Chapter 5 - Circuit Theorems

Lecture 17
Sections 5.6

MEMS 0031 Electrical Circuits

Mechanical Engineering and Materials Science Department
University of Pittsburgh

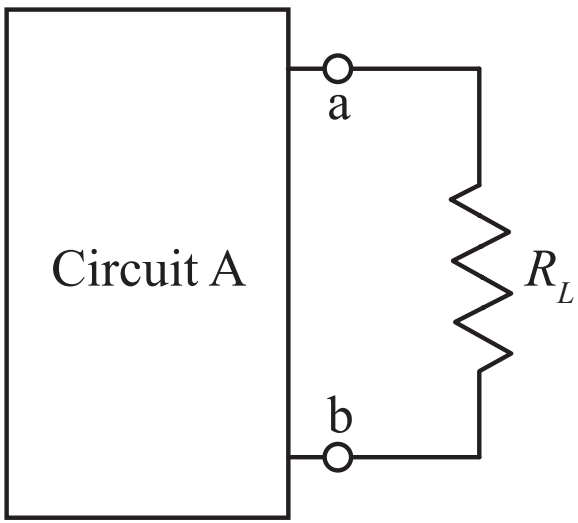
Student Learning Objectives

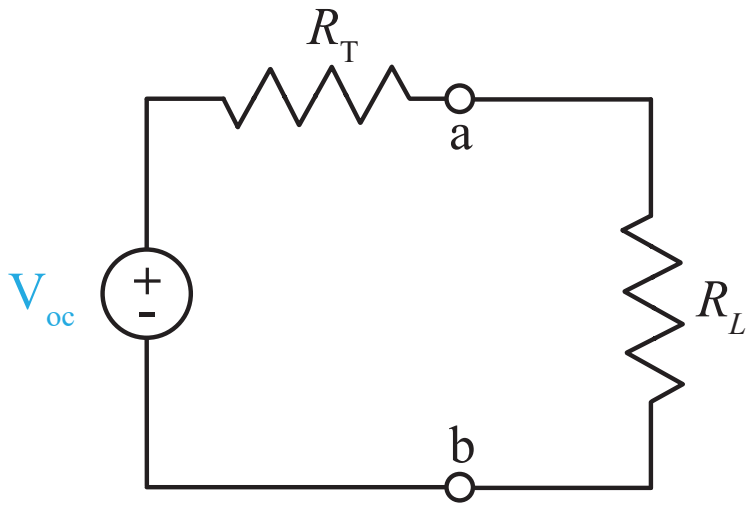
At the end of the lecture, students should be able to:

- Construct an expression that relates the maximum power transferred by a circuit to the load resistance

Maximum Power Transfer

- Choose R_L to maximize P of the circuit
- Or, given R_L, design a circuit to provide maximum P





- Remember the expression for Power:

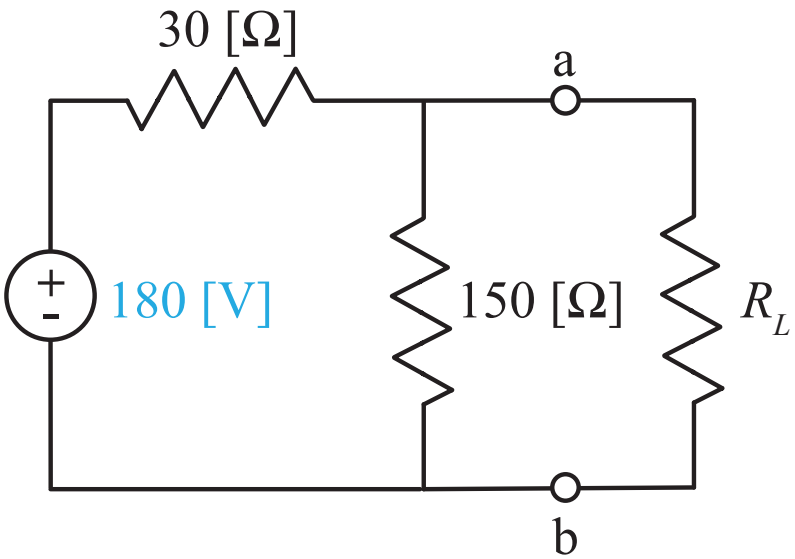
$$P = i^2 R_L = \left(\frac{V_{\text{oc}}}{R_t + R_L} \right)^2 R_L$$

Maximum Power Transfer

- How do we mathematically determine which value of R_t maximizes R_L?

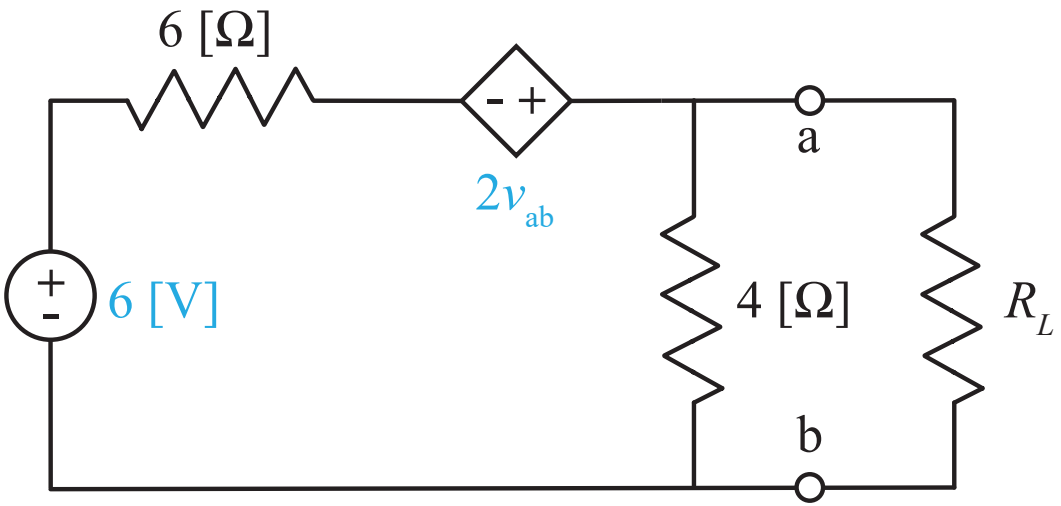
Example #1

- Find R_L that maximizes P, and determine P



Example #2

- Find R_L that maximizes P, and determine P



Student Learning Objectives

At the end of the lecture, students should be able to:

- Construct an expression that relates the maximum power transferred by a circuit to the load resistance
  - Maximum power transfer occurs when the load resistance is equal to the internal resistance of the circuit.

Suggested Problems

- 5.6-1, 5.6-2, 5.6-3, 5.6-5, 5.6-6, 5.6-7, 5.6-8