ECE113: Basic Electronics (BE)
Winter 2024
Mid Semester Exam (Set-A)

Date: **29-Feb-2024** Duration: **1Hours** Total Points: **40 Points**

[CO1, CO2] Q1: [2 Points] Find the value of resistor R_1 and R_2, so that maximum power can be delivered from **10 volt** source to **5 Ω** load (Figure-1).

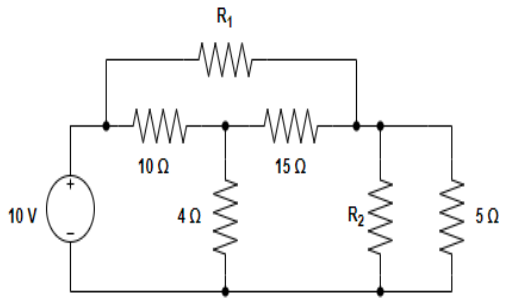


Figure 1

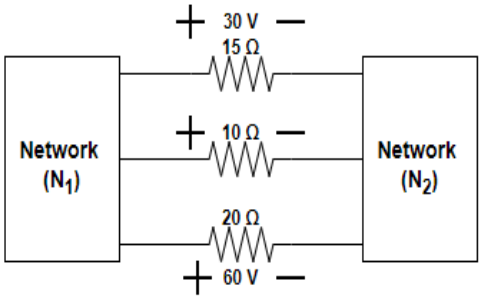


Figure 2

[CO1, CO2] Q2: [2 Points] Two electrical networks N_1 and N_2 are connected through three resistors (Figure-2). The voltage across **15 Ω** resistor and **20 Ω** resistor are given to be **30 V** and **60 V** respectively. Find the value of voltage across **10 Ω** resistor.

[CO1, CO2] Q3: [3 Points] Find the value of current I_o flowing through resistor **10 Ω** (Figure-3) by using Table-1 (when Circuit-1 work independently) and Table-2 (when Circuit-2 work independently).

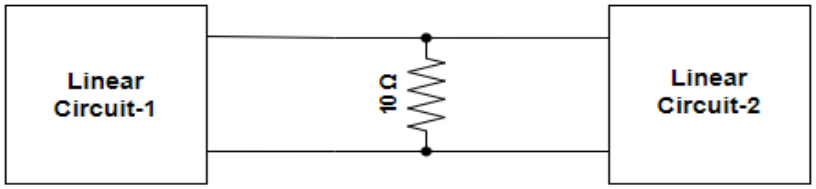
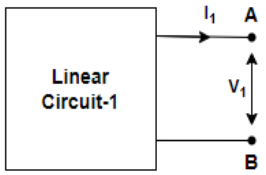
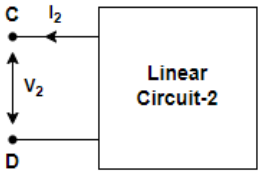


Figure 3



V_1 (in Volt)	10	0
I_1 (in Amp)	0	5

Table 1



V_2 (in Volt)	0	15
I_2 (in Amp)	4	0

Table 2

[CO1, CO2] Q4: [3 Points] For the active network shown in the Figure-4, find the value of V_{in}/I_{in}.

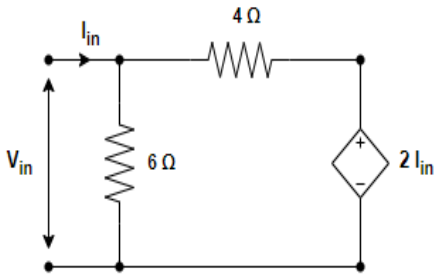


Figure 4

[CO1, CO2] Q5: [6 Points] (a) Determine the Thevenin equivalent circuit as viewed by the resistor **R** (Figure-5). **(b)** What value of **R** is required if the power dissipated by **R** is to be maximum? **(c)** What is the value of the said power?

