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| **Course Name:** | **Networks, Signals and Systems** | **Semester:** | **III** |
| **Date of Performance:** | **07 / 08 2023** | **Batch No:** | **A - 3** |
| **Faculty Name:** | **Bhargavi Kaslikar** | **Roll No:** | **16014022050** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** |  |

**Experiment No.: 2**

**Title: Tutorial on Network Elements and Sources**

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| **Aim and Objective of the Experiment:** |
| Tutorial on Network Elements and Sources (Thevenin and Norton). |

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| **COs to be achieved:** |
| **CO1:** Analyze DC and AC circuits using mesh, nodal analysis, and network theorems. |

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| **Theory:** |
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| **Stepwise-Procedure:** |
| **Creating a Circuit in LTspice:**   1. Open LTspice and create a new schematic. 2. Add components like resistors, dependent voltage sources, and independent sources from the toolbar. 3. Connect components using wires. 4. Set component values in properties. 5. Save the circuit.   **Solving the Circuit using Thevenin's Theorem:**   1. Identify the load resistor or component for which you want to find the equivalent Thevenin circuit. 2. Disconnect the load component from the circuit. 3. Analyze the circuit to determine the open-circuit voltage (Voc) across the load terminals. This can be done using simulation or by calculating the voltage. 4. Short-circuit all the independent voltage sources and replace the independent current sources with open circuits. 5. Calculate the equivalent resistance (Rth) seen from the load terminals by looking into the circuit. 6. Now you have the Thevenin equivalent circuit, which consists of a voltage source (Voc) in series with a resistor (Rth).   **Solving the Circuit using Norton's Theorem:**   1. Identify the load resistor or component for which you want to find the equivalent Norton circuit. 2. Disconnect the load component from the circuit. 3. Analyze the circuit to determine the short-circuit current (Isc) flowing through the load terminals. This can be done using simulation or by calculating the current. 4. Remove all the independent current sources and replace the independent voltage sources with short circuits. 5. Calculate the equivalent resistance (Rn) seen from the load terminals by looking into the circuit. 6. Now you have the Norton equivalent circuit, which consists of a current source (Isc) in parallel with a resistor (Rn). |

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| **Observations:** |
| 1. **Nortons Theorem:**      1. **Thevenin’s Theorem:** |

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| **Post Lab Subjective/Objective type Questions:** |
| **Solve the below question using Thevenin and Norton Analysis across 4 ohms:** |

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| **Conclusion:** |
| In conclusion, this experiment aimed to provide an understanding of network elements and sources, specifically Thevenin's and Norton's theorems. By solving circuits using these theorems and validating our results through LTspice simulations, we gained practical insights into simplifying complex circuits for analysis and design purposes. |

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| **Signature of faculty in-charge with Date:** |