

- 7 (a) A sinusoidal alternating voltage has a root-mean-square (r.m.s.) potential difference (p.d.) of 4.2 V and a frequency of 50 kHz.

- (i) The alternating voltage is applied across a resistor of resistance  $760\ \Omega$ .

By considering the peak voltage, show that the maximum power dissipated by the resistor is 46 mW.

[2]

- (ii) On Fig. 7.1, draw a smooth curve to show how the power  $P$  dissipated in the resistor varies with time  $t$  between  $t = 0$  and  $t = 40\ \mu\text{s}$ . Assume that  $P = 0$  when  $t = 0$ .

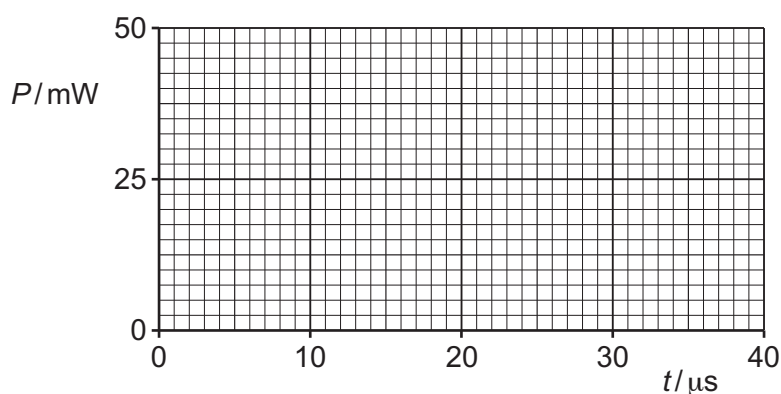


Fig. 7.1

[3]

- (iii) Use your line in (a)(ii) to explain why the mean power dissipated in the resistor is 23 mW.

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 ..... [1]

**(b)** The alternating voltage in **(a)** is now applied to a piezoelectric crystal in air.

**(i)** Explain what happens to the air surrounding the crystal.

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..... [3]

**(ii)** A second piezoelectric crystal is placed in the air near to the first crystal.

Explain the effect of the surrounding air in **(b)(i)** on the second crystal.

..... [1]