HW1: Circuits
NeSS M2023

Duration: 1 week
* Leave out MATLAB verification for now. You should verify using an alternate method.

1. Investigate different technologies or gadgets & equipments etc used in labs, hospitals, factories, homes/offices etc, and figure out what would be the circuit inside it. List at least 3 such equipment & 1 line description of the circuit.

2. Derive the equivalent resistance for (a) series (b) parallel combination of the resistors. Which combination can be used as voltage divide and which as current divider & how.

3 What are the units of R, L, C in terms of SI units.

4. From text book , chapter 3 (Ed 8)
Solve the following problems (back of the chapter): 27, 33, 39, 49, 51, 59

5. Solve the following problems Chapter 4 (back of the chapter, ed 8): 10, 13, 28, 34, 4

6. For the circuits in Figure 1- 4, solve using (1) KCL (nodal analysis) (2) KVL (mesh analysis) (3) Source Transformation or other form of simplification. Compare the solutions you get in each case and make a note of the number of variables & equations required in each case.

7. Solve problems 23, 41, 44 and 61 from chapter 5 of the text book (Ed 8) .

8. Derive maximum power transfer theorem.

9. Circuit shown in figure 5a is a 'π' connected circuit (look at its shape). Circuit shown in figure 5b is a 'Y' connected circuit (look at its shape).
(a) How can you select R_1,R_2&R_3 values in fig 5b so that the circuit behaves same as fig 5a circuit ? (b) Can you also find R_A,R_B&R_C values in fig 5a so that the circuit behaves same as fig 5b circuit ?
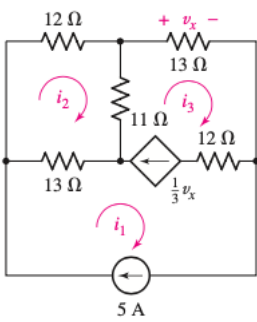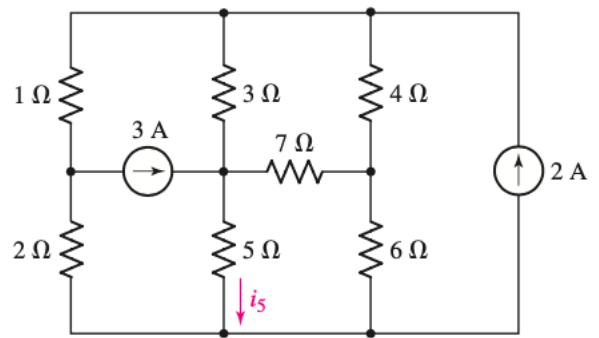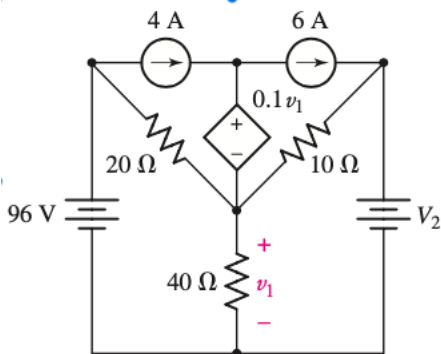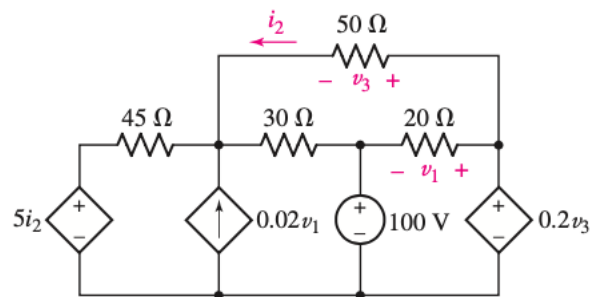
Figure 1: Figure1
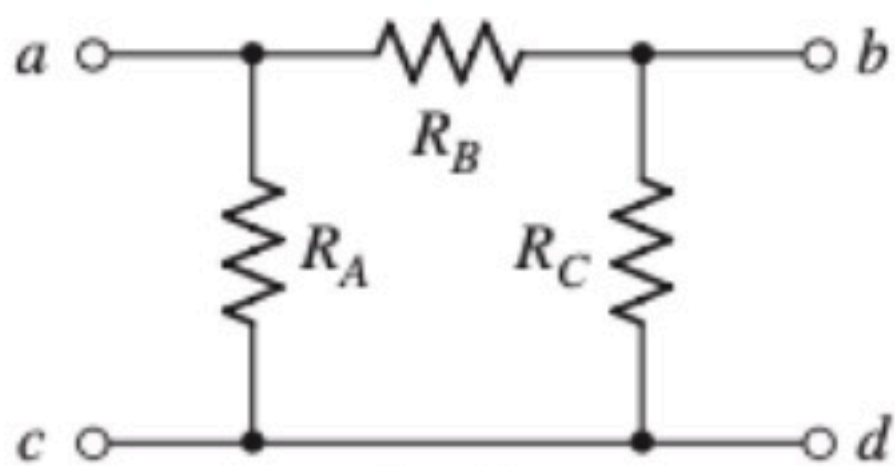

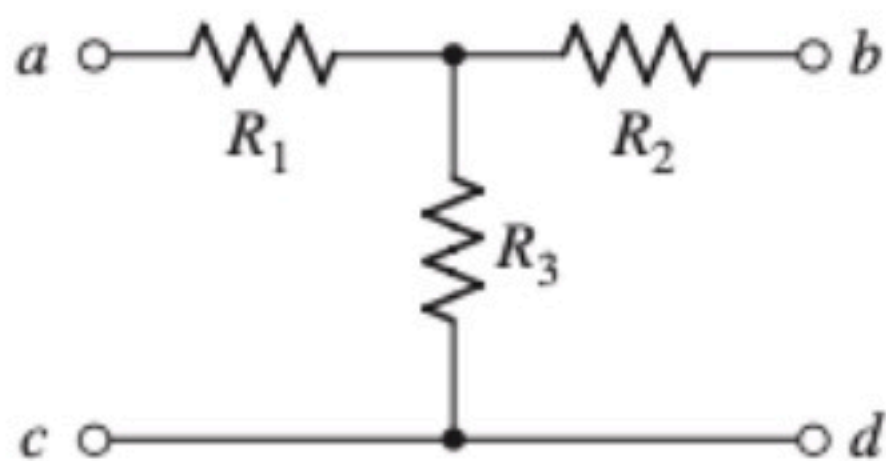Figure 2: Figure2

Figure 3: Figure3

Figure 4: Figure4

Figure 5a

Figure 5b