Course Name:	**EEEE**	**Semester:**	**I/II**
Date of Performance:		**Batch No:**	**G3**
Faculty Name:		**Roll No:**	**16010421063**
Faculty Sign & Date:		**Grade/Marks:**	

Experiment No: 5
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

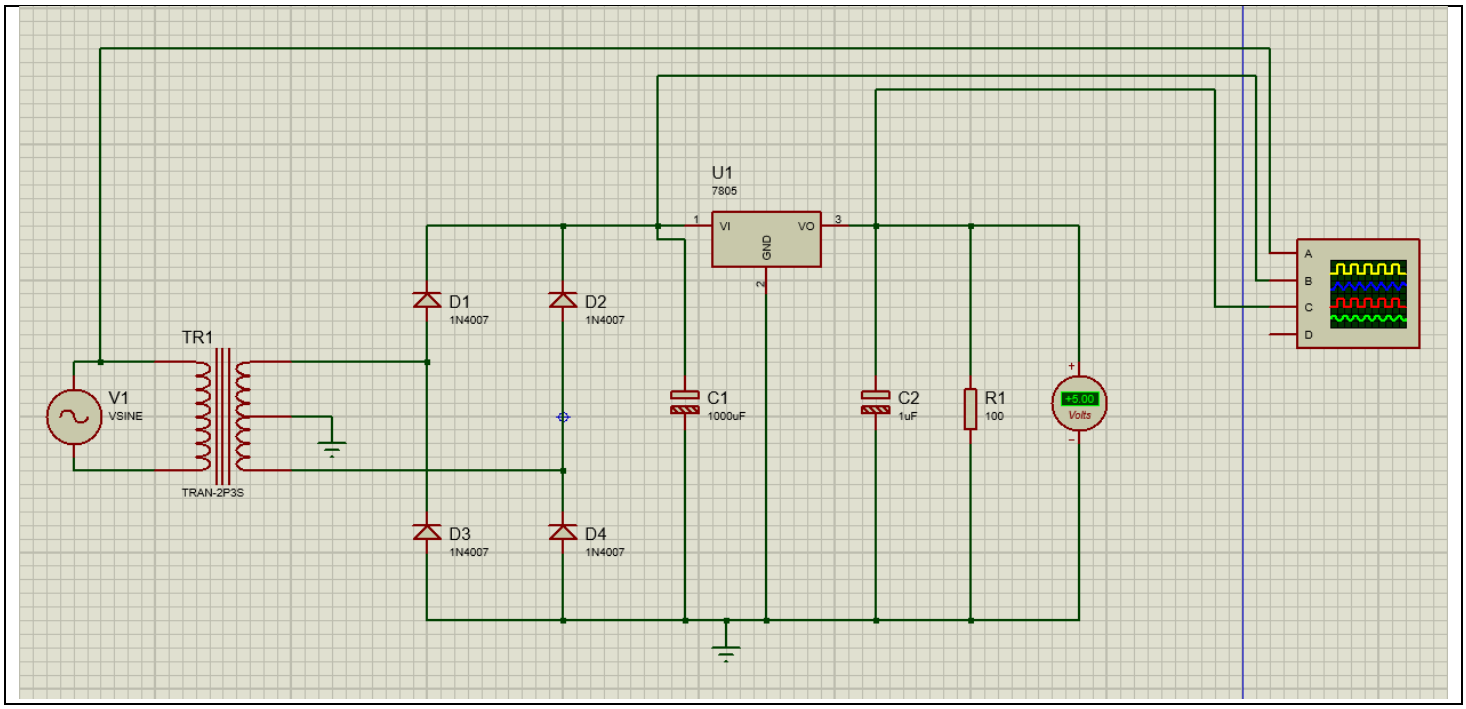
Requirements:

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:

The Vsine, which has an AC voltage of 230V and a frequency of 50Hz, works as a source. A step-down transformer with a secondary inductance of 0.0027H is used to minimise the high voltage current. A rectifier circuit is used to convert alternating current (AC) to direct current (DC) utilising four forward biassed diodes, two in each pair, to convert two half cycles of AC into DC. To filter out the AC, an electrolytic capacitor is connected. This DC current is then filtered with the help of an electrolytic capacitor with a low capacitance and then regulated with the help of an IC 7805 regulator. The waveforms produced by the oscilloscope linked to the circuit aid in determining the voltage of the current at each stage. The Vsine, or source current, is connected to Channel A. The current entering the rectifier network is channel B. Channel C displays the rectified current waveform, whereas Channel D displays the final rectified and regulated current waveform. The value of each box for channel B is 5V, and the waveforms produced have a peak value that nearly leaps to 2 boxes on each sides, i.e., nearly 20V, as seen in the following screenshot of the waveforms produced by the digital oscilloscope (CRO). As a result, we may state that the rectifier's AC current input voltage is around 20V, or nearly 17V. Similarly, the waveform of channel C leaps approximately two boxes, and the rectified DC current has a value of 10V, or nearly 7.42V.

