FACULTY OF INDUSTRIAL SCIENCES & TECHNOLOGY
MATERIAL TECHNOLOGY PROGRAMME

ELECTRICITY, MAGNETISM & OPTICS

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CH06: DIRECT CURRENT CIRCUIT

1. Find the equivalent resistance and the current in each resistor shown in figure 6.1. The source of emf has negligible internal resistance.

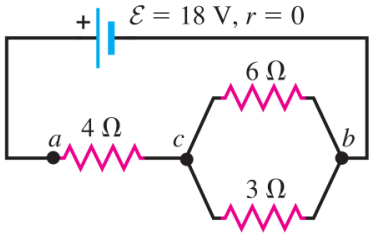

Figure 6.1

2. Two identical light bulbs, each with resistance R = 2 Ω, are connected to a source with $\mathscr{E}$ = 8 V and negligible internal resistance. Find the current through each bulb, the potential difference across each bulb, and the power delivered to each bulb if the bulb are connected
   (i) in series, and
   (ii) in parallel.
   (iii) Suppose one of the bulbs burns out; that is, the filament breaks and current can no longer flow through it. Determine what happens to the other bulb in the series case, and in the parallel case.

3. In the circuit shown below, a 12 V power supply with unknown internal resistance r is connected to a run-down rechargeable battery with unknown emf $\mathscr{E}$ and internal resistance 1 Ω, and to an indicator light bulb of resistance 3 Ω carrying a current of 2 A. The current through the run-down battery is 1 A in the direction shown.
   (i) Find *r*, $\mathscr{E}$ and the current *I* through the power supply.
   (ii) Calculate the power delivered by the 12 V power supply and by the battery being recharged.
   (iii) Determine the power dissipated in each resistor.