OCR
Oxford Cambridge and RSA

AS Level Physics A

H156/01 Breadth in Physics

Question Set 20

1 (a) A cell of electromotive force (e.m.f.) 1.4 V and internal resistance 0.62 Ω is connected to resistor **A** and wire **B** as shown in Fig. 23.1.

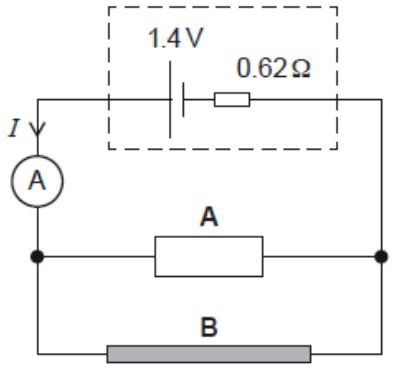

Fig. 23.1

The resistance of resistor **A** is 1.8 Ω and resistance per unit length of wire **B** is 9.5 Ωm^{-1}.
The length of wire **B** is 40 cm.

(i) Calculate the current I in the circuit. Write your value to an appropriate number of significant figures.

I = A **[4]**

(ii) Calculate the ratio $\frac{\text{power dissipated in the internal resistance}}{\text{total power supplied by cell}}$.

[2]

(b) This question is about two identical filament lamps. Fig. 23.2 shows the I-V characteristic of each lamp.

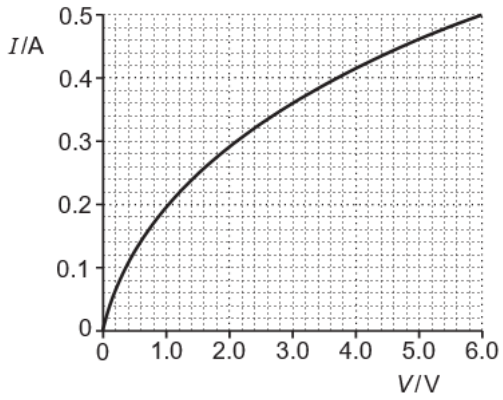

Fig. 23.2

The lamps are connected to a 6.0 V supply of negligible internal resistance in **series**, as shown in Fig. 23.3, and then in **parallel**, as shown in Fig. 23.4.

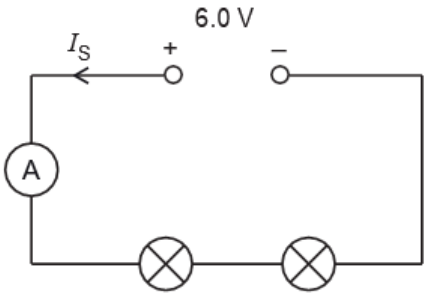

Fig. 23.3

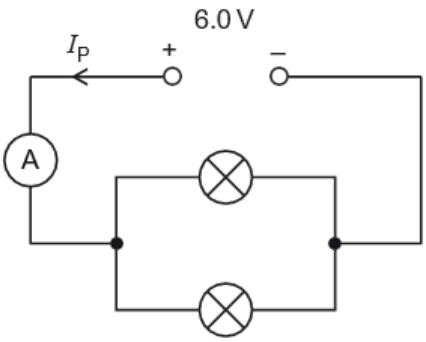

Fig. 23.4

The current from the supply in the series circuit is I_S and the current from the supply in the parallel circuit is I_P.
I_P is found to be almost 3 times greater than I_S.

Use Fig. 23.2 to explain why I_P is almost 3 times greater than I_S.
Show any calculations and your reasoning below.

Fig. 23.3 Fig. 23.4

[4]

Total Marks for Question Set 20: 10