電路學(EE2210)第一次期中考

2011年10月26日
時間：2 小時
Close Book

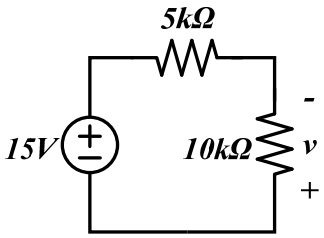
學號：_____

姓名：_____

- There are 11 pages in this midterm exam, including this cover page. Please check that you have them all.
- Please write your **學號 姓名** in the space provided above.
- **IMPORTANT:** The problems in this exam vary in difficulty; moreover, questions of different levels of difficulty are distributed throughout the exam. If you find yourself spending a long time on a question, consider moving on to later problems in the exam, and then working on the challenging problems after you have finished all of the easier ones.
- Do your work and enter your answer for each question within the boundaries of that question. You may do your work on the back of the preceding page.
- Remember to include the sign and units for all numerical answers.
- This is a closed-book exam, but you may use a calculator.
- You have 2 hours to complete this exam.
- Good luck!

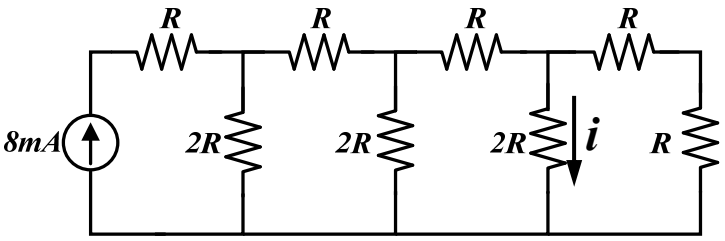
1.	2.	3.	4.	5.
6.	7.	8.	9.	10.
11.	12.	13.	14.	15.
Total Grade				

1. Determine the indicated branch voltage v. (4%)



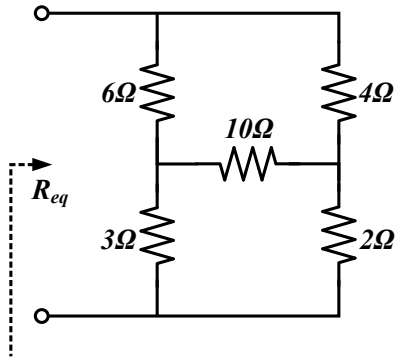
v = _____

2. Determine the indicated branch current i. (4%)



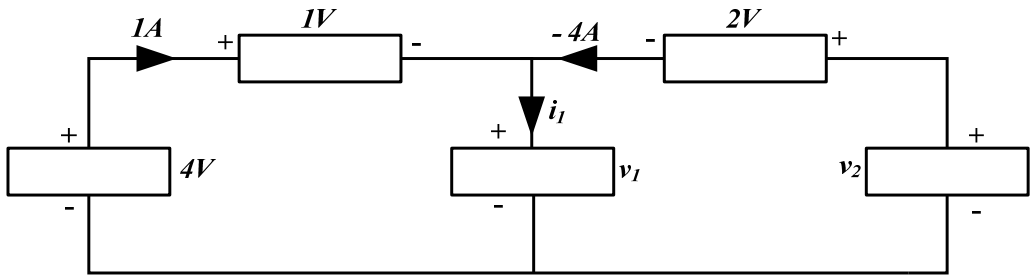
i = _____

3. Find the equivalent resistance R_{eq} between the indicated terminals. (4%)



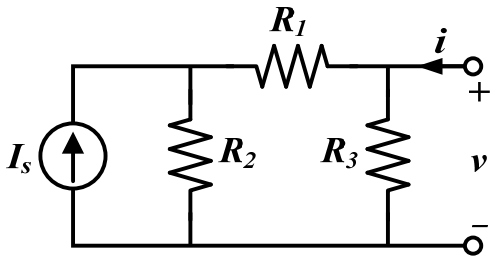
R_{eq} = _____

4. Find the branch voltage v_1, v_2 and the branch current i_1. (9%)



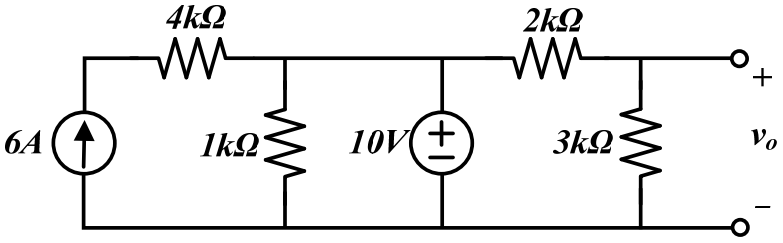
v_1 = _____, v_2 = _____, i_1 = _____

5. Find the Thévenin equivalent for the network. (8%)



V_{TH} = _____, R_{TH} = _____

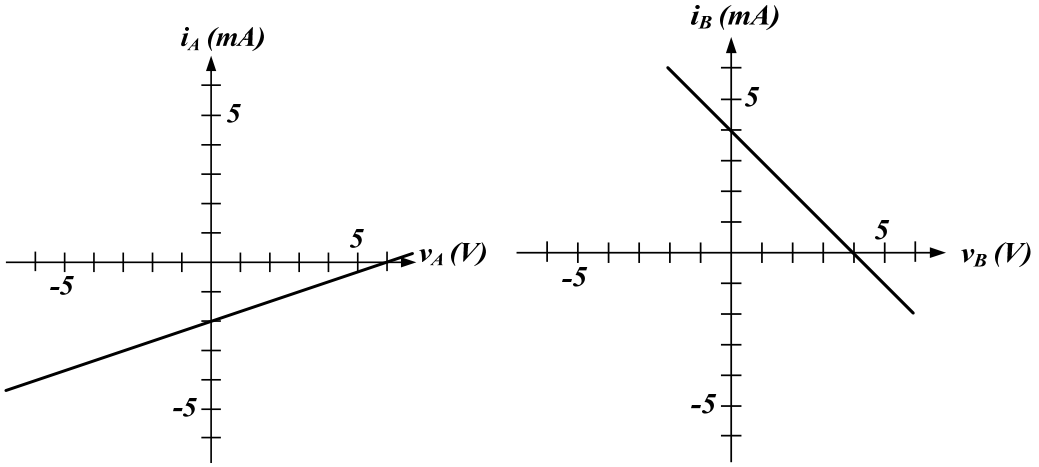
6. Find v_0 of the following network by superposition. (4%)

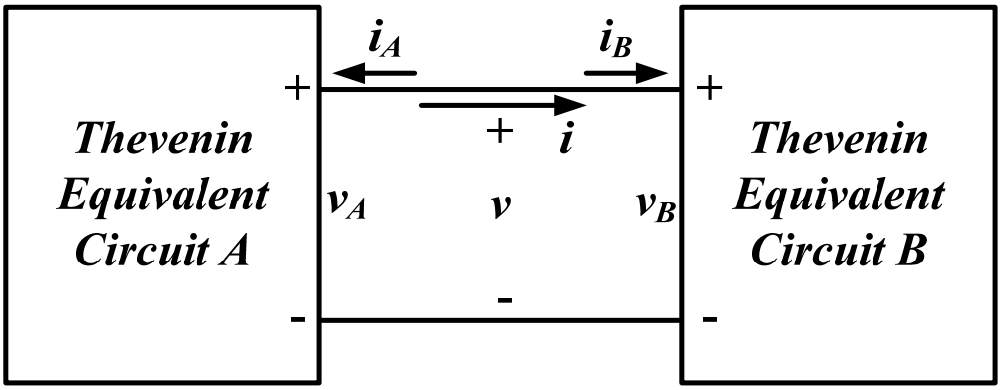


v_o = _____

7. The *i*-*v* characteristics for each of two Thévenin equivalent circuits are plotted in the graphs corresponding to the labelled network. Using the graphs, estimate the

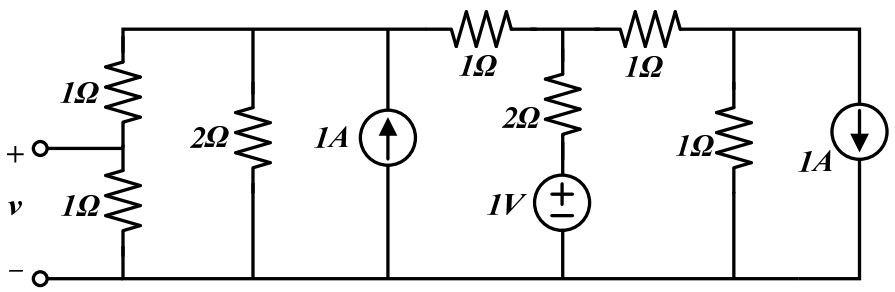
current *i* when the circuits are connected as shown. (Hint: This problem is most easily done graphically.) (8%)





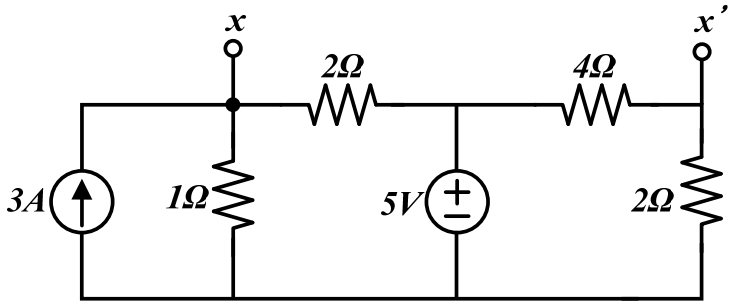
i = _____, v = _____

8. Find *v* of the following network by superposition. (4%)



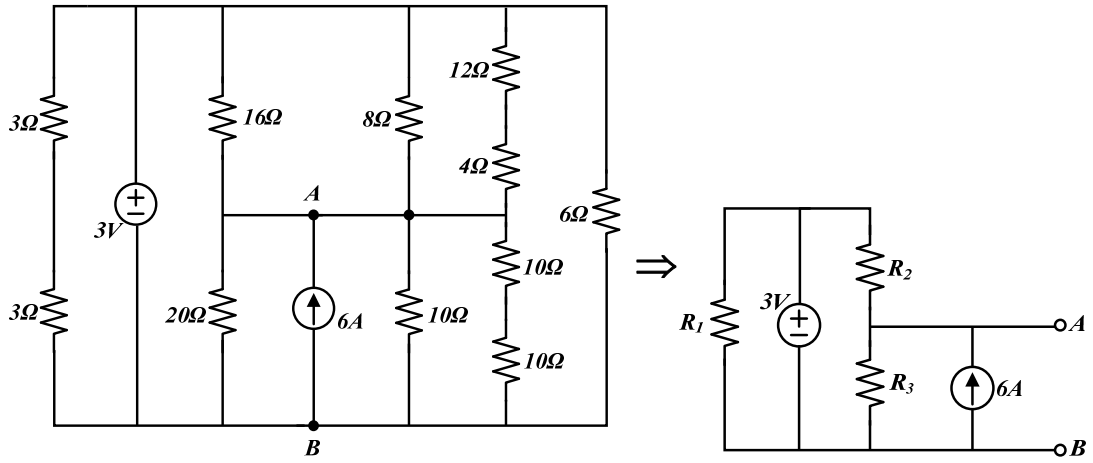
v = _____

9. Find the Norton equivalent at the terminals marked x x' in the circuit. (8%)



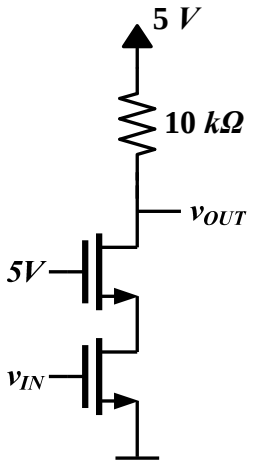
I_N = _____, R_N = _____

10. **Determine** the values of R_1, R_2 and R_3 so that the entire circuit above is equivalent to the simpler circuit shown below for the purpose of creating the Norton equivalent of the above circuit when viewed from its port labeled A-B. **Find** the Norton equivalent of the circuit when viewed from A-B port. (15%)



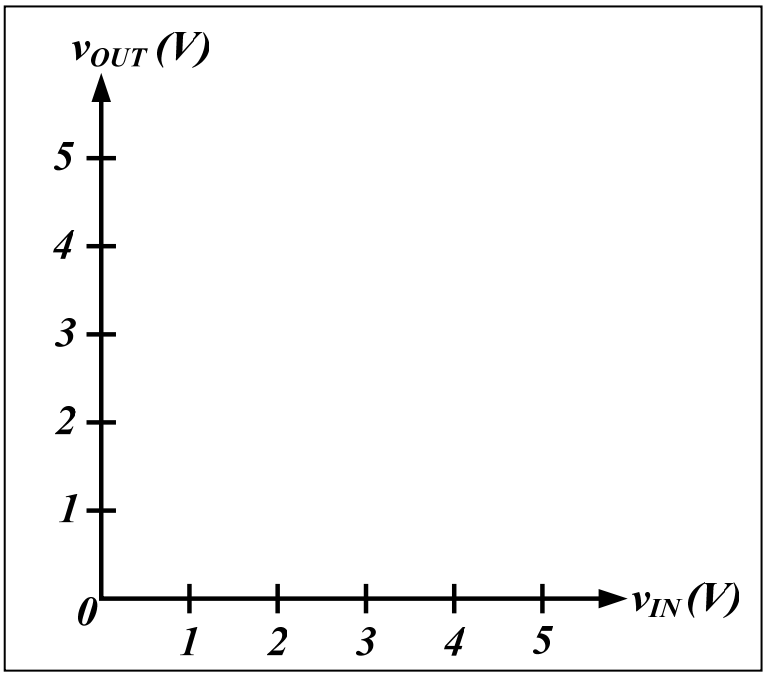
R_1 = _____, R_2 = _____, R_3 = _____
I_N = _____, R_N = _____

11. **Draw** the voltage transfer characteristics for the NAND gate circuit shown. Can this gate be operated in a digital system characterized by a static discipline with the voltage thresholds below? (8%)



