

- 4 (a) An electric lamp has a resistance of $960\ \Omega$. 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.

length = m [2]

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

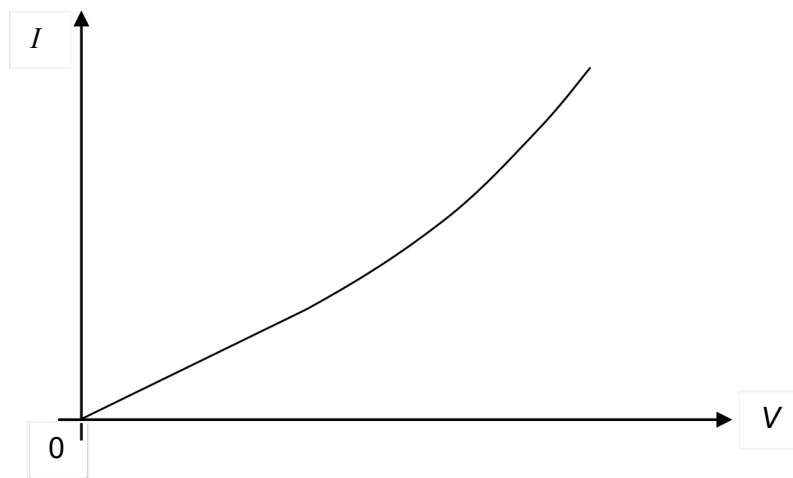


Fig. 4.1

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

.....
[1]

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

.....

[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.

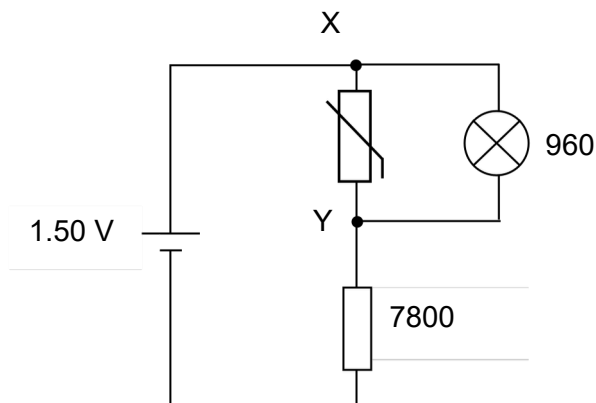


Fig. 4.2

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

effective resistance = Ω [1]

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

potential difference =V [2] Explain why the filament

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

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 [3]

[Total 12]