

- 6 (a) A battery B, a variable resistor R and a uniform resistance wire XY are connected in series, as shown in Fig. 6.1.

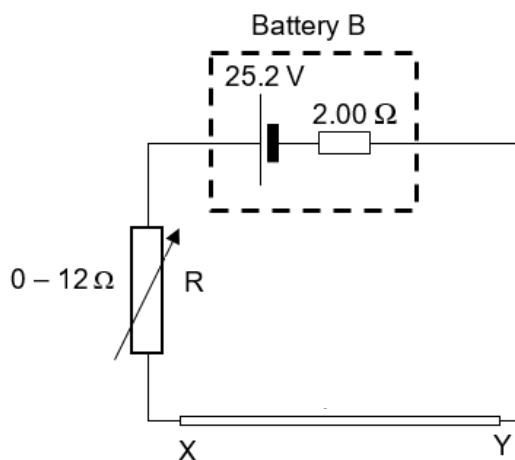


Fig. 6.1

Battery B has electromotive force (e.m.f.) 25.2 V and internal resistance 2.00 Ω . Wire XY is made of constantan and has resistance 40.0 Ω .

- (i) The resistance of R is varied from 0.0 to 12.0 Ω . Describe and explain the variation in the terminal potential difference (p.d.) across B. Numerical values are not required.

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 [3]

- (ii) The resistance of R is set at 4.00 Ω . Calculate the terminal p.d. across B.

p.d. = V [2]

- (b) A thermistor T is connected in series with a resistor of resistance $1.50\text{ k}\Omega$ and a battery, as shown in Fig. 6.2. The e.m.f. of the battery is 6.00 V and its internal resistance is negligible.

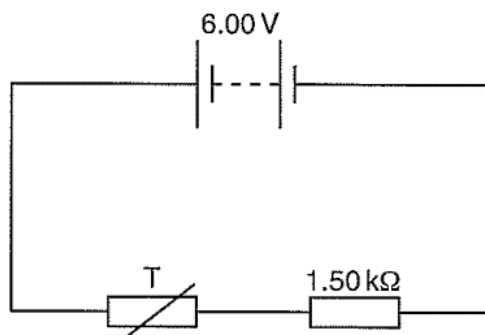


Fig 6.2

The variation with temperature θ of the resistance R of the thermistor is shown in Fig. 6.3.

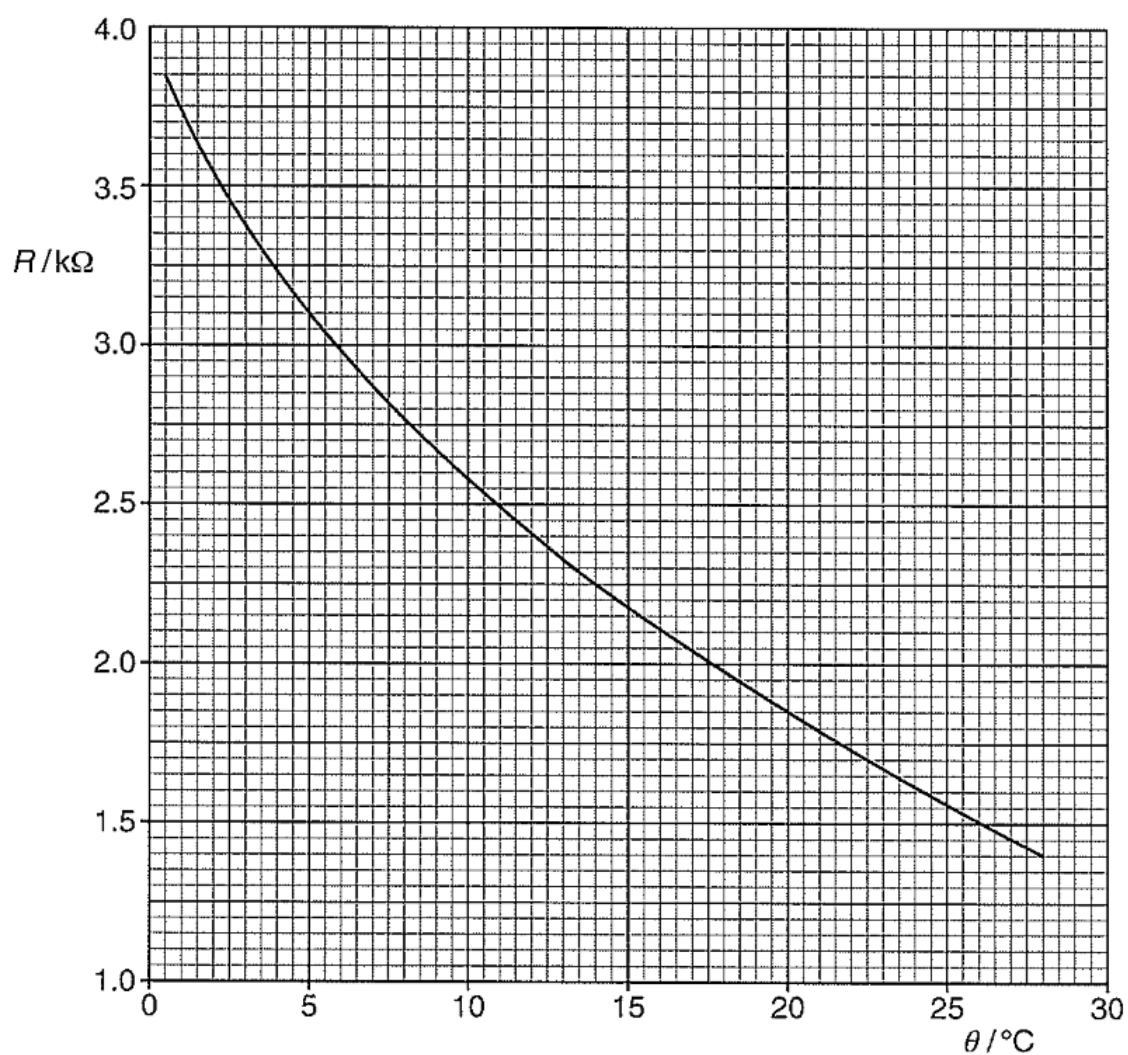


Fig. 6.3

- (i) At one temperature t of the thermistor, the current in the circuit is 1.60 mA. Determine the temperature t .

$t = \dots\dots\dots^\circ\text{C}$ [3]

- (ii) Determine the p.d. across the fixed resistor when the temperature is 5°C .

p.d. = $\dots\dots\dots\text{V}$ [2]