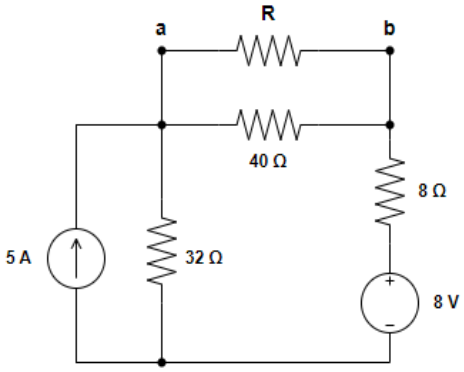


Figure 5

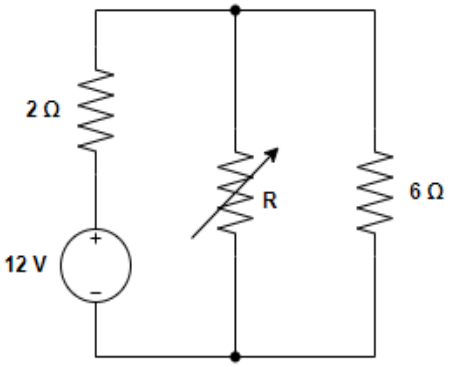


Figure 6

[CO1, CO2] Q6: [6 Points] Find the difference of value of currents in **2 Ω** resistor and **6 Ω** resistor, when the resistance in variable branch is changed from **3 Ω** to **6 Ω** (Figure-6).

[CO1, CO2] Q7: [6 Points] The circuit shown in Figure-7 is replaced by that in Figure-8. If the value of current "**I**" remain same, then find the value of resistance "**R**" in Figure-8.

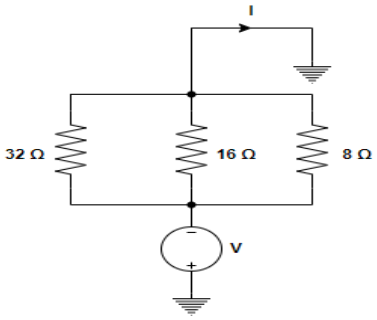


Figure 7

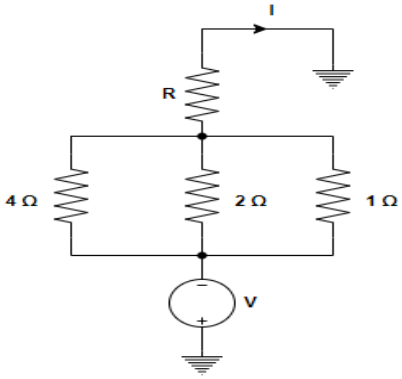


Figure 8

[CO1, CO2] Q8: [6 Points] Find the value of I_S (in Amps), V_S (in Volts) and current in the **1 Ω** resistor (Figure-9).

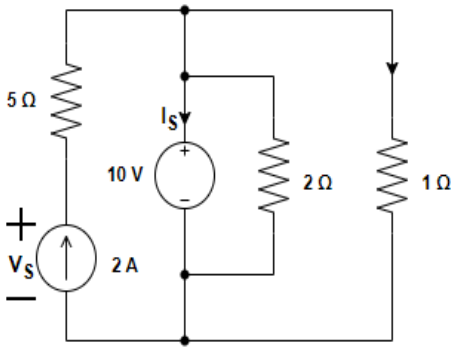


Figure 9

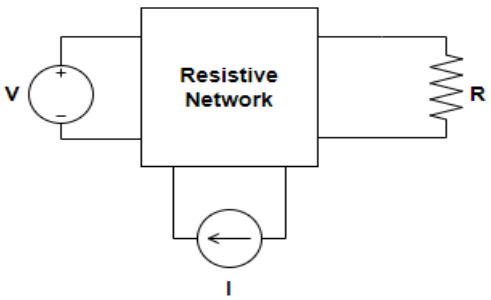


Figure 10

[CO1, CO2] Q9: [6 Points] A DC circuit shown in Figure-10 has a voltage source **V**, a current source **I** and several resistors. A particular resistor **R** dissipates a power of **4 watts**, when voltage source **V** alone is active. The same resistor **R** dissipates a power of **9 watts**, when current source **I** alone is active. Find the value of power dissipated by resistor **R**, when both sources are active.