Name:
ID:

Razan Monther Jaradat.   1931783

Construct the circuit shown below:-
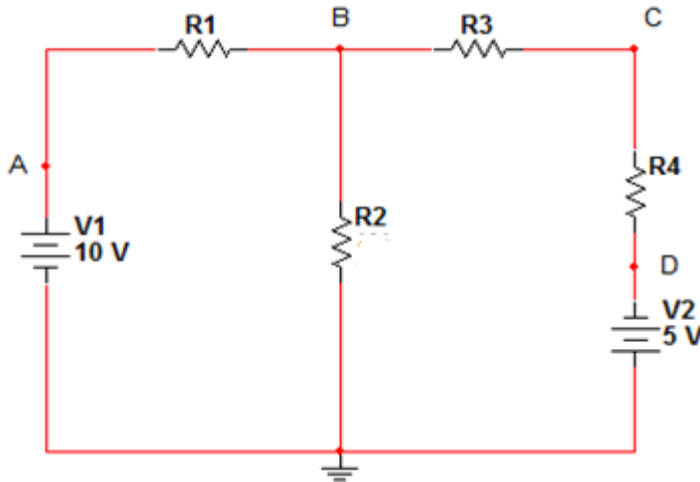
R	Theoretical Value (Kohm)	Measured Value
R1	1.8	1.79
R2	9.1	9.04
R3	3.9	3.83
R4	2.7	2.66

- **Nodal Analysis:**

Value	VA	VB	VC	VD
Measured	10	5.84	-0.55	-4.99
Theoretical	10	5.87	-0.552	-5

$V_A = V_{S1} = 10\ Volt$

$V_D = -V_{S2} = -5\ Volt$

$To\ find\ V_B\ and\ V_C, use\ Nodal\ Analysis:$

$$\frac{V_B - 10}{R1} + \frac{V_B}{R2} + \frac{V_B - V_C}{R3} = 0$$

$$\frac{V_C + 5}{R4} + \frac{V_C - V_B}{R3} = 0$$

$V_C = -0.552\ Volt\ , V_B = 5.87\ Volt$

1- Use the Nodal Analysis to find the theoretical values.

- **Mesh Analysis:**

Value	I1	I2
Measured	2.5	1.66
Theoretical	2.23	1.65

$$-10 + R1 * I1 + R2 * (I1 - I2) = 0$$

Name:
ID:

$$R2 * (I2 - I1) + R3 * I2 + R4 * I2 - 5 = 0$$
$$-10 + 10.9 * I1 - 9.1 * I2 = 0$$
$$-5 - 9.1 * I1 + 15.7 * I2 = 0$$
$$I1 = 2.23\ mA$$
$$I2 = 1.65\ mA$$

2- Use the Mesh Analysis to find the theoretical values.

- **Superposition Analysis:**

Value	VB'	VB''	VC'	VC''	$I1'$	$I1''$	$I2'$	$I2''$
Measured	6.78	-0.93	2.78	-3.32				
Theoretical	6.8	-0.98	2.782	-3.35				

$V1 = 10\ volt\ and\ V2 = 0\ volt$:

$$\frac{VB' - 10}{1.8} + \frac{VB'}{9.1} + \frac{VB' - VC'}{3.9} = 0$$

$$\frac{VC' - VB'}{3.9} + \frac{VC'}{2.7} = 0$$

$$VC' = 2.782\ volt\ , VB' = 6.8\ volt$$

$V1 = 0\ volt\ and\ V2 = 5\ volt$:

