**Department of ECE, Bennett University**

**EECE105L: Fundamentals of Electrical and Electronics Engineering**

**Tutorial Sheet-5**

**Topics Covered: Thevenin's Theorem, Norton's Theorem with a voltage or a current source, and Maximum Power Transfer Theorem**

1. Using Thevenin's theorem, simplify the circuits shown in Fig. 1 to Fig. 6. Assume that the load resistance is connected between nodes A and B. If the load resistance value is not specified, compute the load resistance such that maximum power is transferred to the load. Find the voltage across the load resistor and current through the load resistor and the power rating of the load resistor.

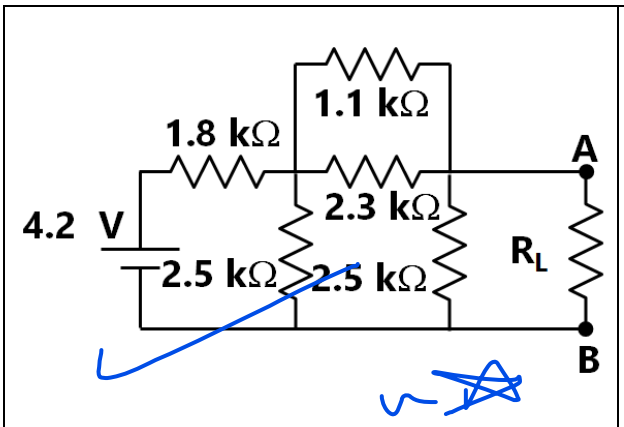


Fig. 1

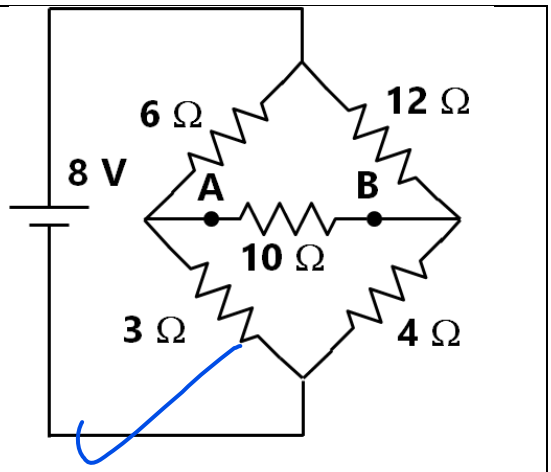


Fig. 2

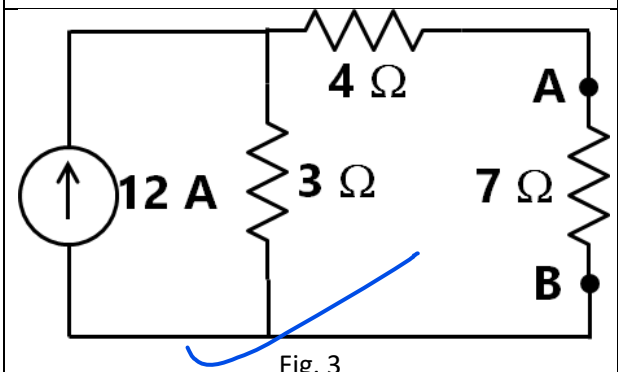


Fig. 3

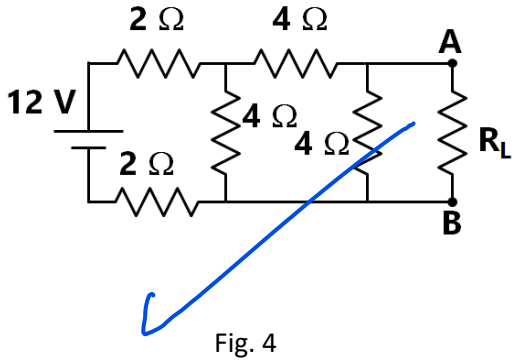


Fig. 4

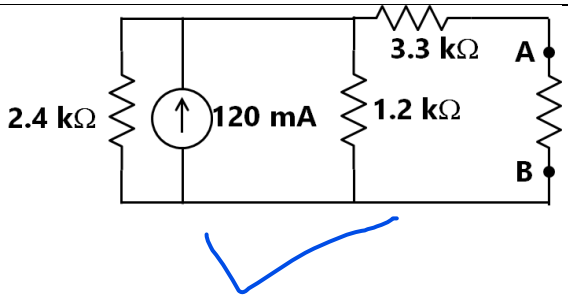


Fig. 5

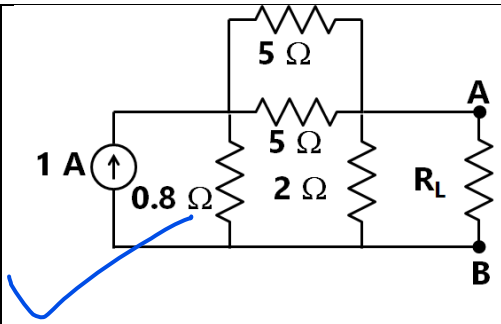


Fig. 6

2. Using Norton's theorem, simplify the circuits shown in Fig. 1 to Fig. 6. Assume that the load resistance is connected between nodes A and B. If the load resistance value is not specified, compute the load resistance such that maximum power is transferred to the load. Find the voltage across the load resistor and current through the load resistor and the power rating of the load resistor. Compare your results from problem 1.

---------- END OF QUESTIONS ----------

**Answers:**

| Fig. No. | $R_{TH}$ ($R_N$) (Ω) | $R_L$ (Ω) | $V_{TH}$ (V) | $I_N$ (A) | $V_L$(V) | $I_L$ (A) | $P_L = V_L \times I_L$ (W) |
|---|---|---|---|---|---|---|---|
| Fig. 1 | 1043 | **1043** | 1.425 | $1.36 \times 10^{-3}$ | 0.7125 | $0.683 \times 10^{-3}$ | $0.49 \times 10^{-3}$ |
| Fig. 2 | 5 | 10 | 0.67 | 0.133 | 0.447 | $44.7 \times 10^{-3}$ | $20 \times 10^{-3}$ |
| Fig. 3 | 7 | 7 | 36 | 5.14 | 18 | 2.57 | 46.286 |
| Fig. 4 | 2.4 | **2.4** | 2.4 | 1 | 1.2 | 0.5 | 0.6 |
| Fig. 5 | 4100 | **4100** | 96 | $23.41 \times 10^{-3}$ | 48 | $11.707 \times 10^{-3}$ | 0.56 |
| Fig. 6 | 1.245 | **1.245** | 0.302 | 0.2424 | 0.151 | 0.121 | $18.31 \times 10^{-3}$ |

**Note:** $R_L$ in bold letters represents $R_L$ for maximum power transfer.