Please Print.

Last Name: 

First Name: 

Instructions

WRITE CLEARLY and NEATLY. Messy and illegible writing will result in ZERO credit.

1. Examination Duration: 1 hour 15 minutes. If you come early (up to 15 minutes), you can have that extra time.

2. You can use a calculator, and the Help Sheet that has been verified by the instructor.

3. There are 2 parts, A and B. Part A: 40 points – answer any 3 of the 4 problems, 13.33 points each) and Part B: 60 points (3 problems, 20 points each). A bonus problem for 10 points is at the end. DO NOT RELY ON PARTIAL CREDITS, which will be given only for proper steps/logic, and solely at the discretion of the instructor. SHOW ALL YOUR STEPS.

Highlight your answers.

4. Answer in the space/sheets provided. Additional sheets are provided at the end for scratch work and/or for space needs. Do not un-staple; if you do, staple back with page numbers in order.

5. Any copying or cheating will result in appropriate action as per university regulations.

Score Tabulation (For Grading Purposes by the Instructor)

A1 -
A2 -
A3 -
B1 -
B2 -
B3 -
Bonus -
A.1

(a) Is the 20 V source dissipating or delivering power? How much?
(b) Is the 50 V source dissipating or delivering power? How much?
A.2
The voltage and current were measured at the terminals of the device shown in Figure (a). The results are shown in a table in Figure (b). Construct a circuit model for this device using an ideal voltage source and a resistor.
A3
The voltmeter shown in Figure (a) has a full scale reading of 750 V, and the meter movement is rated at 75 mV and 1.5 mA. What is the percentage of error in the meter reading if it is used to measure the voltage $v$ in the circuit shown in Figure (b)? **Hint:**

$$\text{% error} = \left(\frac{\text{measured value}}{\text{true value}} - 1\right) \times 100.$$
A4
In the figure shown below, the dc source is 25 V, $R_1 = 500 \, \Omega$, $R_2 = 1 \, k\Omega$, and $R_3$ is set to $750 \, \Omega$ so that the bridge is balanced. (a) What is the value of $R_x$? (b) What is the power dissipated in the bridge?

![Bridge Circuit Diagram](image)
B1 (20 points)
Determine the voltage, $v_0$, in the circuit shown below using node voltage analysis. What is the power dissipated in the 10Ω resistor?
B2 (20 points)
Use the mesh current method to determine the current through each of the branches (resistors, and dependent source). Clearly mark the direction of the branch currents in the figure so that your results can be verified.
B3. (20 points)

A load resistor, $R_L$, is to be connected to the terminals a-b, so that maximum power is dissipated in $RL$. Determine $R_L$, and the power dissipation in $R_L$. 

![Circuit Diagram](image-url)
C. Bonus (10 points)

Determine the voltage $V_R$ in the circuit shown below. What is the power dissipated or delivered by the dependent voltage source?