$$\frac{VB''}{1.8} + \frac{VB''}{9.1} + \frac{VB'' - VC''}{3.9} = 0$$

$$\frac{V'' - VB''}{3.9} + \frac{VB'' - (-5)}{2.7} = 0$$
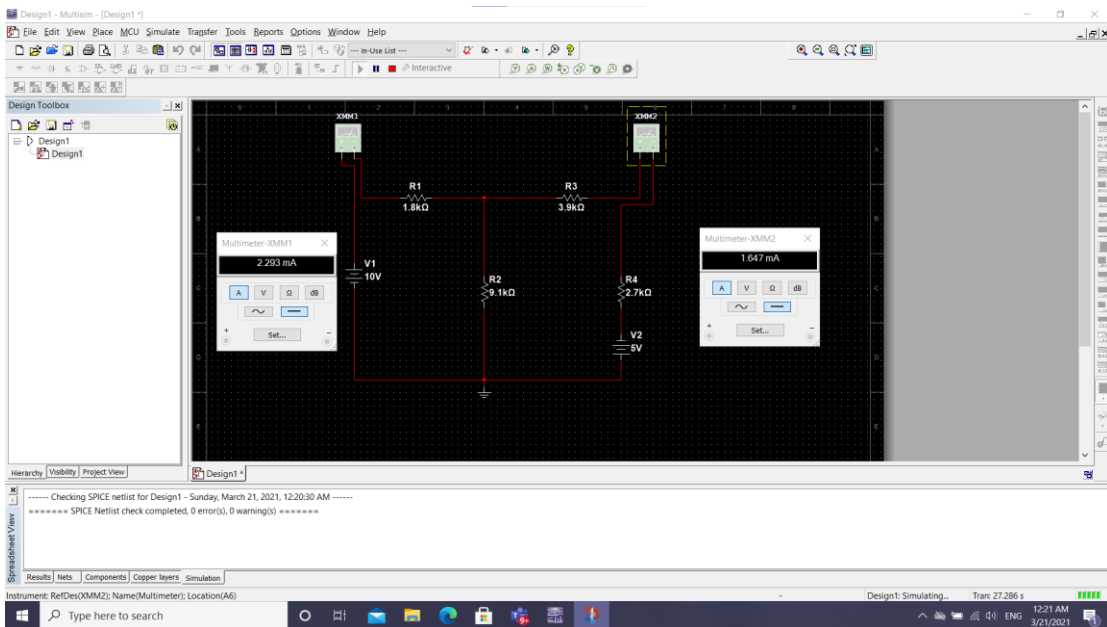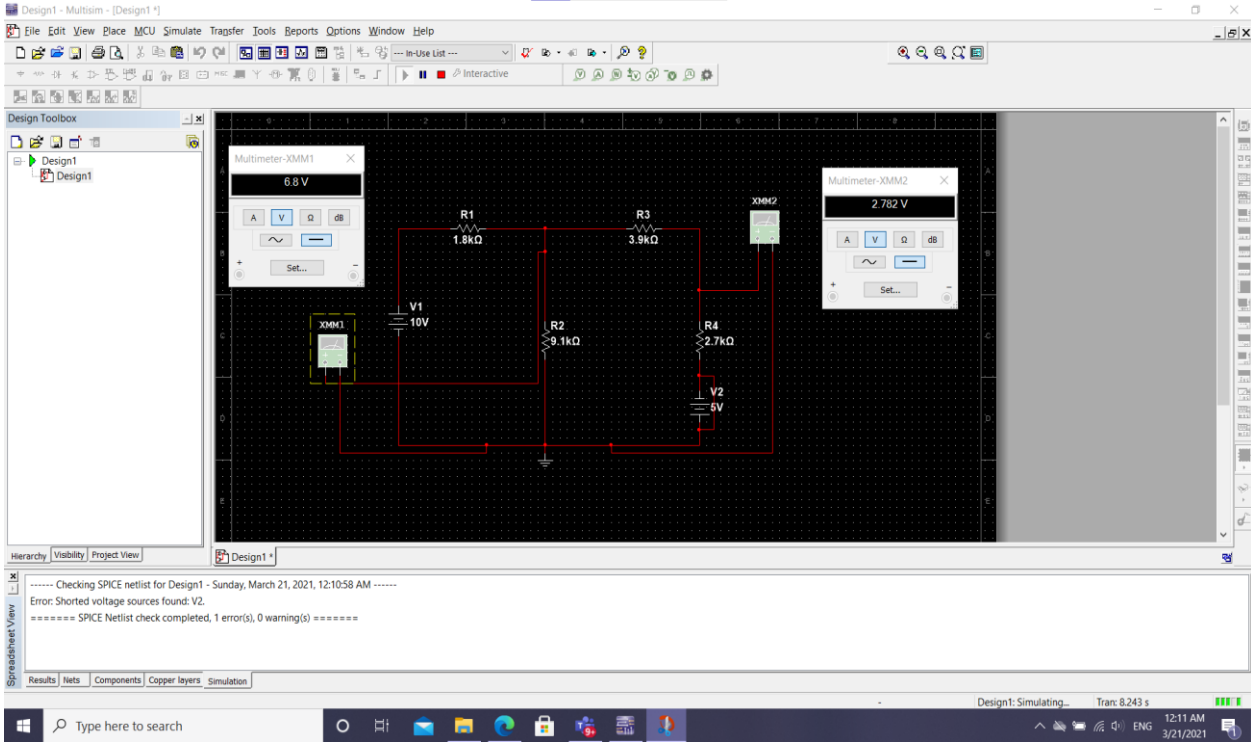
$$VB'' = -0.98\ volt, VC'' = -3.35\ volt$$

$$V_B = VB' + VB'' = 6.8 - 0.98 = 5.82\ volt$$

$$V_C = VC' + VC'' = 2.782 - 3.35 = -0.568\ volt$$

3- Use the Superposition Analysis to find the theoretical values.

Name:
ID: