6 A sinusoidal alternating voltage supply is connected to a bridge rectifier consisting of four ideal diodes. The output of the rectifier is connected to a resistor R and a capacitor C as shown in Fig. 6.1.

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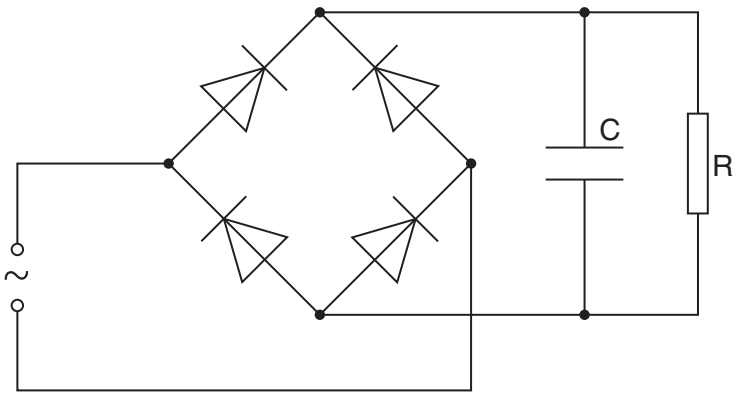

Fig. 6.1

The function of C is to provide some smoothing to the potential difference across R.
The variation with time *t* of the potential difference *V* across the resistor R is shown in Fig. 6.2.

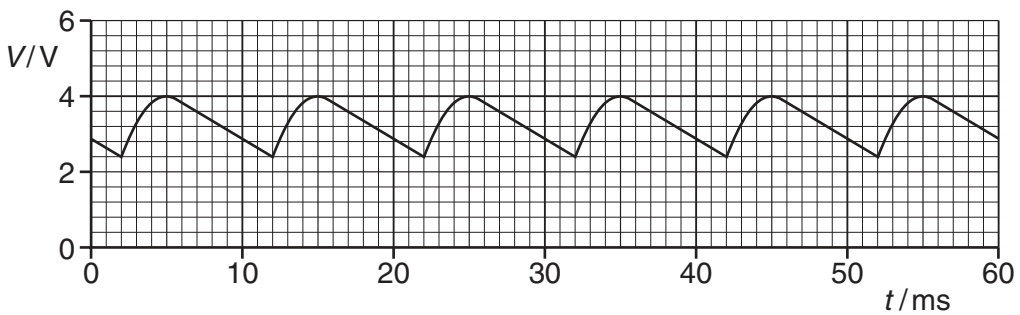

Fig. 6.2

(a) Use Fig. 6.2 to determine, for the alternating supply,

(i) the peak voltage,

peak voltage = ... V [1]

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

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

(iii) the frequency. Show your working.

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frequency = ... Hz [2]

(b) The capacitor C has capacitance 5.0 μF.
For a single discharge of the capacitor through the resistor R, use Fig. 6.2 to

(i) determine the change in potential difference,

change = ... V [1]

(ii) determine the change in charge on each plate of the capacitor,

change = ... C [2]

(iii) show that the average current in the resistor is 1.1×10^{-3} A.

[2]

(c) Use Fig. 6.2 and the value of the current given in **(b)(iii)** to estimate the resistance of resistor R.

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resistance = ... Ω [2]