

7 An alternating voltage  $V$  varies with time  $t$  according to

$$V = 18 \cos 40\pi t$$

where  $V$  is in V and  $t$  is in s.

(a) For the alternating voltage:

(i) show that the period is 0.050 s

[1]

(ii) determine the root-mean-square (r.m.s.) voltage.

r.m.s. voltage = ..... V [1]

(b) On Fig. 7.1, sketch the variation of  $V$  with  $t$  for values of  $t$  from  $t = 0$  to  $t = 100$  ms.

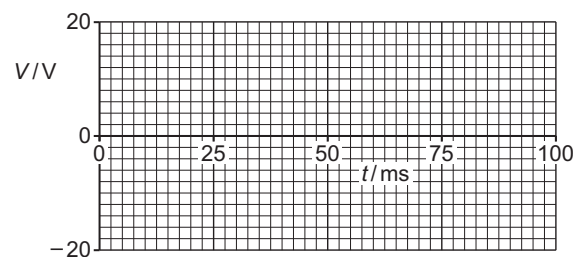


Fig. 7.1

[3]

(c) The alternating voltage is rectified to produce an output voltage across a load resistor  $R$ , as shown in Fig. 7.2.

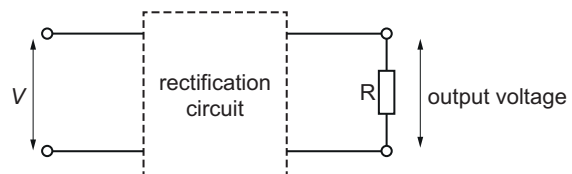


Fig. 7.2

①

Fig. 7.3 shows the variation with  $t$  of the power  $P$  in the load resistor.

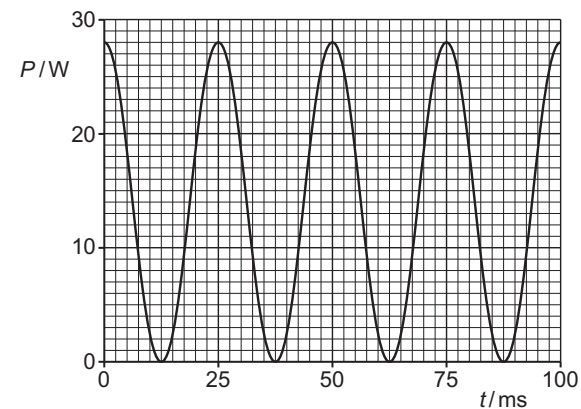


Fig. 7.3

State **three** conclusions that can be drawn from Fig. 7.3. The conclusions may be qualitative or quantitative. Use the space for any working.

- 1 .....
- 2 .....
- 3 .....

[3]

[Total: 8]

②