

- 5 (a) A silver wire of length 0.42 m has diameter 0.38 mm. The number density of free electrons in silver is $5.9 \times 10^{28} \text{ m}^{-3}$. The drift velocity of electrons in the wire is $7.2 \times 10^{-5} \text{ m s}^{-1}$.

Calculate the charge Q passing a point in the wire in a time of 30 minutes.

$$Q = \dots\dots\dots \text{ C [2]}$$

- (b) An a.c. power supply is connected to three resistors, as shown in Fig. 5.1.

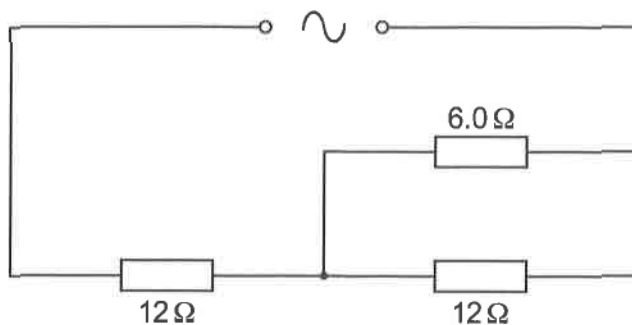


Fig. 5.1

The variation with time t of the voltage V of the power supply is given by the expression shown.

$$V = 9.0 \sin 120\pi t$$

- (i) For the power supply determine:

1. the frequency f

$$f = \dots\dots\dots \text{ Hz [1]}$$

2. the root-mean-square (r.m.s.) voltage V_{rms}

$$V_{\text{rms}} = \dots\dots\dots \text{ V [1]}$$





- (ii) 1. Calculate the peak current I_o from the power supply.

$$I_o = \dots\dots\dots \text{ A [3]}$$

2. Calculate the mean power P dissipated in the resistor of resistance 6.0Ω .

$$P = \dots\dots\dots \text{ W [2]}$$

[Total: 9]

