DEPARTMENT OF ELECTRONIC AND ELECTRICAL ENGINEERING

Autumn Semester 2009 (30 minutes)

EEE 101 CIRCUITS AND SIGNALS MID TERM TEST

Answer **ALL** questions. **The numbers given after each question indicate the relative weighting of that question. A total of 26 marks can be obtained from the seven questions.**

REGISTRATION NUMBER:.....

WRITE YOUR ANSWERS ON THIS QUESTION PAPER

1 Figure 1 shows three resistors labelled with voltages and currents in specified directions. R, V and I are positive. Indicate by ticking the appropriate box which of the three resistors is marked with the correct convention. ***{1 mark}***

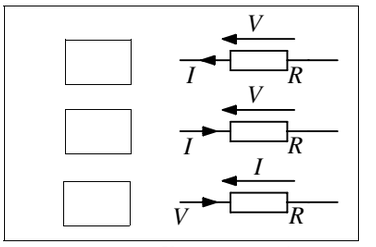

figure 1

2 Figure 2 shows two sources, **(a)** and **(b)**. By circling either **(a)** or **(b)** on the diagram, identify the current source. Label figure 2 with voltage differences and currents that have directions appropriate for the voltage source delivering energy to a load and the current source absorbing energy from a load. (*Note, the loads are not shown on the diagram.*) ***{5 marks}***

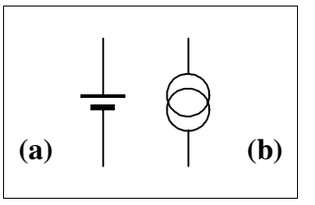

figure 2

3 Figure 3 shows four resistive circuits. If each circuit is attached to a 10V source, work out the magnitude of the current through R_2 in each case and put your answer in the box provided. ***{4 marks}***

Q3 *work space*

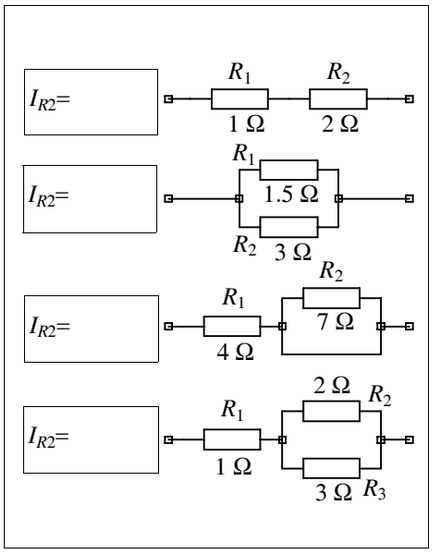

figure 3

4 Figure 4 contains a voltage source and a current source, both of which are ideal, and two resistors. Work out the power dissipation in R_2. ***{4 marks}***

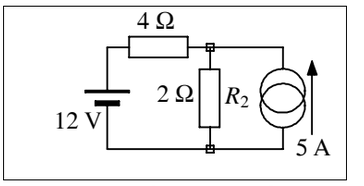

Figure 4

Q4 *work space*

5 Figure 5 shows a Thevenin equivalent circuit and a Norton equivalent circuit. Find values of I and R_N that will make the two circuits indistinguishable from the load's point of view. Label the current source to show the direction in which its current I will flow. ***{3 marks}***

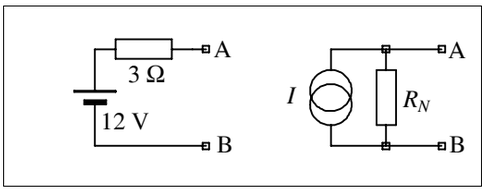

Figure 5

Q5 *work space*

6 Write down the loop equation for the I_2 loop in the circuit of figure 6. ***{6 marks for correct answer minus one mark per error}***

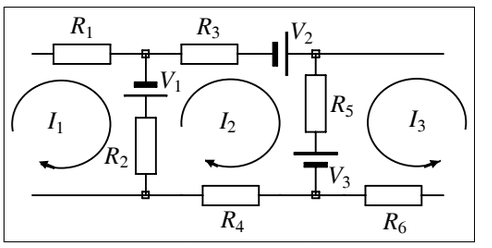

Figure 6

Q6 *work space*

7 Calculate the current I_S in the circuit of figure 7. ***{3 marks}***

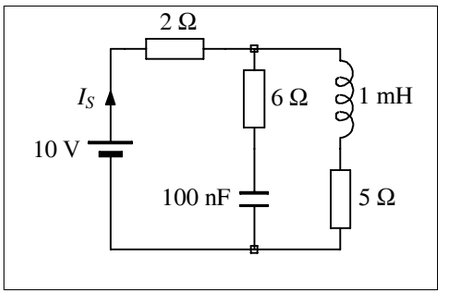

Figure 7

Q7 *work space*