6 **(a)** Fig. 6.1 shows a battery of negligible internal resistance connected with a thermistor in parallel with an ohmic resistor of resistance 1200 Ω.

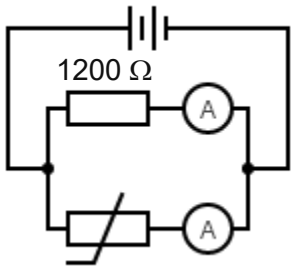

Fig. 6.1

The current in the 1200 Ω resistor is measured to be 5.0 mA.

(i) The thermistor has a resistance of 4700 Ω at room temperature.

Determine the current in the thermistor.

current = …… mA [2]

(ii) The temperature increases.
State how the currents in the resistor and the thermistor change.

resistor: ……

thermistor: …… [1]

(b) Fig. 6.2 shows an illumination level sensor circuit used to send a voltage signal V_{out} to another processing circuit.

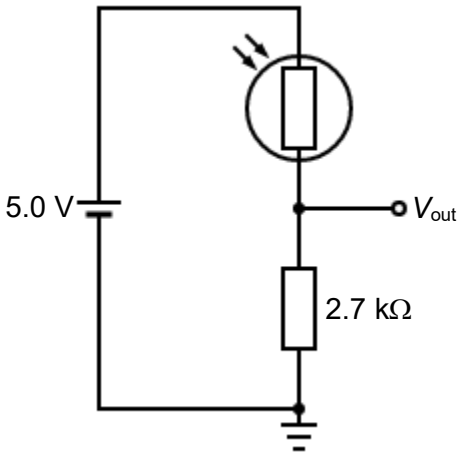

Fig. 6.2

The minimum and maximum resistances of the light-dependent resistor is 0.7 kΩ and 4.5 kΩ over the range of illumination level it is expected to operate in.

(i) Determine the minimum and maximum V_{out} the processing circuit is expected to receive.

minimum V_{out} = ... V

maximum V_{out} = ... V [3]

(ii) The processing circuit processes the V_{out} signal to calculate the relative illumination levels measured by the illumination level sensor circuit.

It is recommended that the resistance of the resistor be comparable to the range of resistances of the light-dependent resistor.

Explain the limitation if the resistance of the resistor is very small compared to the range of resistances of the light-dependent resistor.

.....

.....

.....

.....

..... [3]

[Total: 9]