4 The rectified output of a sinusoidal signal generator is connected across a resistor **R** of resistance 1.5 k, as shown in Fig. 4.1.

Fig. 4.1

The variation with time *t* of the potential difference *V* across **R** is shown in Fig. 4.2.

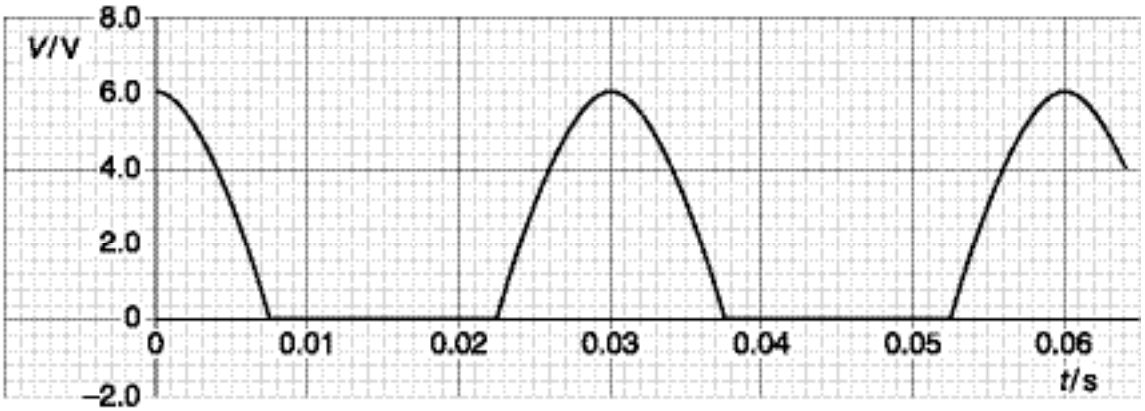

Fig. 4.2

(a) State how the rectification shown in Fig. 4.2 may be achieved.

.....

..... [2]

(b) A capacitor is now connected in parallel with the resistor **R**. The resulting variation with time *t* of the potential difference *V* across **R** is shown in Fig. 4.3.

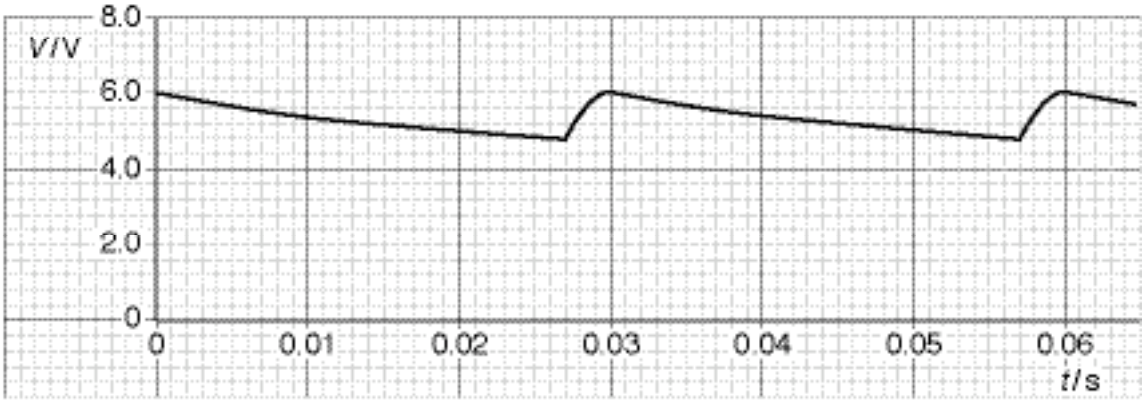

Fig. 4.3

(i) Using Fig. 4.3, determine

1. the mean potential difference across the resistor **R**,

potential difference = ... V

2. the mean current in the resistor,

mean current = ... A

3. the time in each cycle during which the capacitor discharges through the resistor.

time = ... s

[4]

(ii) Using your answers in **(i)**, calculate

1. the charge passing through the resistor during one discharge of the capacitor,

charge = ... C

2. the capacitance of the capacitor.

capacitance = ... F
[4]

(c) A second capacitor is now connected in parallel with the resistor **R** and the first capacitor. On Fig. 4.3, draw a line to show the variation with time *t* of the potential difference *V* across the resistor. [1]

[Turn over