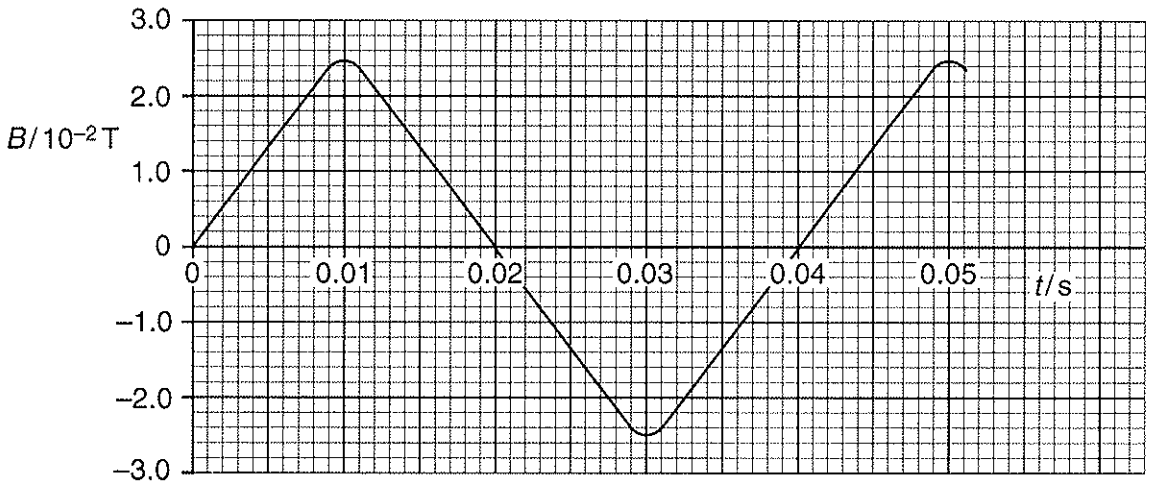

Fig. 5.2

(i) Calculate the maximum current in R.

maximum current = ... A [3]

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(ii) On Fig. 5.3, sketch the variation with time t of current I in R.

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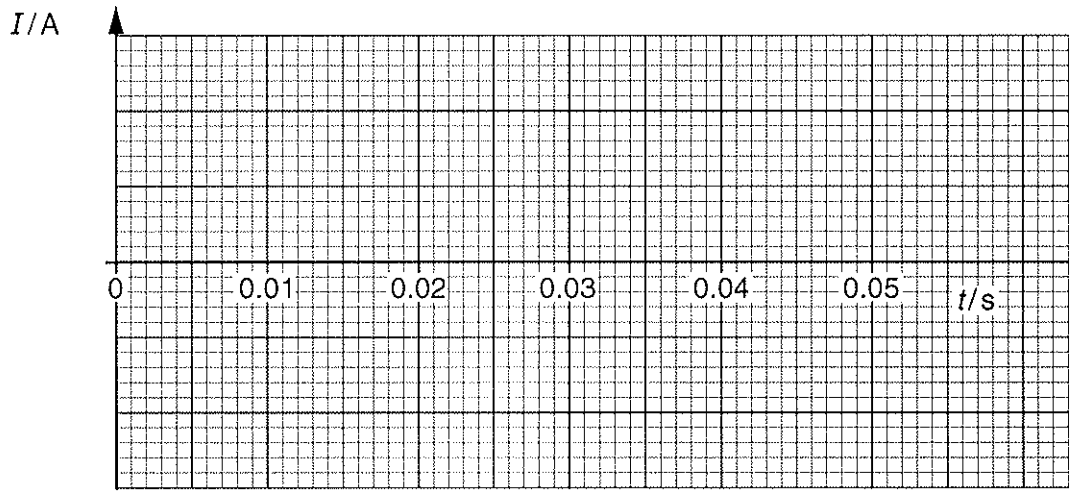

Fig. 5.3

[2]