VOLTAGE, CHARGE AND CURRENT

\[ R = \frac{V}{I} \]
\[ R \] is the resistance in ohms (\( \Omega \))
\[ V \] is the voltage drop in volts (V)
\[ I \] is the current in amps (A)

\[ P = VI \]
\[ P \] is power in watts (W)
\[ V \] is voltage drop in volts (V)
\[ I \] is current in amps (A)

\[ \text{current (in amps)} = \frac{\text{charge transferred (in coulombs)}}{\text{time taken (in seconds)}} \]

**Figure 1.1** Power supply arrangements for a typical electronic system.

\[ f = \frac{1}{T} \]
\[ f \] is the frequency in hertz (Hz)
\[ T \] is the period in seconds (s)

**Figure 1.2** Using a battery of four 1.5V cells to make a 6V d.c. supply.

**Figure 1.3** Split supply rails: note the use of an earth connection to fix 0V.

**Figure 1.5** A voltage–time graph for a typical mains alternating voltage.

**Figure 1.7** Block and circuit diagrams for a simple smoothed power supply.

**Figure 1.8** The i–V characteristic for a silicon diode.

**Figure 1.11** The voltage at the anode of the diode goes both positive and negative.

**Figure 1.12** The voltage at the cathode is only positive or zero.

**Figure 1.9** There is a current in the diode when it is forward biased.

**Figure 1.15** The voltage across the load fluctuates up and down as the capacitor charges and discharges.

\[ V_r = \frac{I}{t} \]
\[ V_r \] is the ripple voltage (V)
\[ I \] is current in the load (A)
\[ t \] is the period of the rectified signal (s)
\[ C \] is the capacitance of the rectified capacitor (F)

\[ V_0 = \sqrt{2} \times V_{\text{rms}} \]

**Figure 1.10** The voltage at the anode of the diode is 5.2V.

**Figure 1.13** The voltage at the cathode is 0V.

**Figure 1.14** The current through the diode is 0A.

**Figure 1.16** The voltage across the load is 5V.

**Figure 1.17** The block diagram for a simple smoothed power supply.