

- 4 (a) An electric lamp has a resistance of 960Ω . The filament of the lamp is made from tungsten that has a resistivity of $7.9 \times 10^{-7} \Omega \text{ m}$. The diameter of the filament is $12.0 \times 10^{-6} \text{ m}$.

Calculate the length of the filament.

$$\text{length} = \dots \text{ m} [2]$$

- (b) Fig. 4.1 shows the variation with voltage V of the current I across a thermistor.

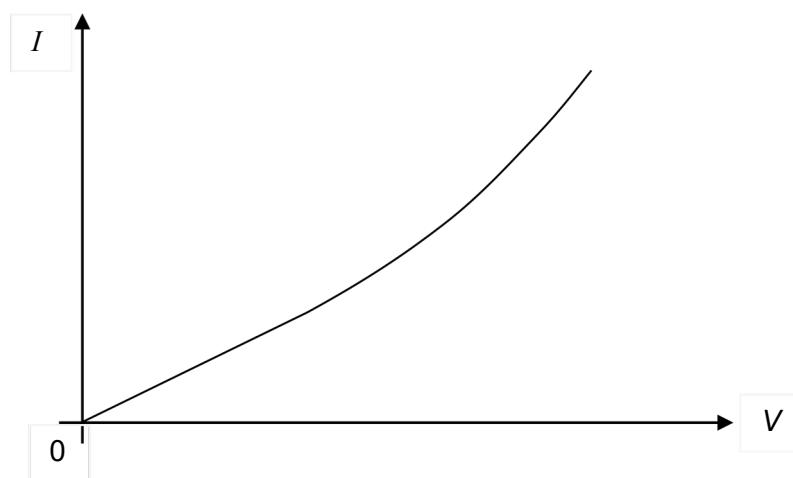


Fig. 4.1

- (i) State how the resistance of the thermistor can be determined from Fig 4.1.

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..... [1]

- (ii) In microscopicterms, explain why the resistance of the thermistor decreases as V increases.

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..... [3]

- (iii) The thermistor is connected to the lamp in (a) into the circuit in Fig 4.2. The resistance of the thermistor is $3900\ \Omega$ at 0°C and $1250\ \Omega$ at 30°C . The battery of electromotive force (e.m.f) $1.50\ \text{V}$ has negligible internal resistance.

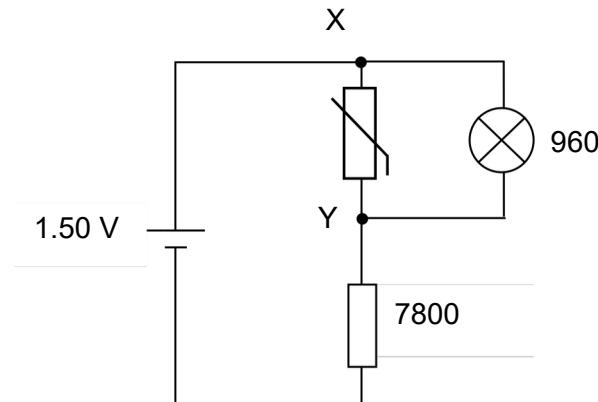


Fig. 4.2

1. Determine the effective resistance across XY when the temperature is 30°C .

$$\text{effective resistance} = \dots \Omega [1]$$

2. Determine the potential difference across XY when the temperature is 30°C .

$$\text{potential difference} = \dots \text{V} [2] \text{ Explain why the filament}$$

3. lamp becomes brighter when the temperature drops from 30°C to 0°C .

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[3]
[Total 12]