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| **Course Name:** | **Elements of Electrical and Electronics Engineering** | **Semester:** | **I** |
| **Date of Performance:** | **27/09/ 2024** | **Batch No:** | **C4-1** |
| **Student Name:** | **Dhruv Pankhania** | **Roll No:** | **16010124216** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | **/ 20** |

**Experiment No: 4**

**Title:** **Maximum Power Transfer Theorem**

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| **Aim and Objective of the Experiment:** |
| * To observe maximum power transfer across load resistor in a D.C circuit. |

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| **COs to be achieved:** |
| **CO1:** Analyze resistive networks excited by DC sources using various network theorems. |

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| **Circuit Diagram:** |
| **VS = 15 V and RS = 560 Ω** |

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| **Stepwise-Procedure:** |
| 1.Set D.C. supply voltage VS = 15 V  2. Vary in the range 100 Ω - 1 KΩ in steps of 100 Ω  3. Note down for each value of Where are current through and  voltage across respectively.  4. Prepare observation table showing readings of .  5. Plot graph of  6. Locate the point of maximum value of power and note down corresponding value of  Verify the results theoretically |

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| **Observation Table:** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Sr. No. | RL Ω | Circuit Current (IL) in mA | | Voltage (VL) in Volts | Power absorbed by load (PL) in W  PL = IL2.RL | | | Theoretical | Practical | Theoretical | Practical | |  | 100 | 22.72 | 23.09 | 15 | 0.0516 | 0.0533 | |  | 200 | 19.74 | 19.99 | 15 | 0.0779 | 0.0799 | |  | 300 | 17.44 | 17.61 | 15 | 0.0912 | 0.0930 | |  | 400 | 15.63 | 15.71 | 15 | 0.0977 | 0.0987 | |  | 500 | 14.15 | 14.23 | 15 | 0.1001 | 0.1012 | |  | 600 | 12.93 | 12.99 | 15 | 0.1003 | 0.1012 | |  | 700 | 11.91 | 11.94 | 15 | 0.0993 | 0.0998 | |  | 800 | 11.03 | 11.06 | 15 | 0.0973 | 0.0979 | |  | 900 | 10.27 | 10.30 | 15 | 0.0949 | 0.0955 | |  | 1 K | 9.62 | 9.62 | 15 | 0.0925 | 0.0925 | |  | 560 | 13.39 | 13.47 | 15 | 0.1004 | 0.1016 | |

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| **Graph: Draw a graph showing effect of variation in** RL on PL using observation table. Take RL on X –axis and PL on Y- axis. (Use a graph paper) |
| **Conclusion-**   1. **Explore one practical application where Maximum Power Transfer Theorem is used.**   One practical application of the Maximum Power Transfer Theorem is in audio amplifier systems. In these systems, the theorem is used to ensure that the maximum amount of power is transferred from the amplifier to the connected speaker. For optimal power transfer, the output impedance of the amplifier should be matched to the input impedance of the speaker. This allows the system to produce the loudest sound output without distortion or significant energy loss. By applying the Maximum Power Transfer Theorem, audio engineers design circuits that balance impedance to achieve efficient energy transfer and maintain high audio quality.   1. **Draw a block diagram or circuit diagram of this application.**      1. **Explain in brief.**   **OR**  **Answer the following:**   1. **Do you apply Thevenin’s Theorem to calculate Maximum Power across load resistor in a D.C. circuit?**   Yes, Thevenin’s Theorem is commonly applied to calculate the maximum power transfer across a load resistor in a DC circuit. The theorem states that any linear electrical network can be replaced by an equivalent circuit consisting of a single voltage source (Thevenin voltage, Vth) in series with a single resistor (Thevenin resistance, Rth​).   1. **Take a sample problem. Draw a block diagram or circuit diagram of this sample problem.**   Find the magnitude of RL for the maximum power transfer to the circuit. Also find out the maximum power.     1. **Explain the solution in brief.** |

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