Exam 2
CSCI-UA.0480-005
Special Topics: Electrical Engineering for Computer Scientists
Prof. Rappaport
March, 12, 2015

Last Name: ______________________
First Name: _____________________
N #: ____________________________

Integrity Policy: A student receiving unauthorized assistance during an examination, as from notes or other students, is in violation of academic regulations and is subject to academic discipline, including forfeiture of credit for the course, probation, and dismissal from the NYU Courant Institute of Mathematical Sciences.

I have read and understand the Integrity Policy.

Signature: ___________________________ Date: ____________

Exam Rules and Instructions:

• No textbooks, no calculators, no cellphones, no notebooks, no extra pieces of papers.
• All personal belongings should be placed at the front of the classroom.
• Two 3.5” x 5” double sided index card crib sheets allowed.
• Leave NYU ID on your desk to be checked during the exam.
• ALL answers should be filled in on the multiple choice test sheet.
• In the “STUDENT NAME” section of the multiple choice sheet, write your entire name and N #.
• On the multiple choice test sheet, leave the STUDENT # section blank.
• Use a No. 2 Pencil and fill in bubbles completely.

The exam consists of 20 multiple choice questions, each worth 5 points.
1. What is the voltage potential between \( V_1 \) and reference node in the circuit in Figure 1?

![Figure 1](image)

A. -10 V  B. -6 V  C. 6 V  D. 10 V  E. 12 V

2. What is the current \( i \) in the circuit in Figure 1?

A. -2 A  B. -1 A  C. 1 A  D. 2 A  E. 4 A
3. What is the voltage $V_x$ in the circuit in Figure 2?

A. -2 V  B. -1 V  C. 1 V  D. 2 V  E. 4 V

![Figure 2](image)

4. Determine the power absorbed by the dependent source in the circuit in Figure 2.

A. -8 W  B. -4 W  C. 4 W  D. 6 W  E. 8 W
5. For the circuit in Figure 3, which of the following equations is correct?

A. \[2i_1 + 8(i_1 - i_4) + 1(i_1 - i_3) + 4(i_1 - 5) = -10\]
B. \[2i_1 + 2i_4 + 3(i_4 - i_3) + 4(i_1 - i_3) + 4(i_1 - 5) = -10 + 3\]
C. \[2i_1 + 2i_4 + 6(i_3 - 5) + 4(i_1 - 5) = -10 + 3 + 3\]
D. \[2(i_2 - i_1) + 6(i_2 - i_3) + 7i_2 = 0\]
E. None of the above

6. For the circuit in Figure 4, which of the following equations is NOT correct?

A. \[\frac{V_1 - V_2}{10} = 3 + 7\]
B. \[\frac{V_1 - V_2}{10} = \frac{V_3 - V_4}{5}\]
C. \[\frac{V_5 - V_4}{7} - \frac{V_6}{3} = 7\]
D. \[\frac{V_4 - V_3}{5} + \frac{V_4 - V_5}{7} + \frac{V_4 + 3}{2} = 0\]
E. \[V_5 - V_6 = 6\]
7. For the circuit in Figure 5, what is $i_2$?

A. -1.5 A  B. -1.4 A  C. 1.4 A  D. 1.5 A  E. 5 A

8. For the circuit in Figure 5, what is $i_3$?

A. -1.5 A  B. -1.4 A  C. 1.4 A  D. 1.5 A  E. 2.1 A
9. For the circuit in Figure 6, determine $i_x$ through the 10 Ω resistor.

![Figure 6](image)

A. -3 A  B. -1 A  C. 1 A  D. 2 A  E. 3 A

10. For the circuit in Figure 6, determine the power dissipated in the 10 Ω resistor.

A. -90 W  B. -40 W  C. 10 W  D. 40 W  E. 90 W
11. For the circuit in Figure 7, determine the Thevenin equivalent resistance $R_{TH}$ between terminals A and B.

![Figure 7](image)

A. 30 kΩ  B. 40 kΩ  C. 80 kΩ  D. 120 kΩ  E. 160 kΩ

12. For the circuit in Figure 7, determine the Thevenin equivalent open circuit voltage $V_{OC}$ between terminals A and B.

A. -20 V  B. -15 V  C. 15 V  D. 20 V  E. 40 V

13. For the circuit in Figure 7, determine the Norton equivalent short circuit current $I_{SC}$ between terminals A and B.

A. -1 mA  B. $-\frac{1}{2}$ mA  C. $\frac{1}{2}$ mA  D. 1 mA  E. 2 mA
14. For the circuit in Figure 7, if a load resistor $R_L = 60 \, \text{k}\Omega$ is connected between terminals A and B, what is the power dissipated in the load resistor?
   A. $\frac{1}{3} \, \text{mW}$  B. $\frac{2}{3} \, \text{mW}$  C. $\frac{4}{3} \, \text{mW}$  D. $\frac{5}{3} \, \text{mW}$  E. 2 mW

15. For the circuit in Figure 8, if you reduce the circuit down to a voltage source in series with a resistor, what is the value of the voltage source?
   A. 14 V  B. 15 V  C. 18 V  D. 19 V  E. 20 V

16. For the circuit in Figure 8, determine the Thevenin equivalent resistance $R_{TH}$.
   A. 3 $\Omega$  B. 5 $\Omega$  C. 6 $\Omega$  D. 9 $\Omega$  E. 10 $\Omega$
17. For the circuit in Figure 9, determine the equivalent resistance of the circuit.

![Figure 9](image)

A. 15 kΩ  B. 20 kΩ  C. 25 kΩ  D. 30 kΩ  E. 35 kΩ

18. If a load resistor $R_L$ is placed in series with the network as depicted in Figure 10, $R_{TH} = 25\Omega$, what is the maximum amount of power that can be dissipated in $R_L$?

![Figure 10](image)

A. 5 W  B. 25 W  C. 50 W  D. 250 W  E. 500 W
19. Determine the Thevenin equivalent resistance $R_{TH}$ of the circuit in Figure 11.

![Circuit Diagram]

Figure 11

A. 4 $\Omega$  B. 8 $\Omega$  C. 10 $\Omega$  D. 16 $\Omega$  E. 20 $\Omega$

20. For the circuit in Figure 11, determine the Thevenin equivalent open circuit voltage $V_{OC}$ between terminals A and B.

A. 5 V  B. 10 V  C. 15 V  D. 20 V  E. 25 V