Course Name:	**EEEE**	**Semester:**	**I/II**
Date of Performance:	**12/05/2022**	**Batch No:**	**E1**
Faculty Name:		**Roll No:**	**16010321005**
Faculty Sign & Date:		**Grade/Marks:**	**/25**

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

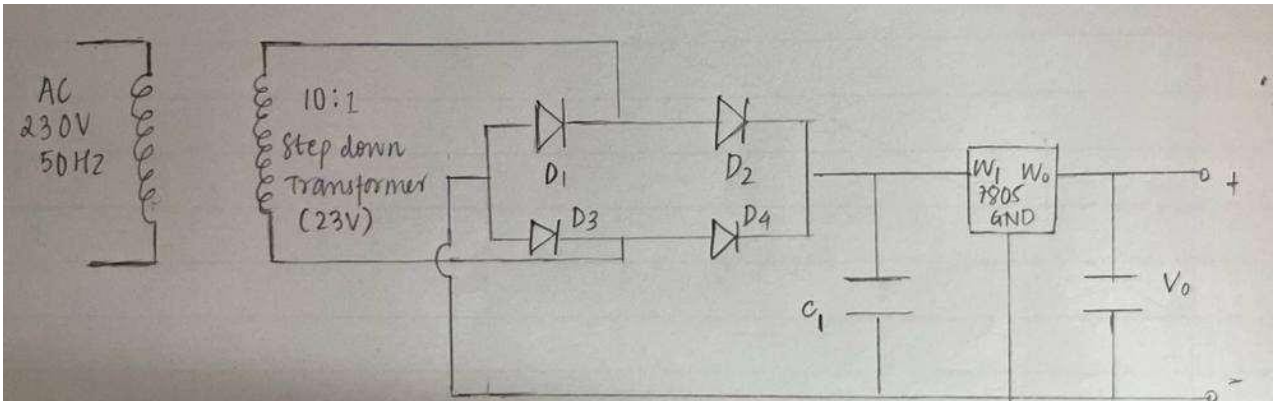
Requirements:

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:

A wireless mobile battery charger circuit is based on the theory of mutual inductance. Based upon the theory of inductive coupling the power gets transferred to the receiver on a wireless form. Inductance comes in two different type:
Mutual Inductance and Self Inductance.
In mutual inductance the conductor that carries the current is strategically positioned near to another conductor so as to pass the voltage to other conductor, and this is possible simply because of the presence of induced magnetic flux. The magnetic flux induced is further connected to another conductor, and the flux helps to induce the voltage to the second conductor. This principle of connecting conductors and induce of voltage among them is referred as inductively coupled.

Circuit Diagram/ Block Diagram:

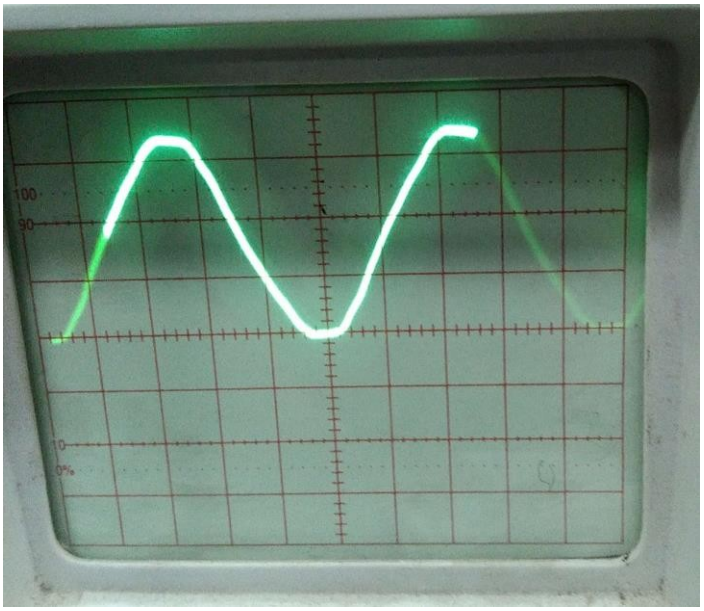


Stepwise-Procedure:

