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1. **Series-parallel combination:** Assemble the circuit in figure 2-1 with the component values shown in table 2-1. Use Vs=10V. Take measurements to complete the entries corresponding to the experimental values.
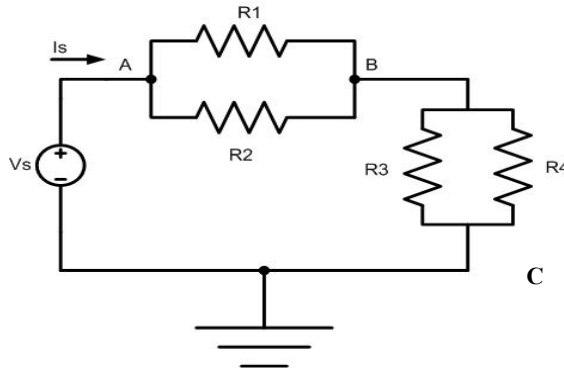

Fig 2-1: Series-parallel combination.

Parameter	Unit	Theor	Exper	%Error	Param	Unit	Theor	Exper	%Error
R_1	KΩ	1.5	1.46	2.67%	I_{R1}	mA	1.75	1.682	3.88%
R_2		2.2	2.15	2.27%	I_{R2}		1.19	1.147	3.61%
R_3		3.9	3.84	1.54%	I_{R3}		1.96	1.917	2.19%
R_4		8.2	8.15	0.61%	I_{R4}		0.93	0.911	2.04%
R_{a-c}		3.4795	3.48	0.014%	I_s		2.87	2.829	1.43%
V_{ab}	V	2.49	2.52	1.2%	Vbc	V	7.5	7.48	0.267%

Table 2-1: Resistors in series-parallel combination

$$R(eq) = \frac{R1*R2}{R1+R2} + \frac{R3*R4}{R3+R4} = \frac{3.139}{3.61} + \frac{31.296}{11.99} = 0.8695 + 2.610 = 3.4795 \ K\Omega$$

$$R(eq1) = \frac{R1*R2}{R1+R2} = \frac{3.139}{3.61} = 0.8695 \ K\Omega$$

$$R(eq2) = \frac{R3*R4}{R3+R4} = \frac{31.296}{11.99} = 2.610 \ K\Omega$$

$$V(ac) = \frac{Vs*R(eq1)}{R(eq)} = \frac{10*0.8695}{3.4795} = 2.49 \ V$$

$$V(bc) = \frac{Vs*R(eq2)}{R(eq)} = \frac{10*2.610}{3.4795} = 7.5 \ V$$

$$Is = \frac{Vs}{R(eq)} = \frac{10}{3.48} = 2.87 \ mA$$

$$I(R1) = \frac{Is*R2}{R1+R2} = \frac{2.87*2.2}{3.61} = 1.75 \ mA$$

$$I(R2) = \frac{Is*R1}{R1+R2} = 1.19 \ mA$$

$$I(R3) = \frac{Is*R4}{R4+R3} = \frac{2.87*8.2}{11.99} = 1.96 \ mA$$

$$I(R4) = \frac{Is*R3}{R14+R3} = \frac{2.87*3.9}{11.99} = 0.93 \ mA$$

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2. **Voltage and Current divider:** Assemble the circuit in Fig 2-4 with the component values shown in table 2-2. Take measurements to complete the entries corresponding to the experimental values.

Fig(2-2): Voltage and Current divider

Parameter	R_1	R_2	R_3	V_s	V_o	I_s	I_1	I_2	Req
Units	KΩ			V		mA			KΩ
Theoretical	2.2	1.5	3.9	10	3.29	3.05	3.05	2.2	3.28
Experimental	2.15	1.46	3.84	10	3.299	3.046	3.046	2.2	3.28
%Error	2.27%	2.67%	1.54%	0%	0.27%	0.13%	0.13%	0%	0%

Table 2-2: Voltage and current divider

$$R(eq) = \frac{R2*R3}{R2+R3} + R1 = \frac{1.5*3.9}{1.5+3.9} + 2.2 = 1.08 + 2.2 = 3.28\ K\Omega$$

