7 **(a)** A sinusoidal alternating current source is connected to a diode and a resistor as shown in Fig. 7.1 below.

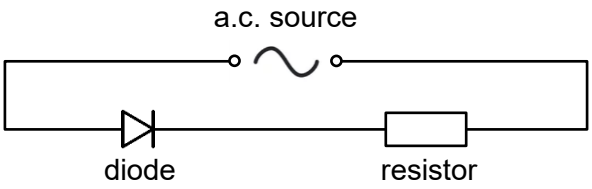

Fig. 7.1

The variation with time of the potential difference in the diode is shown in Fig. 7.2 below.

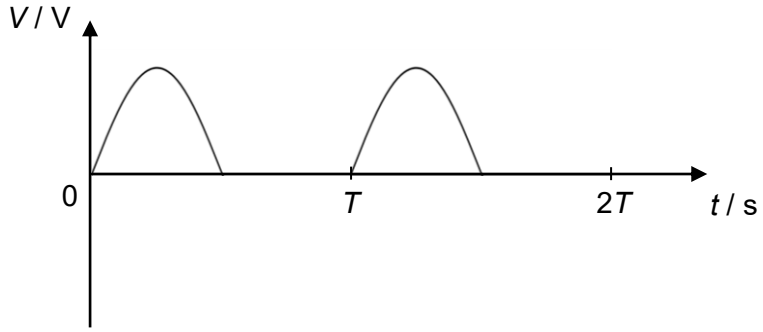

Fig. 7.2

(i) On Fig. 7.3, sketch the variation with time of the potential difference across the resistor.

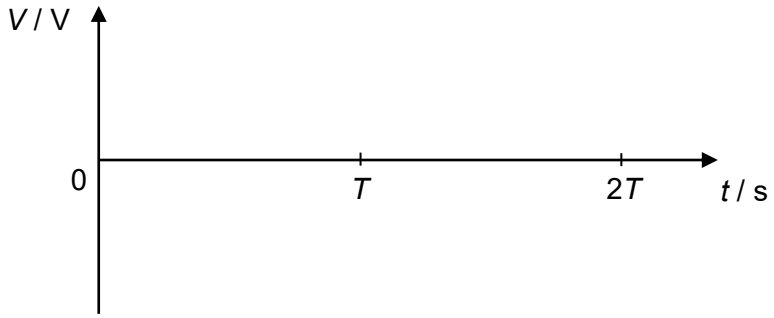

Fig. 7.3

[1]

(ii) On Fig. 7.4, sketch the variation with time of the power in the resistor.

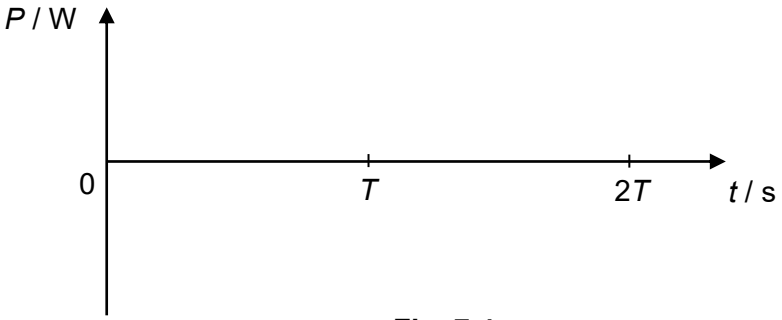

Fig. 7.4

[1]

(iii) Given that the resistance of the resistor is 2.0 Ω, and that the peak voltage in it is 5.0 V, calculate the average power dissipated.

average power = ... W [2]

(b) Fig. 7.5 shows an ideal iron-cored transformer. The ratio of the secondary turns to the primary turns is 1:20.

A 230 V alternating current supply is connected to a primary coil and a 7.0 Ω resistor is connected to the secondary coil.

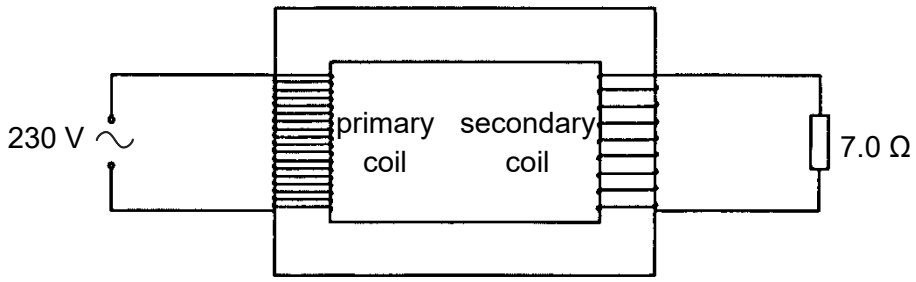

Fig. 7.5

(i) Explain how an alternating current in the primary coil induces an electromotive force in the secondary coil.

.....

.....

.....

.....

..... [2]

(ii) Determine the current in the primary coil.

current = ... A [2]