**5** **(a)** State Kirchhoff's first law.

.....

..... [1]

**(b)** Fig. 5.1 shows a circuit containing a thermistor T that has a negative temperature coefficient.

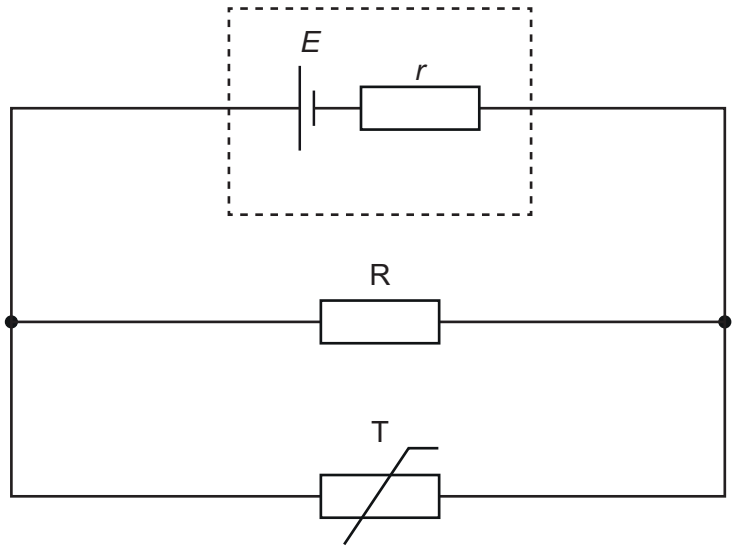


**Fig. 5.1**

**(i)** The thermistor has resistance $R_0$ at a temperature of 0 °C.

On Fig. 5.2, sketch a possible variation of the resistance of the thermistor with temperature between 0 °C and 100 °C.

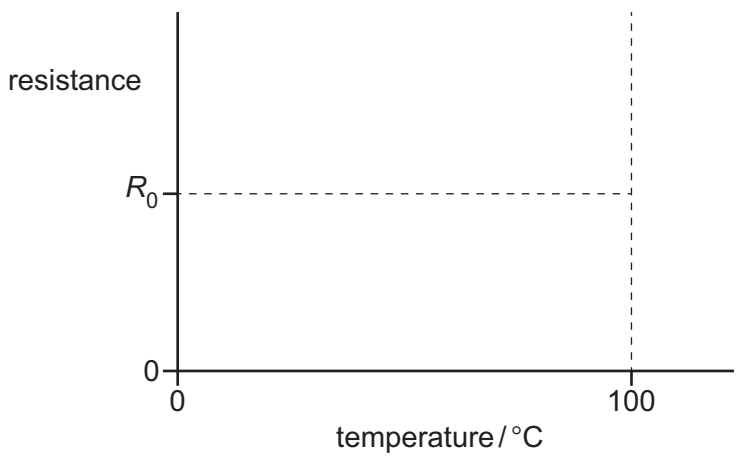


**Fig. 5.2**

[2]

**(ii)** With reference to the current in the cell, explain why the current in **resistor R** decreases with increasing temperature of the thermistor.

.....

.....

.....

.....

..... [3]

**(c)** The electromotive force (e.m.f.) $E$ of the cell in Fig. 5.1 is 1.50 V. The internal resistance $r$ of the cell is 0.12 Ω.

Resistor R has a resistance of 6.00 Ω.

At a particular temperature of the thermistor, the current in R is 0.200 A.

For this temperature of the thermistor, determine:

**(i)** the current in the cell

current = .....A [2]

**(ii)** the resistance of the thermistor.

resistance = ..... Ω [2]

[Total: 10]