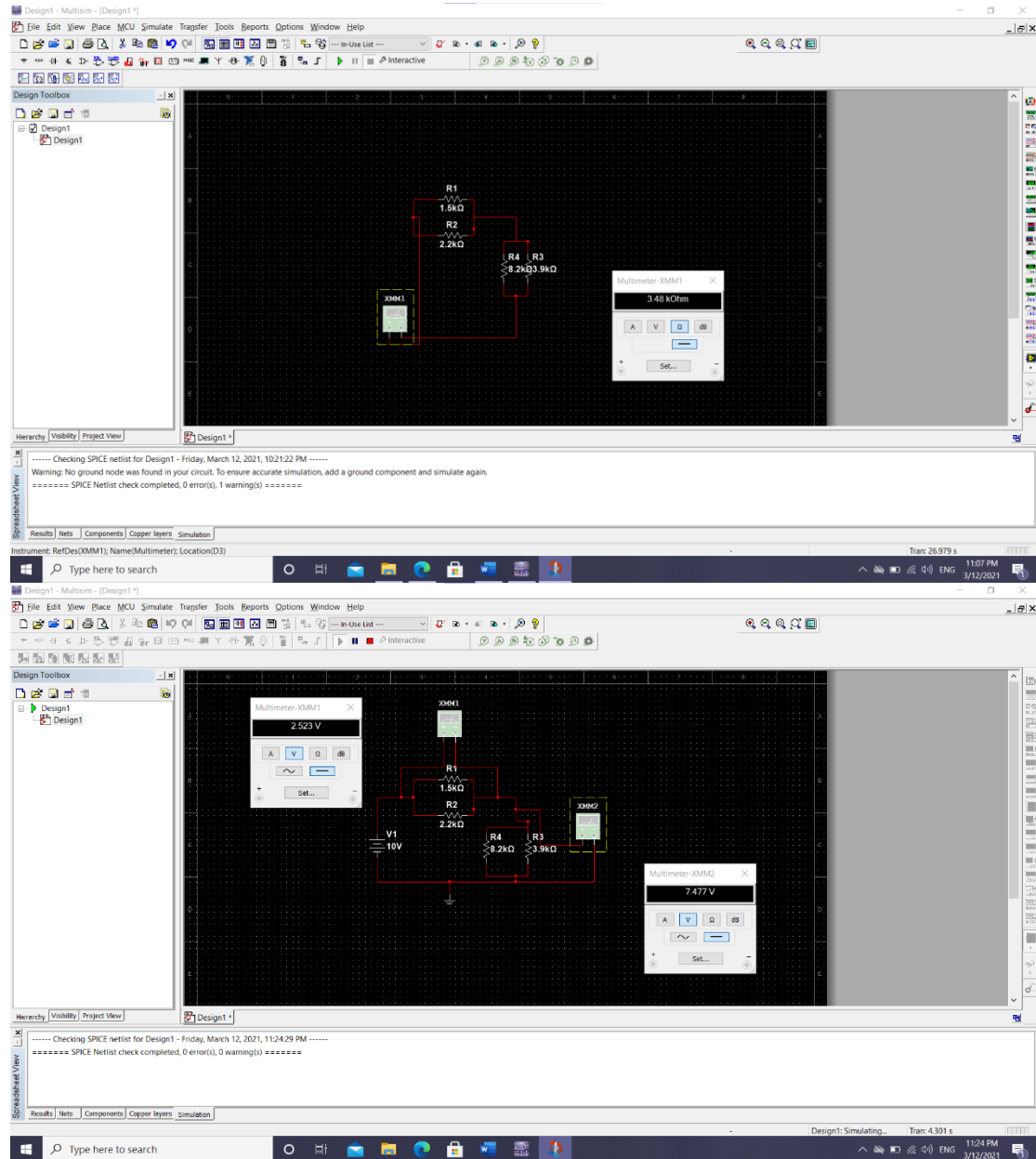$$Vo = V3 = V2 = \frac{R(eq2-3)}{R1+R(eq2-3)} * Vs = \frac{1.08}{3.28} * 10 = 3.29\ V$$

