

ENGR 065: HW2-2

2- a) $V = 3 I_o$

$$V = 3 \cdot 15 \Rightarrow 45V$$

$$P_R = I_o^2 R$$

$$P_R = (15)^2 \cdot 3 = 675 \text{ m-watt} \leftarrow \text{Power of resistor}$$

b) $P_{\text{source}} = V I_o \Rightarrow 45 \cdot 15 = 675 \text{ mw}$

$$I_o = 15 \text{ mA}$$

KVL: $V = -15 \cdot 3 = -45 \text{ volts}$

Power of resistor: $P = (15)^2 \cdot 3$

$$= 675 \text{ mW} \\ (\text{delivers})$$

Power of ~~resistor~~

$$P = V I_o$$

$$= -45 \cdot 15$$

$$= -675 \text{ (absorb)}$$

3- Resistance of thermistor at $25^\circ C = 5 k\Omega$

Resistance of thermistor at $100^\circ C = 340 \Omega$

$$R_2 = R_1 [1 + \alpha (\theta_2 - \theta_1)]$$

$$340 = 5000 [1 + \alpha (100 - 25)]$$

$$0.068 = 1 + \alpha \cdot 75$$

$$-75 \alpha = 0.932$$

$$-\alpha = 0.0124$$

$$\alpha = -0.0124$$

Now $R_3 = 1 k\Omega$

$$R_3 = R_2 [1 + \alpha (\theta_3 - \theta_2)]$$

$$R_3 = 1 k\Omega$$

$$1000 = 340 [1 + \alpha (\theta_3 - 100)]$$

$$2.941 = [1 - 0.0124 \cdot (\theta_3 - 100)]$$

$$0.0124 (\theta_3 - 100) = 1 - 2.941$$

$$\theta_3 - 100 = -1.941$$

$$\frac{0.0124}{0.0124}$$

$$\theta_3 - 100 = -156.54$$

$$\theta_3 = 100 - 156.54 = -56.54$$

-56.54°