

Assignment 1



BRAC University

Semester: Fall 2022

Course No: CSE251

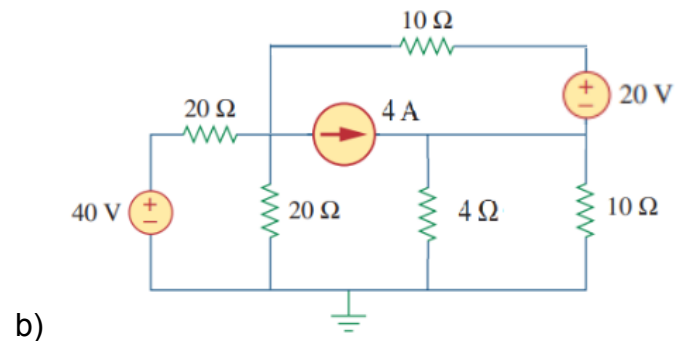
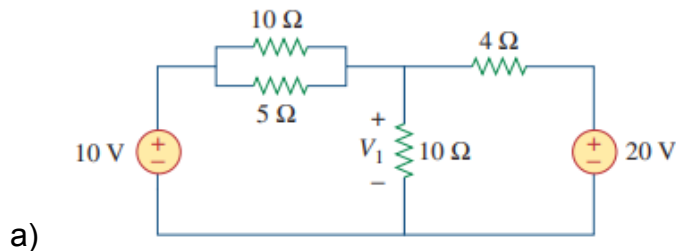
Course Title: Electronic Devices and Circuits

Full Marks: 150

Deadline: 18 October 2022

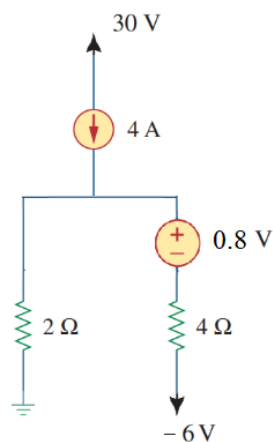
1. Draw the alternate representations of the following circuits [Note that the number of floating sources should be minimized in your design].

[10+10]

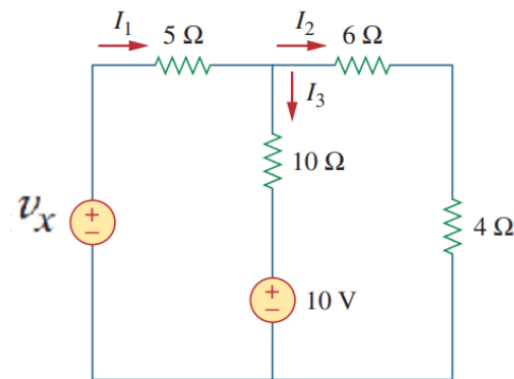


2. Find the loop representation of the following circuit:

[10]



3.



Here, $v_x = (10 + \text{last digit of your ID}) \text{ V}$

(i) **Draw** the alternate circuit representation of the circuit shown in the Figure above

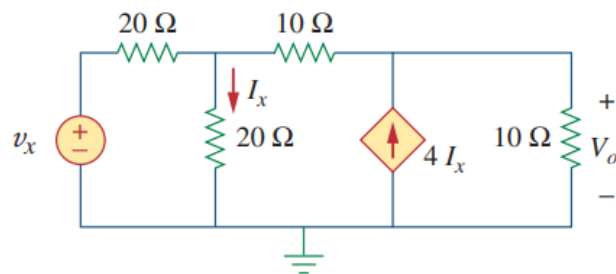
[Note that the number of floating sources should be minimized in your design].

(ii) **Apply** KCL and KVL on the circuit drawn in 3(i) and calculate I_1 , I_2 , and I_3 .

[10+20]

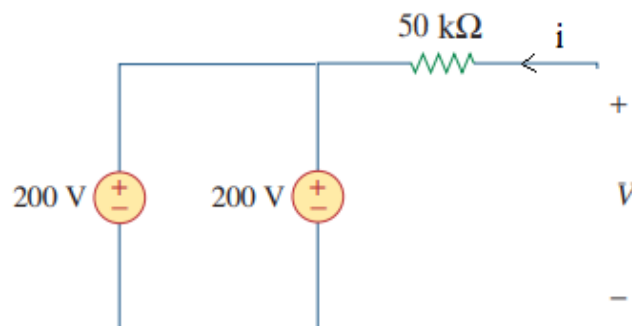
4. Use nodal analysis to find V_o in the following circuit:

[20]



Here, $v_x = (40 + \text{last digit of your ID}) \text{ V}$

5.



(i) **Draw** the i-V graph of the circuit drawn above. Clearly mention the coordinates of x and y-intersecting points on the graph [Free-hand drawing is sufficient].

(ii) What happens when the resistance becomes (a) **100k Ω** , (b) **200k Ω** instead of **50 k Ω** ? **Plot** these cases on the graph and explain the result.

[10+10]

6.

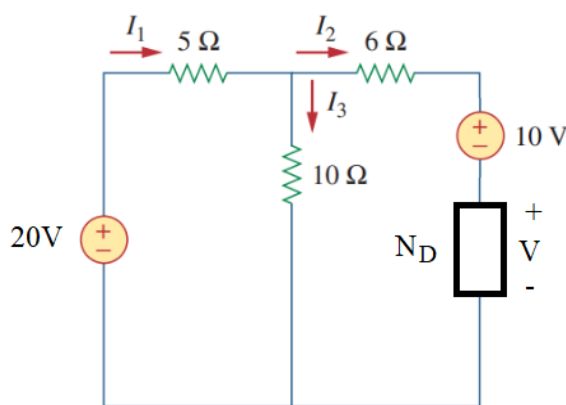


Figure 1(a)

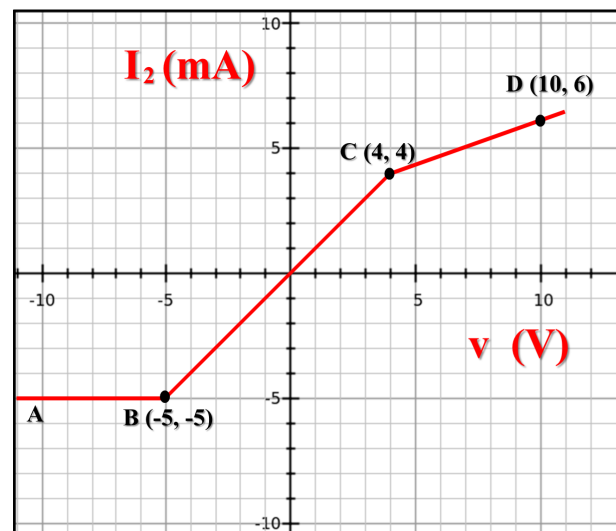


Figure 1(b)

The I-V graph shown in Figure 1(b) is that of a piecewise linear device N_D shown in Figure 1(a). The I-V graph has 3 segments, denoted as AB (Region 1), BC (Region 2), and CD (Region 3).

[15+5+5+25]

(a) **Identify** the equivalent linear circuit models for the 3 linear regions shown in the I-V characteristics of the non-linear device N_D and calculate the model parameters.

(b) **Detect** the operating region for the device N_D and **calculate** the value of I_2 when $v=2V$.

(c) **Show** the alternative representation of the circuit shown in Figure 1 (a).

(d) Consider the device N_D has been replaced by a linear component that shows an I-V characteristic like the BC portion of Figure 1(a). **Apply** KVL and KCL to **calculate** the values of I_1 , I_2 , and I_3 .