|  |  |  |  |
| --- | --- | --- | --- |
| **Course Name:** | **Elements of Electrical and Electronics Engineering** | **Semester:** | **II** |
| **Date of Performance:** |  | **Batch No:** | **P1 - 2** |
| **Faculty Name:** | **Annu Abraham** | **Roll No:** | **16014022050** |
| **Faculty Sign & Date:** |  | **Grade/Marks:** |  |

**Experiment No: 3**

**Title: Mobile Battery Charger**

|  |
| --- |
| **Aim and Objective of the Experiment:** |
| * To understand the working of Mobile Battery Charging Circuit. * To implement the circuit of Mobile Battery charger on Breadboard and observe the waveforms at various points (Input and output Waveforms for Bridge Rectifier) and measure the output voltage. |

|  |
| --- |
| **Requirements:** |
| Step-down Transformer (+/- 12 v), Diodes(1N4007), voltage regulator IC 7805, Resistor, Capacitors (1000µF, 100µF, 10µF, 0.01 µF), CRO, Digital Multimeter (DMM), breadboard, connecting wires, Micro USB cable, etc. |

|  |
| --- |
| **Theory:** |
| Fullwave Rectifier with Capacitor FilterThroughout the above half cycle, the current in the D1 diode gets the filter and energizes the capacitor. But the capacitor charging will occur just when the voltage which is applied is superior to the capacitor voltage. Firstly, the capacitor will not charge, as no voltage will stay among the capacitor plates. So, when the voltage is switched on, then the capacitor will get charged immediately.  Throughout this transmission time, the capacitor gets charged to the highest value of the i/p voltage supply. The capacitor includes a highest charge at the quarter waveform in the positive half cycle. At this end, the voltage supply is equivalent to the voltage of the capacitor. Once the AC voltage begins falling & turns into less than the voltage of the capacitor, after that the capacitor begins discharging gradually.  As the i/p AC voltage supply gets the negative half-cycle, then the D1 diode gets reverse biased but the D2 diode is forward biased. Throughout the negative half cycle, the flow of current in the second diode gets the filter to charge the capacitor. But the capacitor charging occurs simply while the applied AC voltage is superior to the voltage of the capacitor.  The capacitor in the circuit is not charged fully, so the charging of this does not occur instantly. Once the voltage supply becomes superior to the voltage of the capacitor, the capacitor gets charging. In both the half cycles, the flow of current will be in the similar direction across the RL load resistor. Thus, we acquire either whole positive half cycle otherwise negative half cycle. In this case, we can get the total positive half cycle. |

|  |
| --- |
| **Circuit Diagram/ Block Diagram:** |
|  |

|  |
| --- |
| **Stepwise-Procedure:** |
| 1. Design circuit and connect it as shown in the circuit diagram using Proteus simulator. 2. Run the hardware and take scree shot of it to attach in the output. |

|  |
| --- |
| **Output waveforms observed on CRO:** |
| Working mobile battery charger  Vin – Peak to Peak  Vout – Peak |

|  |
| --- |
| **Observation Table:** |
| |  |  |  | | --- | --- | --- | | **Vin (p & rms )**  **(input of Rectifier in Volts)** | **Vout (peak)**  **Output of Rectifier (in Volts)** | **DC output of 7805 (in Volts)** | |  |  |  | |

|  |
| --- |
| **Post Lab Subjective/Objective type Questions:** |
| 1. **Explain working of Mobile Battery charger circuit.**   A mobile charger works on the simple principle of conversion of AC (alternating current) to DC (direct current). To accomplish 5V output that is what exactly needed by the smartphone it has to do step by step working. Step downing: In order to produce 5V output, it needs an input voltage.   1. **Explain the working principle of Turbo- charger for mobile phones.**   Turbo Charging is a technology that delivers the power to battery in a different way than the conventional charger does. It has a higher output voltage. It usually ranges between 6V to 12V depending upon your battery capacity.  The main highlight of the technology is that even though the output voltage is high, the current flow is not altered in any way. So, if you but a 6V DC adapter and plug your battery into it, that's going affect the battery as it has higher charge flow i.e., current flow which makes the battery to heat up and has bad effect on its life too. Whereas Turbo Charging involves different arrangement of resistors, capacitors and inductors than regular chargers which makes it capable to produce higher output voltage without increasing current flow and hence has no to very less effect on battery.   1. **State commonly used types of mobile phone batteries.**   Two types of batteries are used in modern mobile and smartphones - Lithium Polymer and Lithium-Ion. Li-Poly is the latest and the most advanced battery used in modern mobile and smartphones.     1. **Explain how to maximize Battery Performance/ Battery life of your mobile phone?**    * 1. Let your screen turn off sooner.      2. Reduce screen brightness.      3. Set the brightness to change automatically.      4. Turn off keyboard sounds or vibrations.      5. Restrict apps with high battery use.      6. Turn on adaptive battery. 2. **Write important specifications of Voltage regulator IC 7805.**    * 1. 5V Positive Voltage Regulator.      2. Minimum Input Voltage is 7V.      3. Maximum Input Voltage is 25V.      4. Operating current (IQ) is 5mA.      5. Internal Thermal Overload and Short circuit current limiting protection is available.      6. Junction Temperature maximum 125 degree Celsius.      7. Available in TO-220 and KTE package. |

|  |
| --- |
| **Conclusion:** |
| In conclusion, by using the principle of a full wave rectifier with capacitor filter and a voltage regulator we are able to use the system as a working mobile battery charger. |

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