ENGG104 Tutorial **5** extra **Problems** (revision)
(Solutions**)**

Name_____   Student Number_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which network theorem states "The current through, or voltage across, an element in a linear   1) _____
   bilateral network is equal to the algebraic sum of the currents or voltages produced independently
   by each other"?
      A) Superposition   B) Norton's maximum power transfer
      C) Substitution   D) Thevenin's

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

2) For any physical network, the value of E_{th} can be determined experimentally by measuring the   2) _____
   open–circuit voltage across the load terminals.

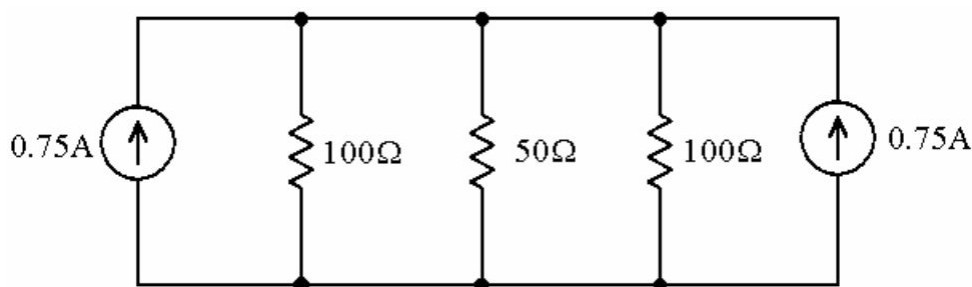**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

Figure 9.8

3) See Figure 9.8. Obtain the Thevenin circuit then convert to a current source assuming the   3) _____
   50 ohms resistor is the load resistor.

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

4) Thevenin's theorem permits the reduction of any two–terminal linear dc network to one having a   4) _____
   single voltage source and series resistance.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.
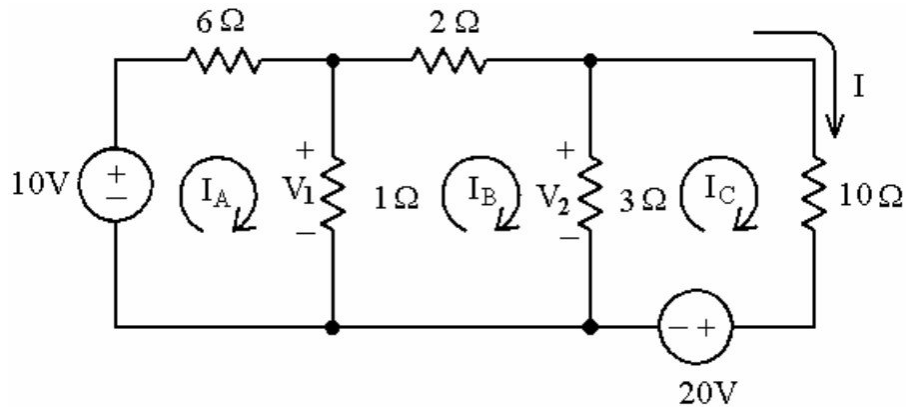

Figure 9.7

5) See Figure 9.7. Solve for the current flowing through the 10 ohms resistor by applying the superposition theorem.

5) _____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

6) The total power delivered to a resistive element can be determined by the sum of the power levels established by each source.

6) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

7) The substitution theorem states that

7) _____

    A) any number of parallel voltage sources can be reduced to a single source.

    B) if the voltage across and the current through a branch are known, the branch can be replaced by a combination of elements that maintain the same voltage across and current through that branch.

    C) any two-terminal linear bilateral source can be replaced by an equivalent circuit consisting of a current source and a parallel resistor.

    D) the current in any branch of a network, due to a single voltage source elsewhere in the network, will equal the current through the branch in which the source was originally located if the source is placed in the branch in which the current was originally measured.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.
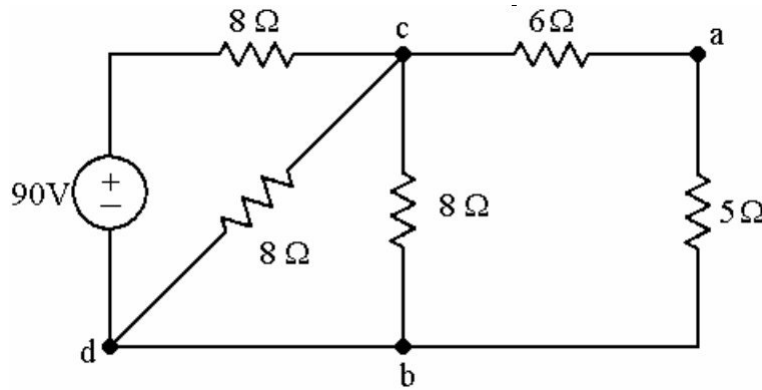

Figure 9.10

8) See Figure 9.10. Calculate the Thevenin voltage and Thevenin resistance circuit for the network at the terminals ab of the circuit.

8) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

9) Thevenin's theorem states that you can replace a 2–terminal dc network with an equivalent circuit consisting of

9) _____

A) a voltage source and a parallel resistor. B) a current source and a parallel resistor.
C) a current source and a series resistor. D) a voltage source and a series resistor.

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

10) The resistance calculated using Norton's theorem is equal to the resistance calculated using Thevenin's theorem for the same electrical network.

10) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.
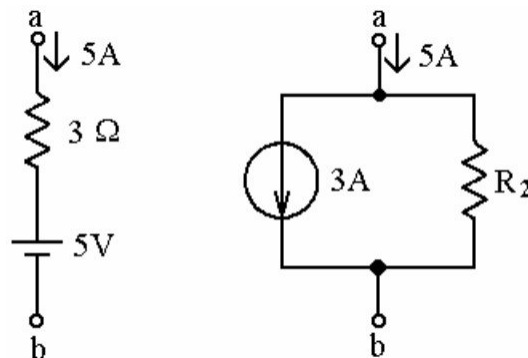

Figure 9.5

11) See Figure 9.5. What value of R_2 makes these two circuits equivalent substitutions between terminals a and b?
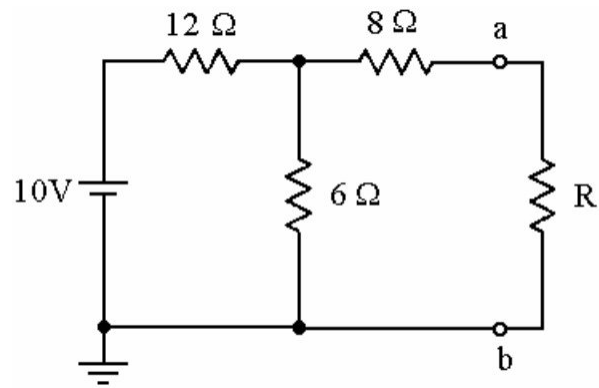
11) _____

A) 10 Ω B) 3 Ω C) 4 Ω D) 15 Ω

Figure 9.1

12) See Figure 9.1. What is the Thevenin resistance external to the resistor R?   12) _____
   A) 15.4 Ω   B) 12 Ω   C) 14 Ω   D) 3.4 Ω

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.
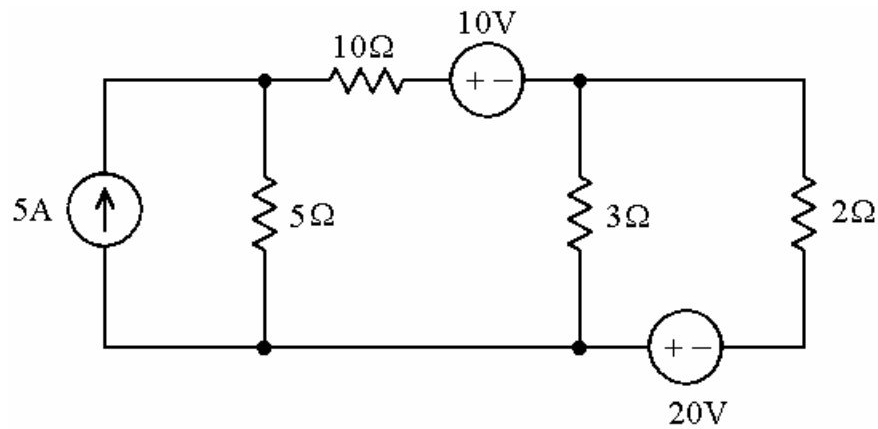

Figure 9.9

13) See Figure 9.9. Using Thevenin's Theorem determine the current in the 2 ohms resistor.   13) _____
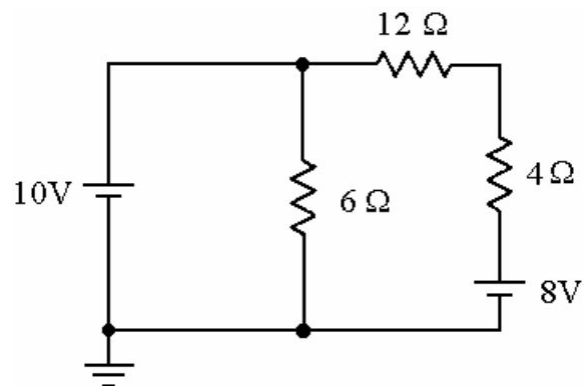

Figure 9.2

14) See Figure 9.2. Use the superposition theorem to compute the voltage across the 4 Ω   14) _____
   resistor.

4

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

$$10\ \Omega$$

$$5\ \Omega$$

R

10V

Figure 9.4
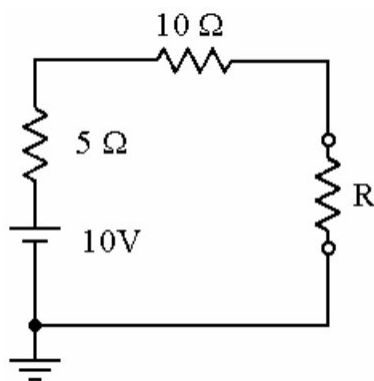
15) See Figure 9.4. What is the Norton equivalent resistance R_N external to the resistor R?   15) _____
    A) 15 Ω B) 3.33 Ω C) infinity   D) 5 Ω

1) A
2) TRUE
3) IN = 1.5 amps, RN = 50 ohms
4) TRUE
5) I = –1.68 amps
6) FALSE
7) B
8) $V_{TH} = 30V$; $R_{TH} = 8.67$ ohms
9) D
10) TRUE
11) A
12) B
13) 5 amps
14) +0.5 V (polarity referenced from top to bottom)
15) A