For both MOSFET: $V_T = 2.1$ V
$R_{on} = 1$ kΩ

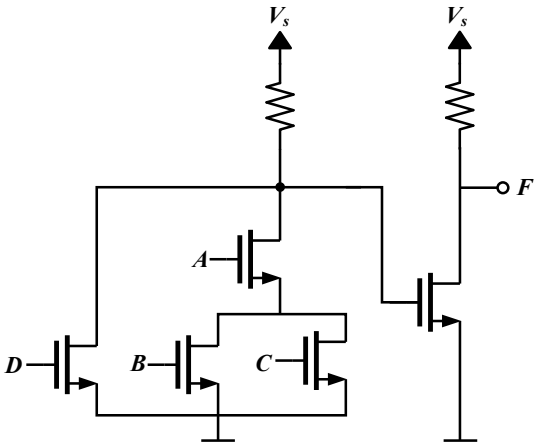
Static Discipline: $V_{OL} = 1$ V $V_{OH} = 4$ V
$V_{IL} = 2$ V $V_{IH} = 3$ V



Can this gate be operated in a digital system characterized by the a static discipline? Explain.

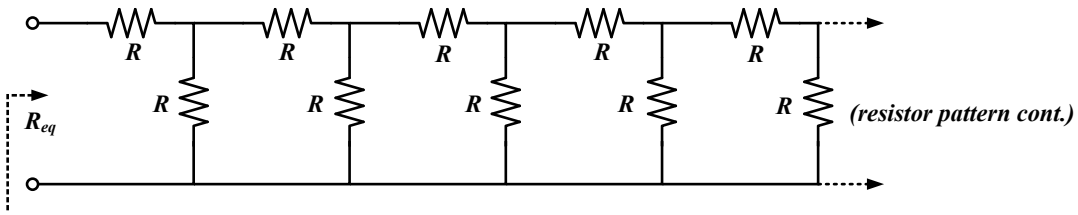
Answer: _____

12. Write the boolean expression for ***F*** in terms of ***A***, ***B***, ***C***, and ***D*** for the following circuit. (4%)



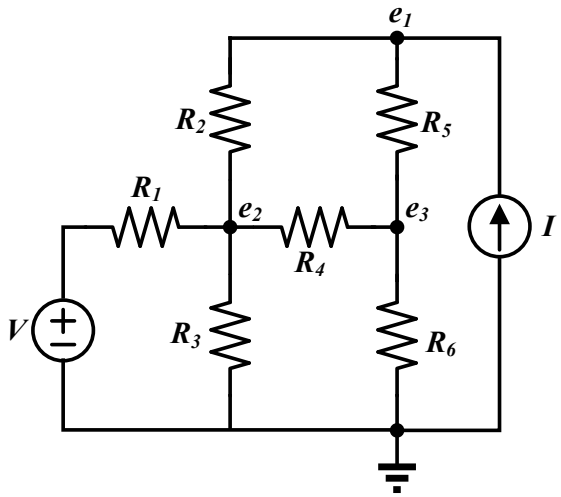
F = _____

13. Find the equivalent resistance R_{eq} between the indicated terminals. (4%)



R_{eq} = _____

14. The network shown below has three nodes with unknown node voltages e_1, e_2 and e_3. Carry out a node analysis and determine three node equations that can be used to determine e_1, e_2 and e_3. You need not solve the equations. (12%)



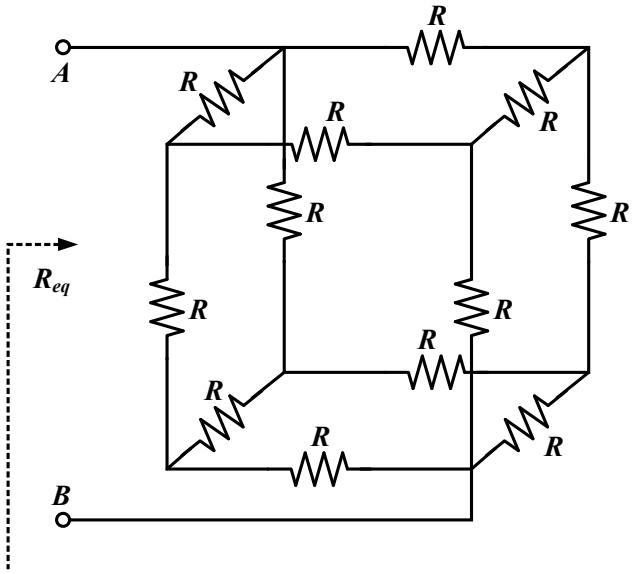
Node equations:

Node e_1: _____

Node e_2: _____

Node e_3: _____

15. Find the equivalent resistance R_{eq} between the indicated terminals. Assume that all of the resistors have a value of 1kΩ, and that 1 mA flows into node A and out of node B. (4%)



R_{eq} = _____