

Test #2 Overview

Material covered

- Chapter 4, Sections 1 - 8 (node and mesh equations) $\approx 70\%$
- Chapter 5 (operational amplifiers) $\approx 30\%$

Node Equations

Node voltages - relative voltages that depend on the reference (ground)

Finding component current, voltage, or power using node voltages

Node Equations = # Nodes - # Voltage Sources - 1

Supernodes - needed when the circuit contains voltage sources that are not adjacent to the ground

Dependent sources - redefine the control variable in terms of node voltages

Mesh Equations

Limited to planar circuits

Finding component current, voltage, or power using mesh currents

Mesh Equations = # Meshes - # Current Sources

Supermesh - needed when the circuit contains internal current sources (not on the outer edge)

Dependent sources - redefine the control variable in terms of mesh currents

Operational Amplifiers

Ideal amplifiers only - no models

Basic rules for analyzing an ideal op amp:

- $V^+ = V^-$
- $I^+ = I^- = 0$
- All voltages are node voltages (w.r.t. a common ground)

Two common op-amp limitations:

- $V_o(\text{max}) = V_{\text{sat}}$ is limited by the supply voltage, $\pm V_{\text{DC}}$.
- $I_o(\text{max})$ is generally specified by the manufacturer

Key analysis tool: node equations

Do not memorize any equations for common op amp configurations (such as $V_o = -(R_F/R_1)V_{\text{in}}$ for the inverting amplifier).

You do not need to know the dependent source model for an op amp (although we will use it in PSPICE).

Study hint:

- Work enough problems so that you become fast at solving them.
- Pick any of the node or mesh equations problems in the text and try solving them twice: once with node equations and once with mesh equations.