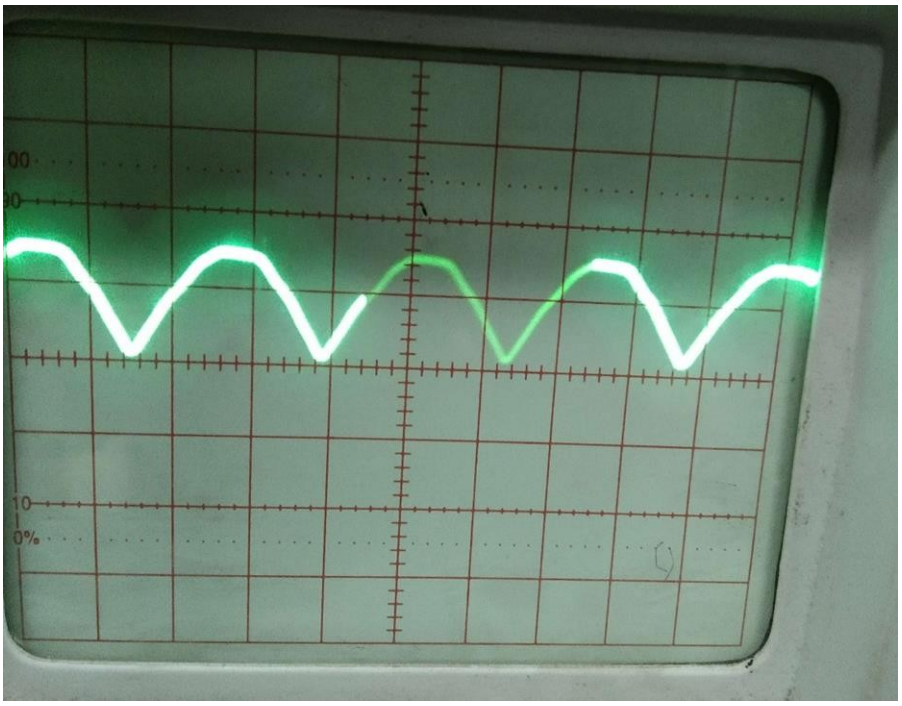
1. Design circuit and connect it as shown in the circuit diagram using Proteus simulator.
2. Run the hardware and take scree shot of it to attach in the output.

Output waveforms observed on CRO:

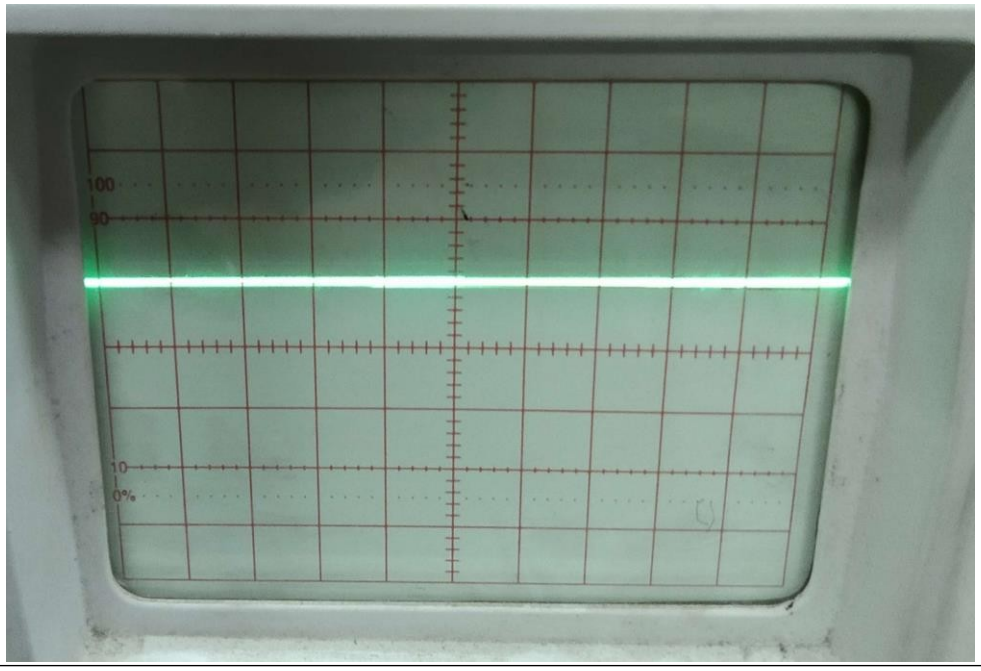
1. Step Down AC Voltage:



