

- 7 An a.c. power supply is connected to a resistor  $R$ , as shown in Fig. 7.1.

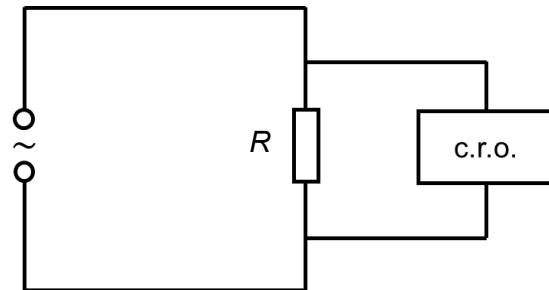


Fig. 7.1

A cathode ray oscilloscope (c.r.o.) is used to show the potential difference (p.d.) across  $R$ . The screen of the c.r.o. displays the variation with time of the p.d. across  $R$ , as shown in Fig. 7.2.

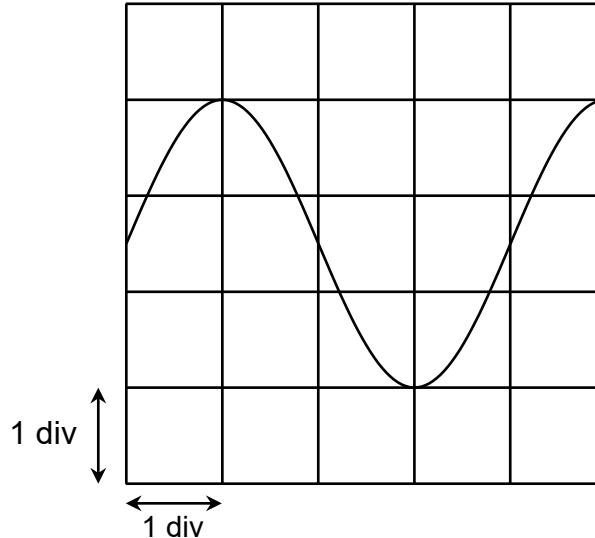


Fig. 7.2

- (a) The power supply's voltage  $V$  is given by the expression

$$V = 6.0 \sin(314t)$$

The voltage  $V$  is measured in volts and the time  $t$  is measured in seconds.

Determine the Y-gain and time-base of the c.r.o.

Y-gain = ..... V / div [1]

time-base = ..... ms / div [2]

- (b) Now, a diode is connected in series with the resistor  $R$ , as shown in Fig. 7.3.

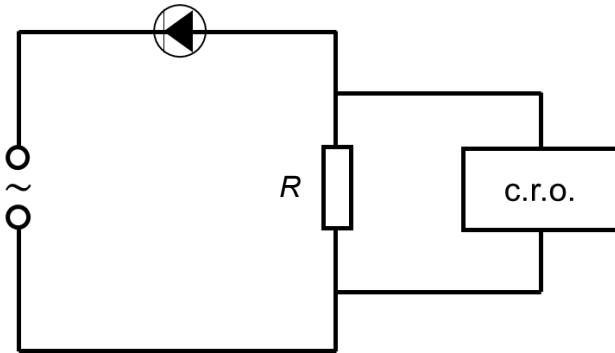


Fig. 7.3

- (i) Sketch in Fig. 7.4 the variation with time of the power  $P$  dissipated in  $R$  when  $R$  is  $20\ \Omega$ . Indicate the peak power value in your sketch.

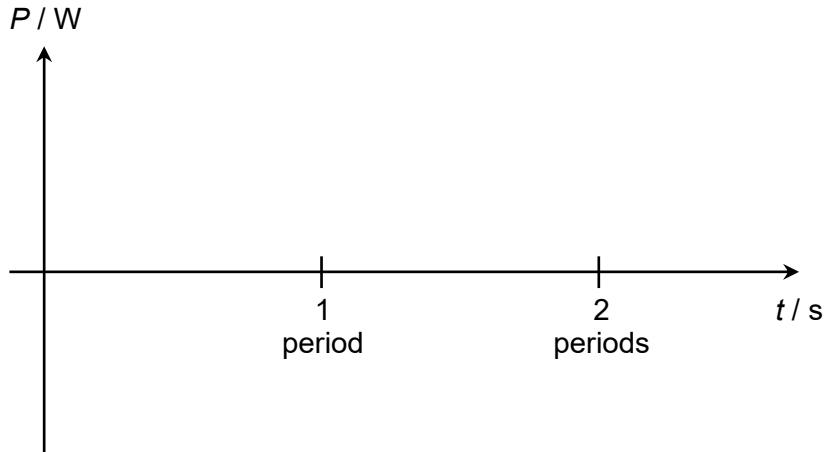


Fig. 7.4

[2]

- (ii) Draw a line in Fig. 7.4 to represent the average power dissipated in  $R$ .

Hence, show that the root-mean-square current in  $R$  is  $0.15\text{ A}$ .

[2]

## **Section B**

Answer **one** question from this Section in the space provided.