2024 Sec 4 Physics Assignment 16B
Thermistors & LDR - Answers

1 (a) The *I/V* **ratio** of the graph is the **reciprocal** of the resistance of the thermistor. The graph shows that the voltage across the thermistor increases, the current is increasing at a greater rate. Hence, the resistance of the thermistor is decreasing.

(b) (i) I = 45 mA = **0.045 A** To show on graph with a horizontal dashed line!

(ii) $R = V / I$ = 2.0 / 0.045 = 44.4 = **44 Ω** (2 sf)

(iii) $P = I^2 R = (0.045)^2 \times 44$ = **0.090 W** (2 sf)

2 (a) (i) **600 Ω**

(ii) **25 Ω**

(b) At ice point, V_T = 600 / (600 + 25) × 12 = **11.5 V**

At steam point, V_T = 25 / (25 + 25) × 12 = **6.0 V**

Hence the difference in voltage is **5.5 V**.

(c) The resistance R of the thermistor changes more rapidly in the **range 0 °C to 10°C** as the graph shows a **steeper gradient** in that temperature range.

OR compare actual change in values in each range!

3 (a) V_{LDR} = 5 – 0.21 = 4.79 V and $V_{resistor}$ = 0.21 V

Apply potential divider method: $\frac{R_{LDR}}{R_{LDR}+10} = \frac{4.79}{5}$

$$5 \cdot R_{LDR} - 4.79 \cdot R_{LDR} = 47.9$$
$$R_{LDR} = \frac{47.9}{0.21}$$

R_{LDR} = 228.095 kΩ ≈ **230 kΩ**

(b) V_{LDR} = 5 – 4.2 = 0.8 V and $V_{resistor}$ = 4.2 V

Apply potential divider method: $\frac{10}{R_{LDR}+10} = \frac{4.2}{5}$

$$4.2 \cdot R_{LDR} = 50 - 42$$
$$R_{LDR} = \frac{8}{4.2}$$

R_{LDR} = 1.905 kΩ = **1.9 kΩ**