

**ELECTROTECHNOLOGY**  
**ELTK1100**  
**QUIZ #5**

Design a voltage divider circuit to power the following loads from a 240V supply:

- 150V drawing 15W.
- 100V drawing 3W.

Design for a bleeder current of 50 mA. Provide a labelled drawing of the circuit in your answer showing where given information (ex. 150V, 15W) is located.

$$I_1 = \frac{P_1}{V_1} = \frac{3W}{100V} = 30mA$$

$$I_2 = \frac{P_2}{V_2} = \frac{15W}{150V} = 100mA$$

$$I_B = 50mA$$

$$V_B = V_1 = 100V$$

$$R_B = \frac{V_B}{I_B} = \frac{100V}{50mA} = 2000\Omega$$

$$P_B = V_B I_B = 100V * 50mA = 5W$$

$$I_{R_1} = I_B + I_1 = 50mA + 30mA = 80mA$$

$$V_{R_1} = V_2 - V_1 = 150V - 100V = 50V$$

$$R_1 = \frac{V_{R_1}}{I_{R_1}} = \frac{50V}{80mA} = 625\Omega$$

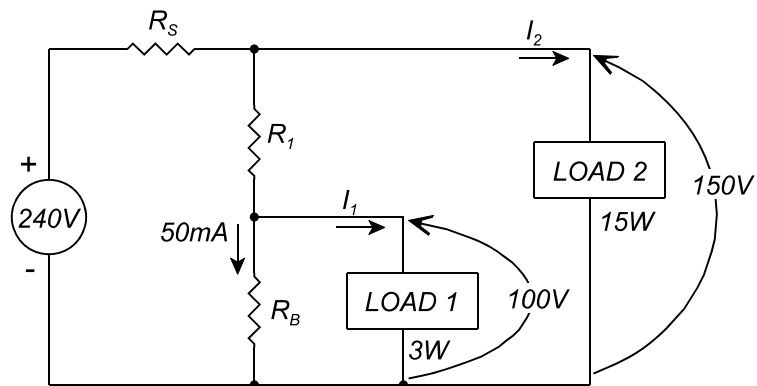
$$P_{R_1} = V_{R_1} I_{R_1} = 50V * 80mA = 4W$$

$$I_T = I_{R_1} + I_2 = 80mA + 100mA = 180mA$$

$$V_S = V_T - V_2 = 240V - 150V = 90V$$

$$R_S = \frac{V_S}{I_T} = \frac{90V}{180mA} = 500\Omega$$

$$P_S = V_S I_T = 90V * 180mA = 16.2W$$



	P (W)	V (V)	I (mA)	R ( $\Omega$ )
T		240	180	
S	16.2	90	180	500
Load 2	15	150	100	
R <sub>1</sub>	4	50	80	625
Load 1	3	100	30	
B	5	100	50	2000

*ohmic size*

*physical size*

Answer:

R<sub>B</sub> 2k $\Omega$ , 5W

R<sub>1</sub> 625 $\Omega$ , 4W

R<sub>S</sub> 500 $\Omega$ , 16.2W

Remember, you must specify the minimum power of the resistors because that determines the physical size of the resistor.