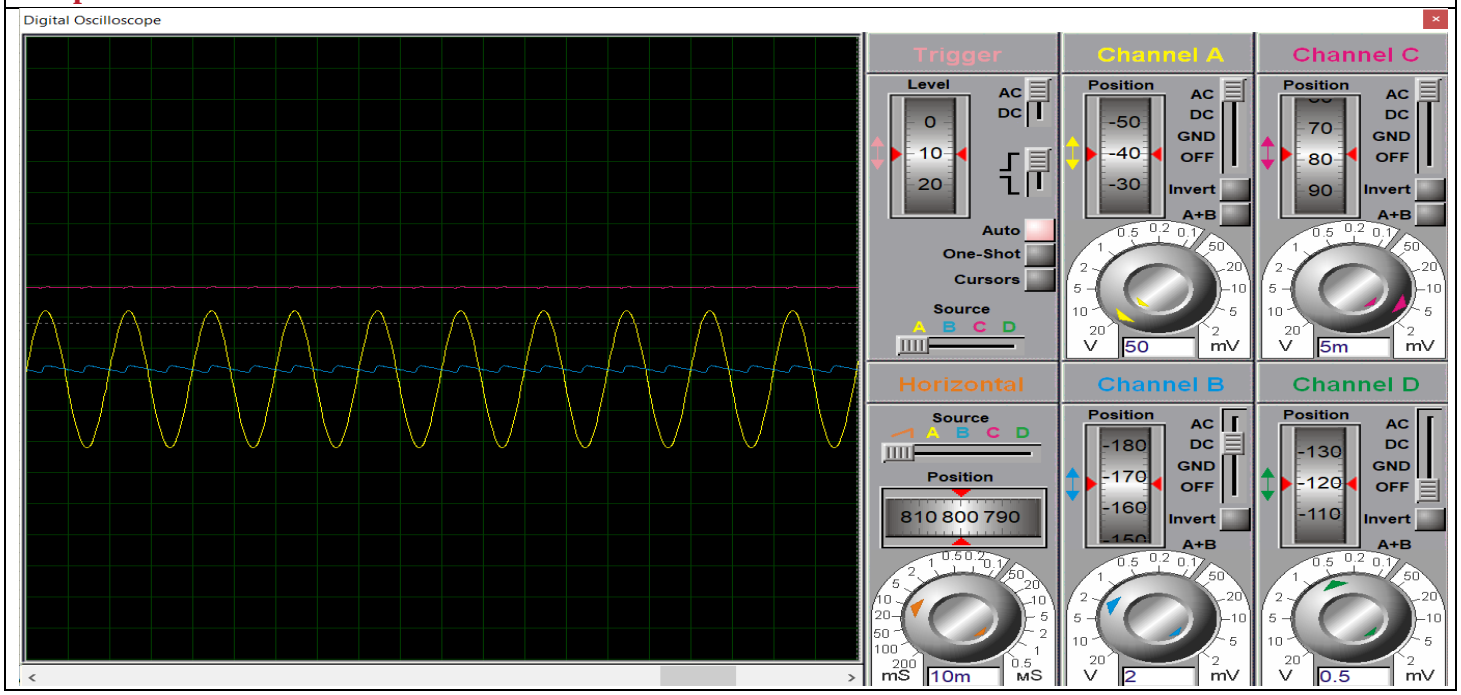
Circuit Diagram/ Block Diagram:



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:



Observation Table:

Vin(p-p) (input of Rectifier in Volts)	Vout(peak) Output of Rectifier (in Volts)	DC output of Charger (in Volts)
17V	7.42V	5v

Post Lab Subjective/Objective type Questions:

3. Explain working of Mobile Battery charger circuit :

Ans: The mobile battery charger circuit reduces the current drawn from a source of very high voltage (230V) to low voltage using a step down transformer, then converts the alternating current (AC) drawn from the source into direct current (DC) using a pair of diodes, and finally uses a capacitor to achieve the desired voltage. However, if the source voltage varies, the overall voltage of the circuit also changes dramatically, so to ensure that we get a constant voltage all the time, we use a capacitor.

4. Explain the working principle of Turbo- charger for mobile phones .

Ans: The charging process can be divided into three parts.

- **Stage 1 – Constant Current:** Voltage increases towards its peak, while current stays constant at a high level. This is the phase where a lot of power is quickly delivered to the device.
- **Stage 2 – Saturation:** This is the phase where the voltage has reached its peak and current drops down.
- **Stage 3 – Trickle/Topping:** The battery is fully charged. In this phase, the power will either slowly trickle in, or will periodically charge a low "topping" amount as the phone consumes battery.

The amount of power and length of each process depends on the fast-charging standard. A standard is an established charging process that corresponds to a particular device, charger, and power output. Different manufacturers develop various charging standards that are capable of varying outputs and charge times.

5. State commonly used types of mobile phone batteries.

Ans:

- Nickel Cadmium(NiCd)
- Lithium polymer(Li-pol)
- Nickle metal hydride

- Li-ion (lithium ion)

4.Explain how to maximize Battery Performance/ Battery life of your mobile phone?
Ans:

- Charge only till 80%
- Avoid using phone while charging
- Check for apps which consume insane amount of battery
- When not in use turn of the mobile data/WI-FI.
- Keep brightness Auto.

5. Write important specifications of Voltage regulator IC 7805
Ans:

- It can deliver up to 1.5 A of current (with heat sink).
- Has both internal current limiting and thermal shutdown features.
- Requires very minimum external components to fully function
- input voltage should always be greater than the output voltage (atleast by 2.5V).
- The input current and output current are almost identical.

Conclusion:

This experiment taught us about the basic principles of charging, how mobile battery circuits function, the many types of batteries, and how to extend battery life. We also learned about different electronic components and their applications in circuits.

Signature of faculty in-charge with Date: