The University of Sheffield
Department of Electronic and Electrical Engineering

EEE101 Problem Sheet

dc Circuit Analysis

Q1 For the circuit of figure 1 find I using any method you like. What is the power dissipation in R_1? [-0.25 A, 10.5 W]

Q2 Using any method you like, find the values of I and V in figure 2. [-2.89 A, 16.89 V]

Q3 In figure 3, I is initially 1 A. Use nodal analysis to find V_R and hence find I_S. What value of I is necessary to give $V_R = -4$ V? [3.2 V, 0.6 A, -5 A]

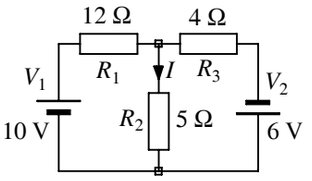

Figure 1

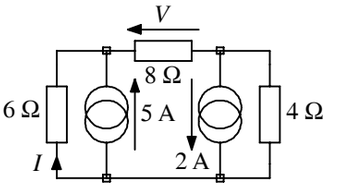

Figure 2

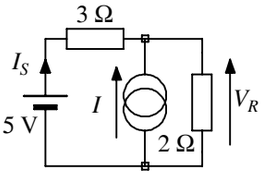

Figure 3

Q4 For the circuit of figure 4, use nodal analysis and superposition to find I_1 and the potential difference $V_4 - V_3$, $V_{4\text{-}3}$. What is the power dissipation in R_4? [-0.15 A, 15.38 V, 23.2 W]

Q5 Use loop analysis and superposition to find I_2 and I_4 in the circuit of figure 5. State with brief reasoning which component could be replaced by a short circuit without affecting either of these currents. [2.93, -2.18, 12 Ω]

Q6 Find $V_2 - V_3$, $V_{2\text{-}3}$, in the circuit of figure 6 using any method you like. [1 V]

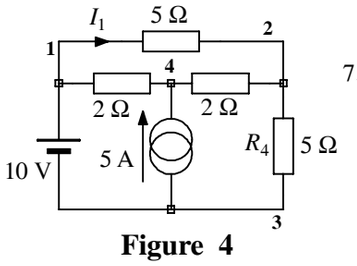

Figure 4

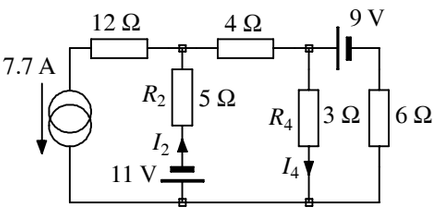

Figure 5

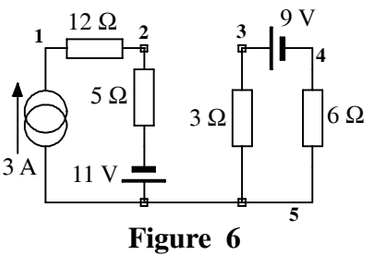

Figure 6

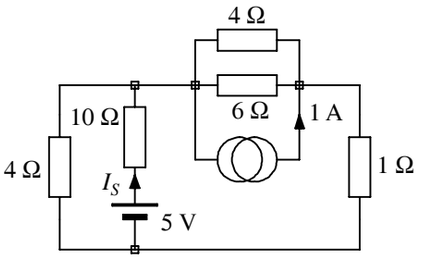

Figure 7

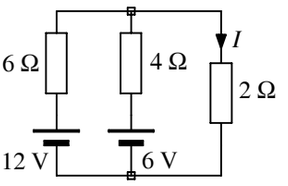

Figure 8

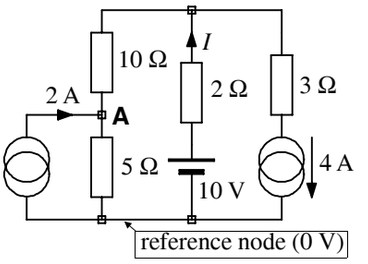

Figure 9

Q7 Use the principle of superposition to work out I_S in figure 7.

Q8 Use the principle of superposition to find I in figure 8.

Q9 Use nodal analysis to find the voltage at node **A** with respect to the reference node in figure 9. Check your answer using the principle of superposition. Using your knowledge of V_A, or by other means, calculate the value of I.

Q10

(a) Use **(i)** nodal analysis and **(ii)** loop analysis to work out the value of current I in the circuit of figure 10.

(b) Which of the five resistors dissipates the largest power?

(c) Evaluate the power in part **(b).**

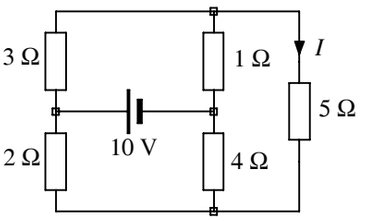

Figure 10

Q11 Use the principle of superposition to find I_S and V_R in the circuit of figure 11. (*Hint: draw out the partial circuit for each source you consider and look for ways to simplify these circuits by combining resistors.*)

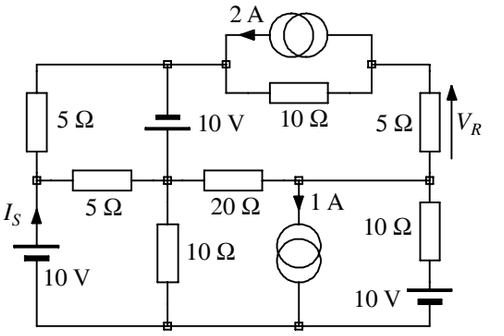

Figure 11