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| **Course Name:** | **Elements of Electrical and Electronics Engineering** | **Semester:** | **I/II** |
| **Date of Performance:** | **28/10/2021** | **Batch No:** | **G3** |
| **Faculty Name:** |  | **Roll No:** | **16010421063** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** | **/ 25** |

**Experiment No: 2**

**Title:** **Battery level Indicator.**

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| **Aim and Objective of the Experiment:** |
| * To understand voltage division concept, current division concept and principle of operation of LED. * To develop a micro project (Battery level indicator) based on the concepts learned in the form of various task performed in the experiment. |

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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/ Block Diagram:** |
| **Task 1: Voltage division Concept and its verification on breadboard**  **C:\Users\FacultyMBZ\Pictures\Screenshots\Screenshot (140).png**  **Task 2**: **Current division Concept**    **Task 3: Turn on an LED and measure its turn-on voltage**    **Task 4: Battery Level Indicator Circuit** |

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| **Stepwise-Procedure:** |
| 1. Make the connections as shown in the circuit diagram for Task1. Measure the voltages Va, Vb  and current Is for Task 1 and compare with calculated results.  2. Make the connections as shown in the circuit diagram for Task2. Measure the currents I1,I2, I3  and IS and compare with calculated results.  3. Make the connections as shown in the circuit diagram for Task3. Measure the voltages VS, VD,  VR1 for Case1 and Case 2.  4. Make the connections as shown in the circuit diagram for Task4. Measure the voltages across  LED and resistors. |

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| **Observation Table:** |
| **Observation Table 1 ( Task 1)**   |  |  |  | | --- | --- | --- | | **Voltages / Currents** | **Theoretical reading** | **Practical reading** | | **Va(V)** | 8 | 8 | | **Vb(V)** | 4 | 4 | | **IS(mA)** | 4 | 4 |   **Calulations (Task1):**  **Calclaute Va and Vb using the formula given below:**  **= 200\*12/300 = 8V**  **= 100\*12/300 = 4V**  **Observation Table 2**   |  |  |  | | --- | --- | --- | | **Currents** | **Theoretical reading** | **Practical Reading** | | **I1 (mA)** | **1200** | **1200** | | **I2 (mA)** | **200** | **200** | | **I3 (mA)** | **240** | **240** | | **IS (mA)** | **1640** | **1640** |   **Calculations (Task2):**  **Calculate I1, I2, I3 and IS using the formula given below:**    **= 24/20 = 1.2A**  **= 24/120 = 0.2A**  **= 24/100 = 0.24A**  **= 1.64A**    **Observation (Task 3):**  **Case 1 : LED just turn’s ON**   |  |  | | --- | --- | | **Parameters** | **Practical reading** | | **VS (V)** | 5 | | **VD (V)** | 2.2 | | **VR1 (V)** | 2.8 |   **Case 2 : LED turn’s ON ( glows brightly)**   |  |  | | --- | --- | | **Parameters** | **Practical reading** | | **VS** | 9 | | **VD** | 2.22 | | **VR1** | 6.68 |   **Observations (Task4):**  **Case 1 : Supply Voltage Levels recording**   |  |  | | --- | --- | | **Scenario** | **Range of Battery voltage (V)** | | **LED 1 ON** | 4 to 5.3 | | **LED 1 ON & LED 2 ON** | 5.35 to 6.95 | | **LED 1 ON & LED 2 ON &**  **LED 3 ON** | 6.95 to 9.07 | | **ALL LEDs ON** | >9.07 |   **Case Case 2: Status of voltages in the circuit when all LEDs On**   |  |  | | --- | --- | | **Voltages** | **Practical reading (in Volts)** | | **VLED 1** | 2.65 | | **VLED 2** | 2.51 | | **VLED 3** | 2.39 | | **VLED 4** | 2.29 | | **VR1** | 22.3 | | **VR2** | 19.8 | | **VR3** | 17.4 | | **VR4** | 15.1 |   Screenshot of Output:  **Task-1-**  **A picture containing text, athletic game, fruit drink  Description automatically generated**  **Task-2-**  Diagram, schematic  Description automatically generated  **Task-3-**  Diagram, schematic  Description automatically generated  **Task-4-**  Chart, diagram  Description automatically generated  Chart  Description automatically generated  Chart  Description automatically generated  Diagram  Description automatically generated |

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| **Post Lab Subjective/Objective type Questions:** |
| 1. Mention some applications of battery level indicator.   **Ans-** Battery level indicator can be used to find percentage of battery used in cars or inverters.So we can recharge the battery before it dies out. This is used on various devices which rely on battery. The most common use of battery level indicator is in powerbanks where a certain number of LEDs light up to show the charge of the power bank.   1. Explain practical usage of Voltage- division concept?   **Ans-**  i) Voltage dividers are used to adjust the signal’s level, for voltage measurement and bias of active devices in amplifiers. A multimeter and Wheatstone bridge include voltage dividers.  ii) Voltage dividers are used in the measurement of sensor, voltage, shifting of logic level, and adjustment of signal level.   1. Explain working of Battery Level Indicator implemented in this experiment in your own words?   **Ans**- Battery level indicator helps us determine how much voltage is being supplied. For example if 3 lights are turning on instead of 4 which means the circuit is using 75% of the voltage. The potentiometer only allows certain percentage of voltage. So we can see that by increasing the percentage on Potentiometer more LED light up. |
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| **Conclusion:** |
| We learnt to use Voltage divider rule in Battery level indicator to see how much of the battery voltage is actually available. |

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