

- 6 (a) A wire has length 100cm and diameter 0.38mm. The metal of the wire has resistivity $4.5 \times 10^{-7} \Omega \text{m}$.

Show that the resistance of the wire is 4.0Ω .

[3]

- (b) The ends B and D of the wire in (a) are connected to a cell X, as shown in Fig. 6.1.

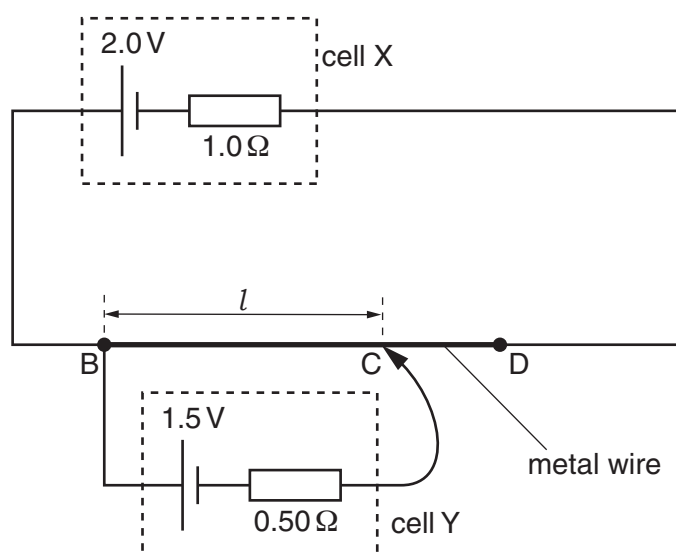


Fig. 6.1

The cell X has electromotive force (e.m.f.) 2.0V and internal resistance 1.0Ω .

A cell Y of e.m.f. 1.5V and internal resistance 0.50Ω is connected to the wire at points B and C, as shown in Fig. 6.1.

The point C is distance l from point B. The current in cell Y is zero.

Calculate

- (i) the current in cell X,

current = A [2]

(ii) the potential difference (p.d.) across the wire BD,

p.d. = V [1]

(iii) the distance l .

l = cm [2]

(c) The connection at C is moved so that l is increased. Explain why the e.m.f. of cell Y is less than its terminal p.d.

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.....[2]