

- 7 A varying current I passes through a resistor of resistance R in the circuit shown in Fig. 7.1.

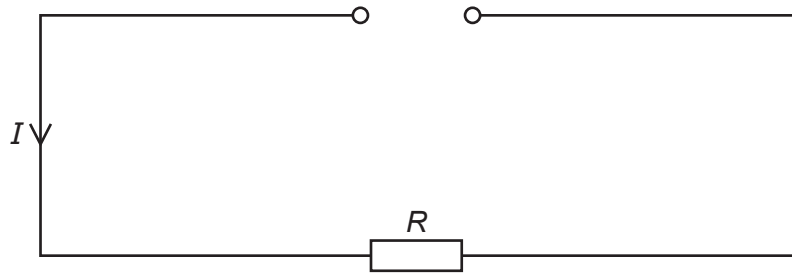


Fig. 7.1

Fig. 7.2 shows the variation with time t of I .

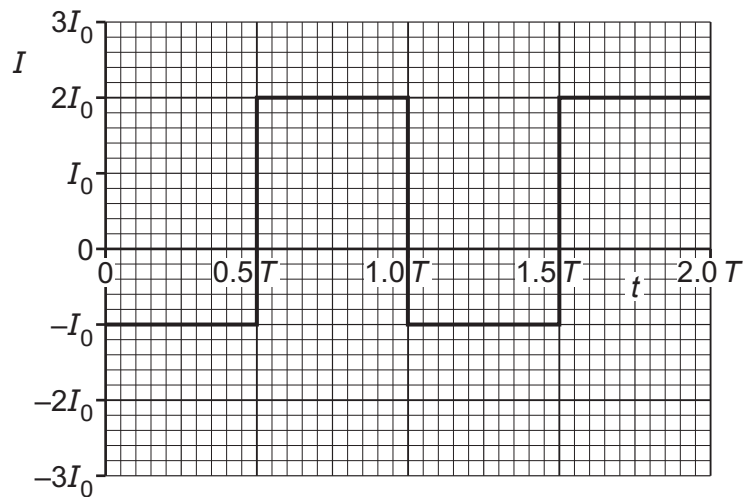


Fig. 7.2

The current has magnitude $2I_0$ when it is in the positive direction and I_0 when it is in the negative direction. The period of the variation of the current is T .

- (a) Determine expressions, in terms of I_0 and R , for the power P dissipated in the resistor for the times when:

- (i) the current is in the negative direction

$$P = \dots\dots\dots [1]$$

- (ii) the current is in the positive direction.

$$P = \dots\dots\dots [1]$$

- (b) On Fig. 7.3, sketch the variation of P with t between $t = 0$ and $t = 2.0T$. Label the power axis with an appropriate scale.

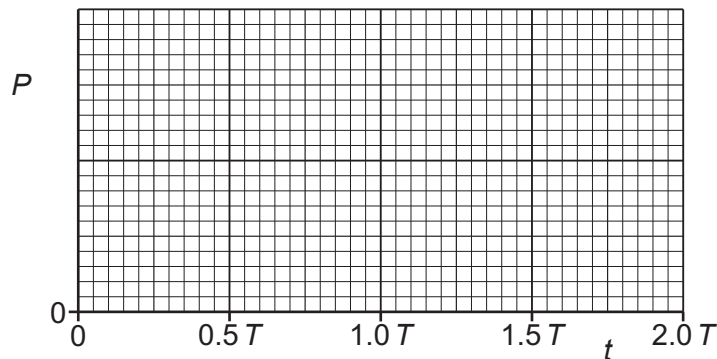


Fig. 7.3

[3]

- (c) Use your answer in (b) to determine an expression, in terms of I_0 and R , for:

- (i) the mean power $\langle P \rangle$ in the resistor

$$\langle P \rangle = \dots\dots\dots [1]$$

- (ii) the root-mean-square (r.m.s.) current $I_{\text{r.m.s.}}$ in the resistor.

$$I_{\text{r.m.s.}} = \dots\dots\dots [2]$$