$$Is = I1 = \frac{Vs}{R(eq)} = \frac{10}{3.28} = 3.05\ mA$$

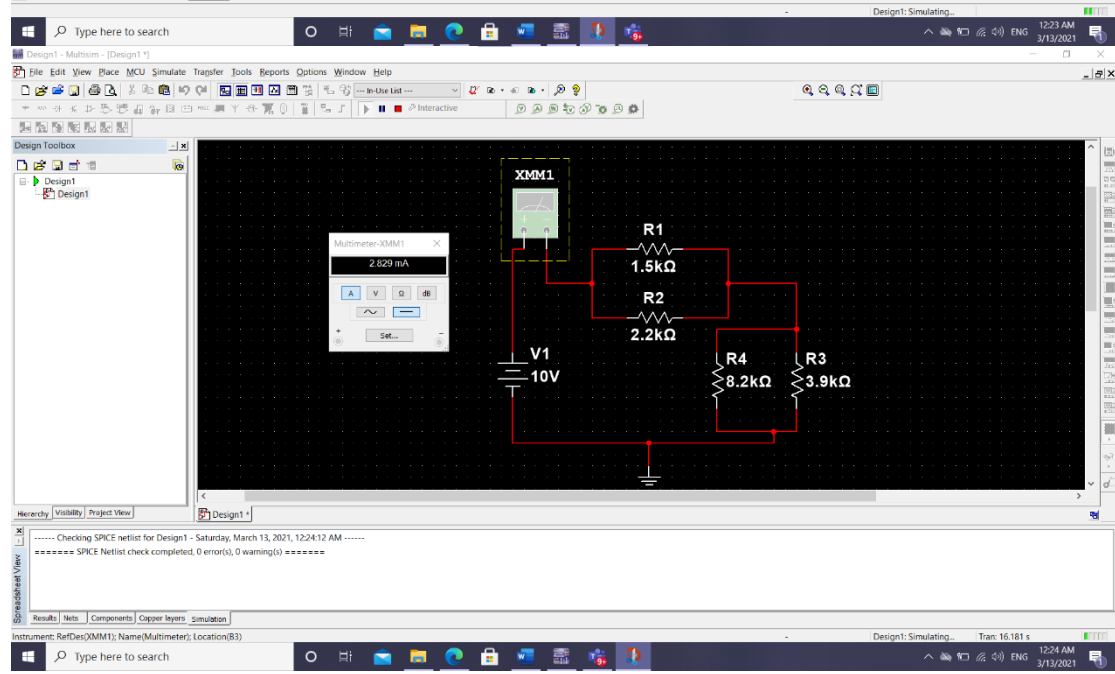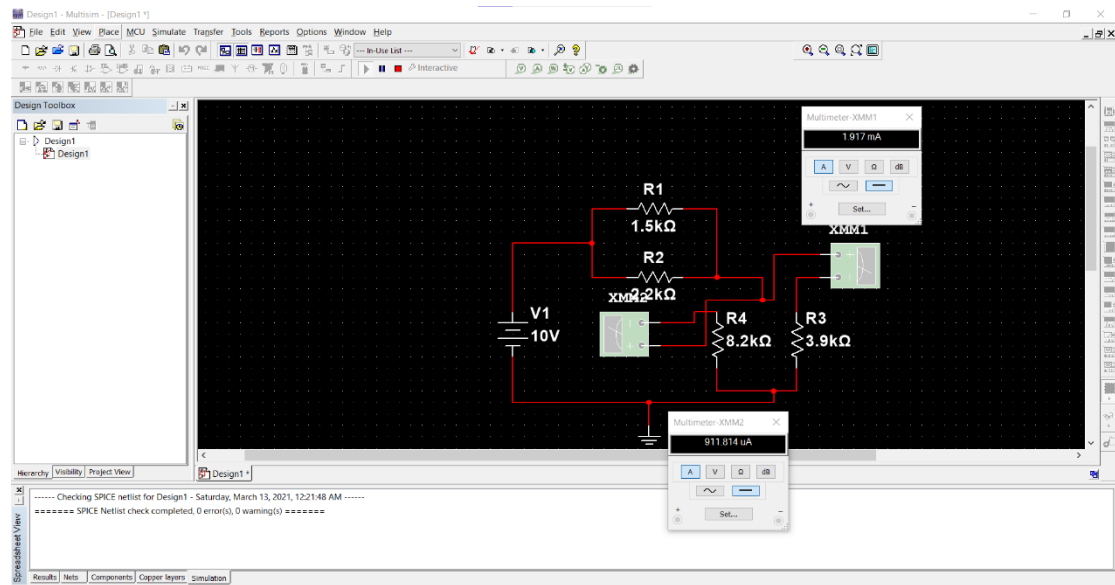$$I2 = Is * \frac{R3}{R2+R3} = 3.05 * \frac{3.9}{5.4} = 3.05 * 0.72 = 2.2\ mA$$
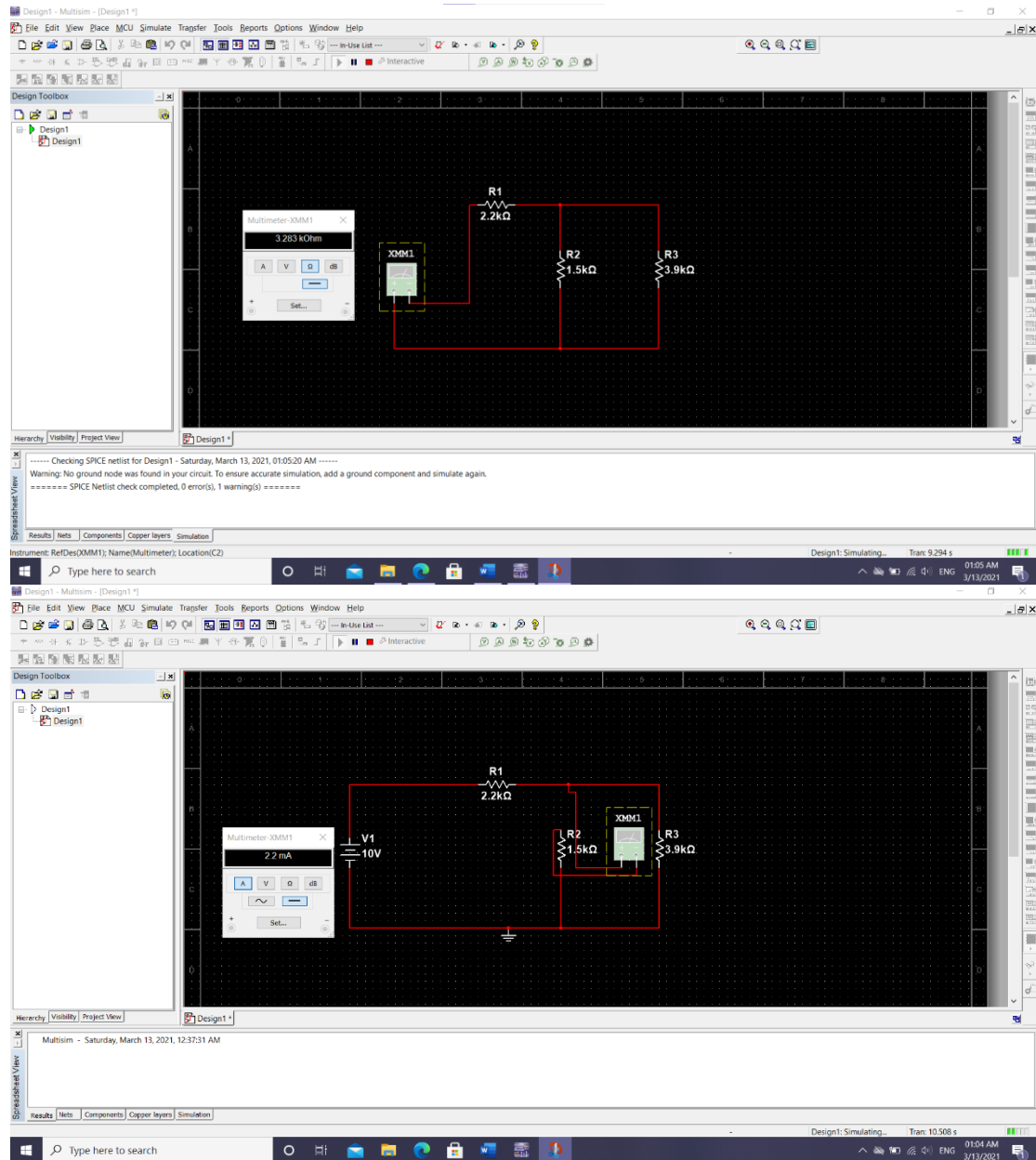
First CCT:-

Name: **ID:**

Second CCT:-