EE1002 AY2010/11 Sem1

Tutorial 3

1. Determine, using superposition, the voltage across R in the circuit of Figure Q1.

$$I_B = 3A, R_B = 1\Omega, V_G = 15V, R_G = 1\Omega, R = 2\Omega$$

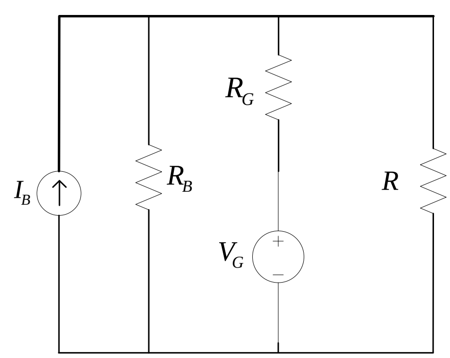

Fig. Q1

2. Find the Thevenin equivalent circuit that the load (R_L) sees for the circuit of Figure Q2.

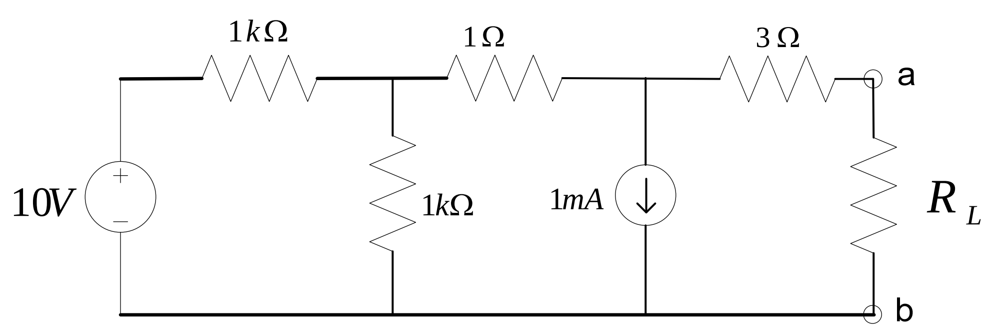

Fig. Q2

3. The circuit shown in Figure Q3 is in the form of what is known as differential amplifier. Find the expression for v0 in terms of v1 and v2 using Thevenin's or Norton's theorem. Assume that the voltage sources v1 and v2 do not source any current.

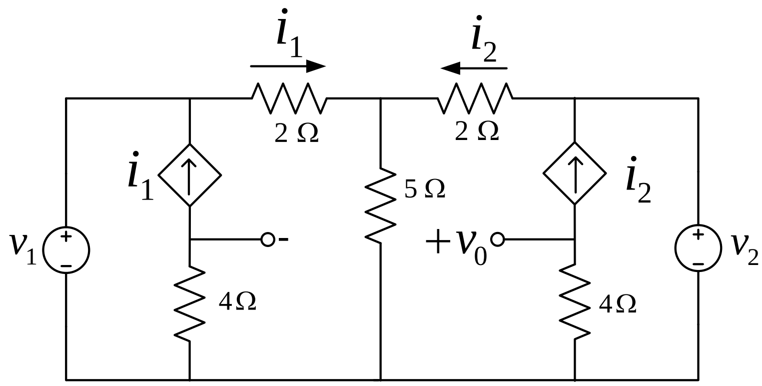

Fig. Q3

4.

(i) Obtain the Thevenin's equivalent for the circuit (Figure Q5), which contains a dependent voltage source.

(ii) What should be the optimum value of a load resistor R_L to be connected between **a** and **b** so that the power delivered to it by the network is maximum?

(iii) What is the maximum power?

(iv) Also verify that the power delivered is less than the maximum power when $R_L = 0.8\ R_{Lop}$ and $1.2\ R_{Lop}$; where R_{Lop} is the optimum R_L for maximum power transfer.

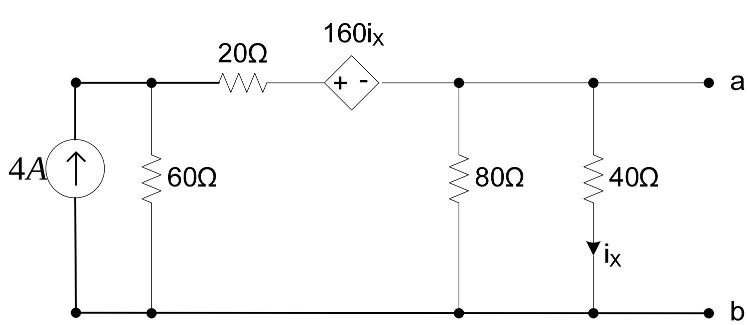

Fig. Q4

5. In the circuit given in Figure Q4, Vs models the voltage produced by the generator in a power plant, and Rs model the losses in the generator, distribution wire, and transformers. The three resistances model the various loads connected to the system by a customer. How much does the voltage across the total load change when the customer connects the third load R3 in parallel with the other two loads?

$V_S = 110V, R_S = 19m\Omega, R_1 = R_2 = 930m\Omega, R_3 = 100m\Omega$

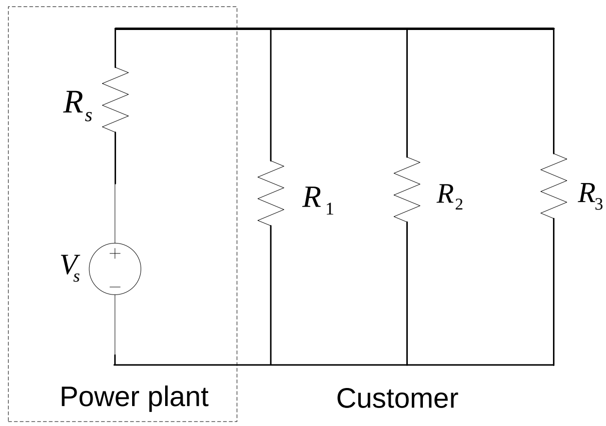

Fig. Q5