2. Rectification:



3. Final DC 5V Output:



Observation Table:

Vin(p-p) (input of Rectifier in Volts)	Vout (peak) Output of Rectifier (in Volts)	DC output of Charger (in Volts)
38 V	19 V	5 V

Post Lab Subjective/Objective type Questions:

1. Explain working of Mobile Battery charger circuit
   - We can divide this circuit into four parts: (1) Step down AC voltage (2) Rectification (3) Filtration (4) Voltage Regulation.

1. Step down AC voltage

As we are converting 220V AC into a 5V DC, first we need a step-down transformer to reduce such high voltage. Here we have used 9-0-9 1A step-down transformer, which convert 220V AC to 9V AC. In transformer there are primary and secondary coils which step up or step down the voltage according to the no of turn in the coils.

Selection of proper transformer is very important. Current rating depends upon the Current requirement of **Load circuit** (circuit which will use the generate DC). The voltage rating should be more than the required voltage. Means if we need 5V DC, transformer should at least have a rating of 7V, because voltage regulator IC 7805 at least need 2V more i.e. 7V to provide a 5V voltage.

2. Rectification

Rectification is the process of removing the negative part of the Alternate Current (AC), hence producing the partial DC. This can be achieved by using 4 diodes. Diodes only allow current to flow in one direction. In first half cycle of AC diode D2 & D3 are forward biased and D1 and D4 are reversed biased, and in the second half cycle (negative half) Diode D1 and D4 are forward biased and D2 and D3 are reversed biased. This Combination converts the negative half cycle into positive.

3. Filtration

The output after the Rectification is not a proper DC, it is oscillation output and has a very high ripple factor. We don't need that pulsating output, for this we use Capacitor. Capacitor charge till the waveform goes to its peak and discharge into Load circuit when waveform goes low. So when output is going low, capacitor maintains the proper voltage supply into the Load circuit, hence creating the DC.

4. Voltage Regulation

A voltage regulator IC 7805 is used to provide a regulated 5v DC. Input voltage should be 2volts more than the rated output voltage for proper working of IC, means at least 7v is needed, although it can operate in input voltage range of 7-

20V. Voltage regulators have all the circuitry inside it to provide a proper regulated DC. Capacitor of 0.01uF should be connected to the output of the 7805 to eliminate the noise, produced by transient changes in voltage.

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

Turbo Charge 2.0 is a technology that uses different charging mechanism and hence you need a different charger for that. It delivers the power to battery in a different way than the conventional charger does. It, like you said, has a higher output voltage! It usually ranges between 6V to 12V depending upon your battery capacity.

3. State commonly used types of mobile phone batteries.

Nickel-cadmium (NiCd),

NiMH (NiMH),

Lithium-ion (Li-ion),

Lithium Polymer (Li-pol) batteries.

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

Reduce screen brightness
Use dark mode
Shorten sleep time
Adjust settings for power draining apps
Turn on power saver mode
Turn off location services
Turn off data roaming

5. Write important specifications of Voltage regulator IC 7805

7805 is a **voltage regulator** integrated circuit. It is a member of 78xx series of fixed linear voltage regulator ICs. The voltage source in a circuit may have fluctuations and would not give the fixed voltage output. The **voltage regulator IC** maintains the output voltage at a constant value. The xx in 78xx indicates the fixed output voltage it is designed to provide. 7805 provides +5V regulated power supply. Capacitors of suitable values can be connected at input and output pins depending upon the respective voltage levels.

Conclusion:
Hence we have understood the working and functioning of a mobile battery charger and its components.

Signature of faculty in-charge with Date: