Department of ECE, Bennett University

EECE105L: Fundamentals of Electrical and Electronics Engineering

Tutorial Sheet-9

Topics Covered: Mesh and Nodal Analysis

1. Consider the circuits shown in fig. 1 through fig. 6. Using Nodal analysis, solve for currents and voltages across all the resistances in a given circuit.

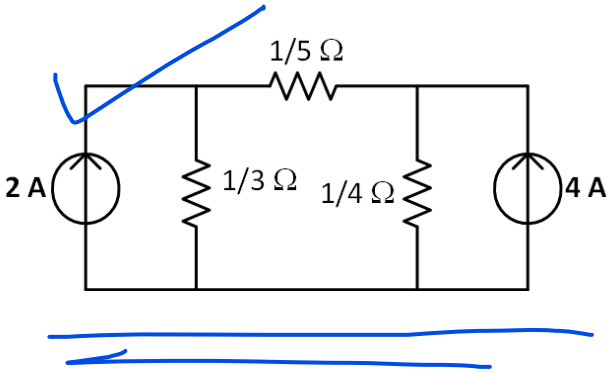

Fig. 1

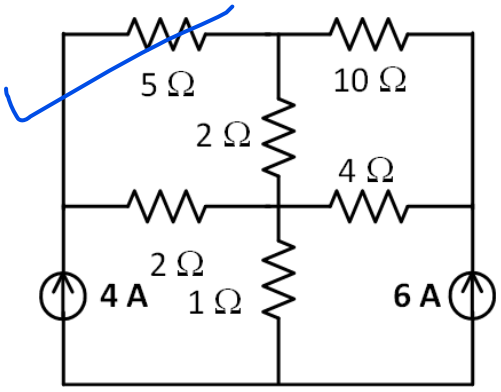

Fig. 2

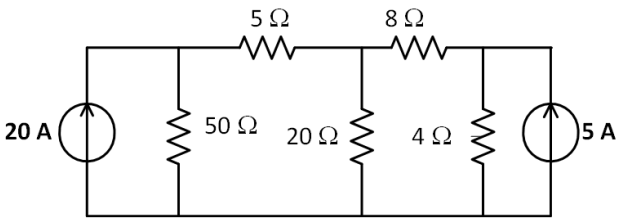

Fig. 3

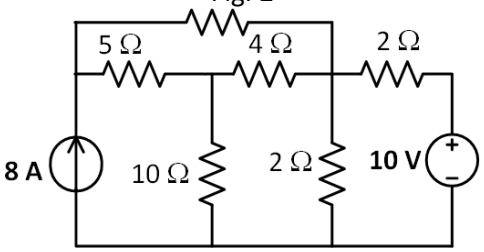

Fig. 4

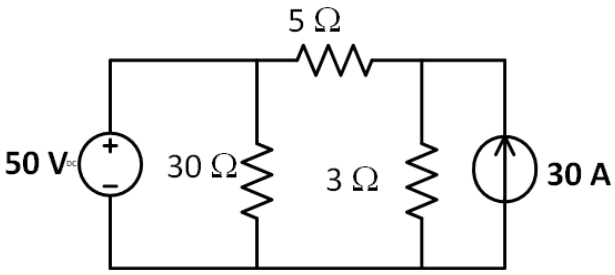

Fig. 5

2. Consider the circuits shown in fig. 7 through fig. 12. Using Mesh analysis, solve for currents and voltages across all the resistances in a given circuit.

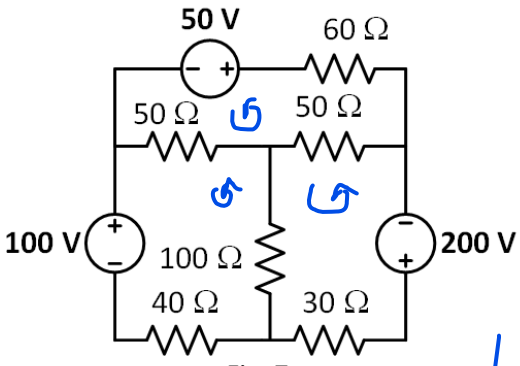

Fig. 7

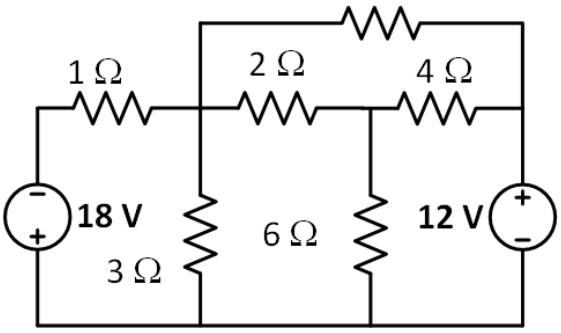

Fig. 8

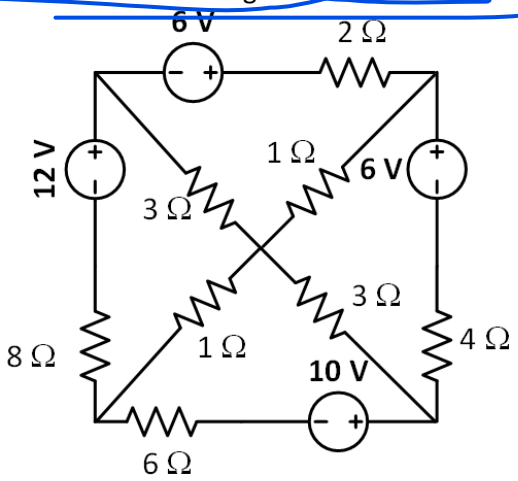

Fig. 9

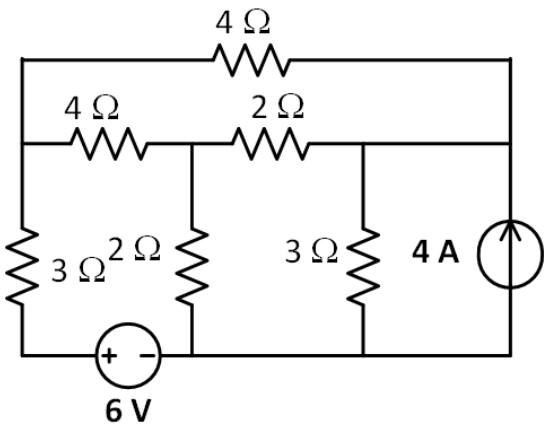

Fig. 10

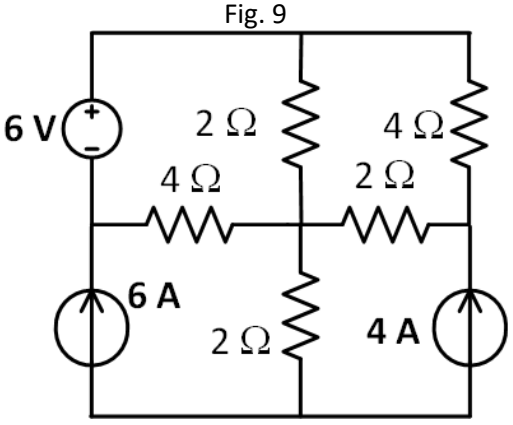

Fig. 11

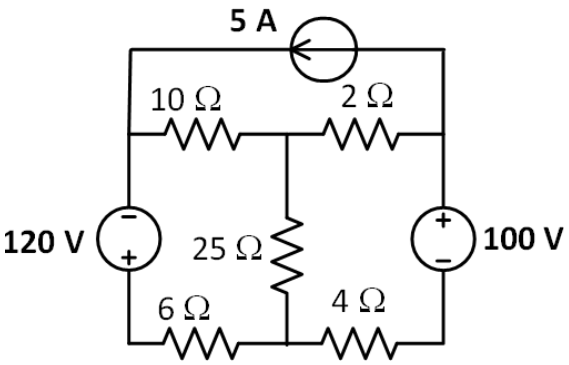

Fig. 12

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Answers:

1. Fig. 1: $V_1 = 0.8085$ V, $V_2 = 0.8936$ V; $I_{0.2\Omega} = -0.4255$ A; $I_{0.33\Omega} = 2.4255$ A, $I_{0.25\Omega} = 3.5744$ A
   Fig. 2: $V_1 = 16.8571$ V, $V_2 = 28.2857$ V, $V_3 = 14$ V, $V_4 = 10$ V; $I_{2\Omega} = 3.43$ A, $I_{5\Omega} = 0.57$ A, $I_{4\Omega} = 4.57$ A, $I_{10\Omega} = 1.43$ A, $I_{2\Omega} = 2$ A, $I_{1\Omega} = 10$ A

Fig. 3: $V_1 = 210$ V, $V_2 = 131$ V, $V_3 = 57$ V; $I_{5\Omega} = 15.8$ A, $I_{50\Omega} = 4.2$ A, $I_{8\Omega} = 9.25$ A, $I_{20\Omega} = 6.55$ A, $I_{4\Omega} = 14.25$ A

Fig. 4: $V_1 = 34.43$ V, $V_2 = 11.24$ V, $V_3 = 17.63$ V; $I_{5\Omega} = 3.36$ A, $I_{10\Omega} = 1.763$ A, $I_{4\Omega} = 1.5975$ A, $I_{5\Omega} = 4.838$ A, $I_{2\Omega} = 5.62$ A

Fig. 5: $V_1 = 50$ V, $V_2 = 75$ V; $I_{5\Omega} = 5$ A, $I_{30\Omega} = 1.67$ A, $I_{3\Omega} = 25$ A, $I_{source} = 3.33$ A

2. **Fig. 7:** $I_1 = 2.873$ A, $I_2 = 3.333$ A, $I_3 = 2.252$ A

	40 Ω	100 Ω	60 Ω	50 Ω	50 Ω	30 Ω
I (A)	2.873	-0.46	2.252	-1.081	-0.621	3.333
V (V)	114.92	-46	135.12	-54.05	-31.05	100

Fig. 8: $I_1 = -9.182$ A, $I_2 = -6.243$ A, $I_3 = -5.987$ A, $I_4 = -2.602$ A

	1 Ω	3 Ω	6 Ω	8 Ω	2 Ω	4 Ω
I (A)	-9.182	-2.939	-0.256	-2.602	3.641	3.385
V (V)	-9.182	-8.817	-1.536	-20.816	9.884	13.54

Fig. 9: $I_1 = -1.1754$ A, $I_2 = 1.2687$ A, $I_3 = 1.4664$ A, $I_4 = -1.0075$ A

	6 Ω	8 Ω	2 Ω	4 Ω	1 Ω	1 Ω	3 Ω	3 Ω
I (A)	-1.1754	1.2687	1.4664	-1.0075	-2.4441	2.4739	-0.1977	-0.1679
V (V)	-7.0524	10.1496	2.9328	-4.03	-2.4441	2.4739	-0.5931	-0.5037

Fig. 10: $I_1 = -1.7561$ A, $I_2 = 0.1469$ A, $I_3 = -0.2927$ A

	3 Ω	2 Ω	2 Ω	3 Ω	4 Ω	4 Ω
I (A)	-1.7561	-1.9023	-1.4634	.1463	0.439	-0.2927
V (V)	-5.2683	-3.8046	-2.9268	0.4369	1.756	-1.1708

Fig. 11: $I_1 = 5.09$ A, $I_2 = 0.273$ A, $I_3 = -4$ A, $I_4 = 6$ A

	2 Ω	4 Ω	4 Ω	2 Ω	2 Ω
I (A)	5.09	-0.91	0.273	4.273	10
V (V)	10.18	-3.64	1.092	8.546	20

Fig. 12: $I_1 = -4.675$ A, $I_2 = -0.867$ A, $I_3 = -5$ A

	10 Ω	2 Ω	4 Ω	25 Ω	6 Ω
I (A)	-0.325	-4.133	-0.867	-3.808	-4.675
V (V)	-3.25	-8.266	-3.468	-95.2	-28.05