**5** **(a)** The mean value of an alternating current is zero.
Explain

**(i)** Why an alternating current gives rise to a heating effect in a resistor,

.....

.....

..... [2]

**(ii)** by reference to heating effect, what is meant by the root-mean-square (r.m.s.) value of an alternating current.

.....

.....

..... [1]

**(b)** The variation with time $t$ of the output V of an alternating voltage supply of frequency 50 Hz is shown in Fig. 5.1.





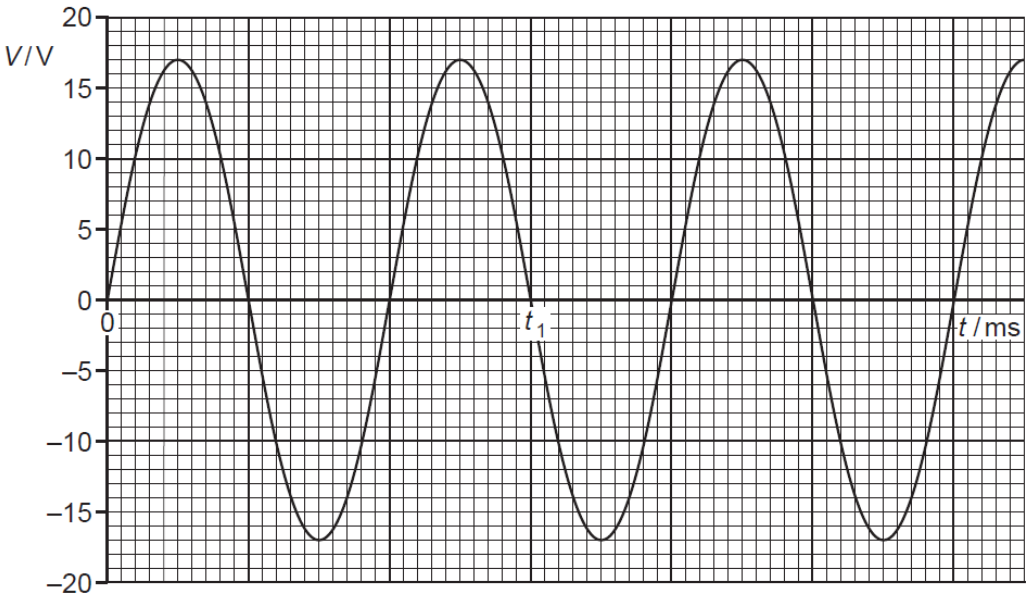


**Fig. 5.1**

Use Fig. 5.1 to determine

**(i)** the time $t_1$ ,

$t_1$ = ..... s [2]

**(ii)** the root-mean-square voltage $V_{rms}$

$V_{rms}$ = ..... V [2]

**(iii)** The alternating supply is connected in series with a diode and a load resistor of resistance 2.4 Ω. On Fig. 5.2, sketch the variation with time t of the power $P$ dissipated in the load resistor for time $t$ = 0 to $t$ = 40 ms.
Assume that $P$ = 0 when $t$ = 0. [3]

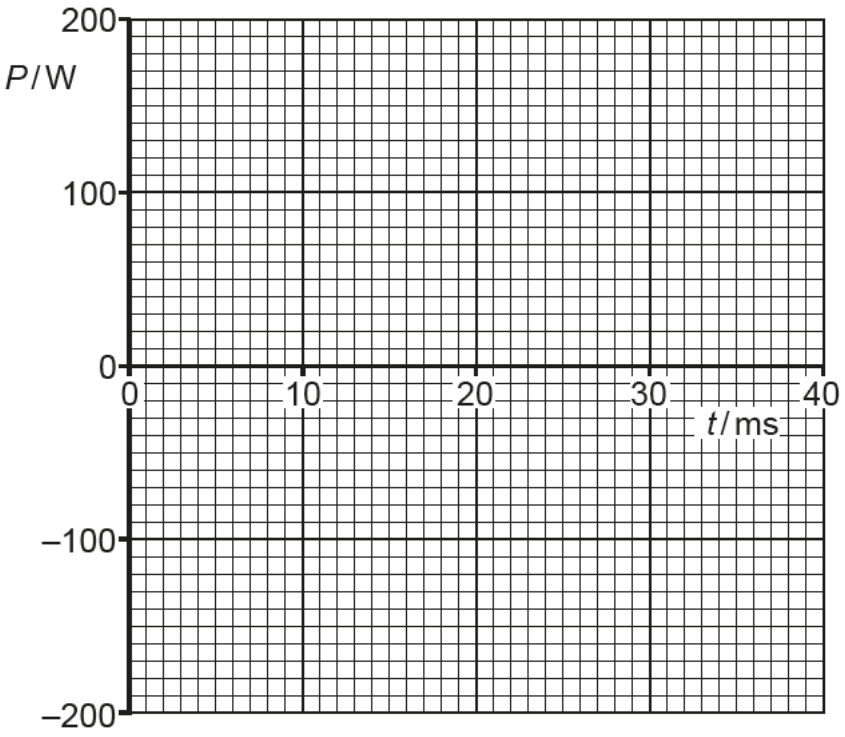


**Fig. 5.2**