

Course Name:	Elements of Electrical and Electronics Engineering	Semester:	I
Date of Performance:	16/10/2023	Batch No:	C5_1
Faculty Name:	Sandeep Hanumante	Roll No:	16010123293
Faculty Sign & Date:		Grade/Marks:	/ 25

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

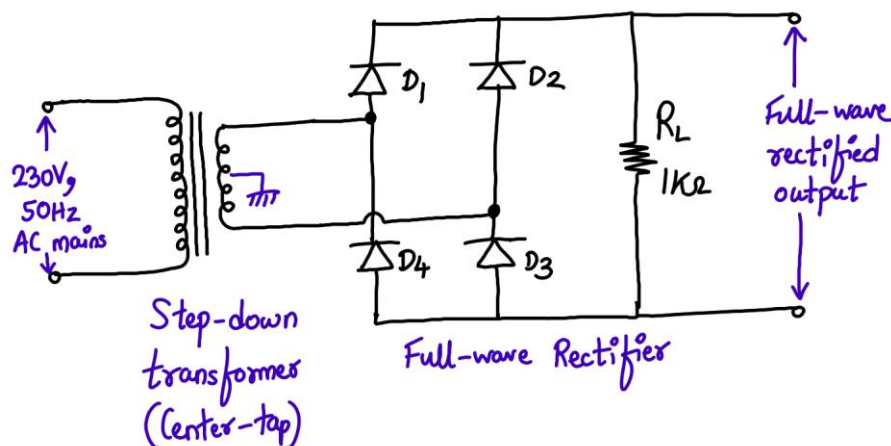
COs to be achieved:

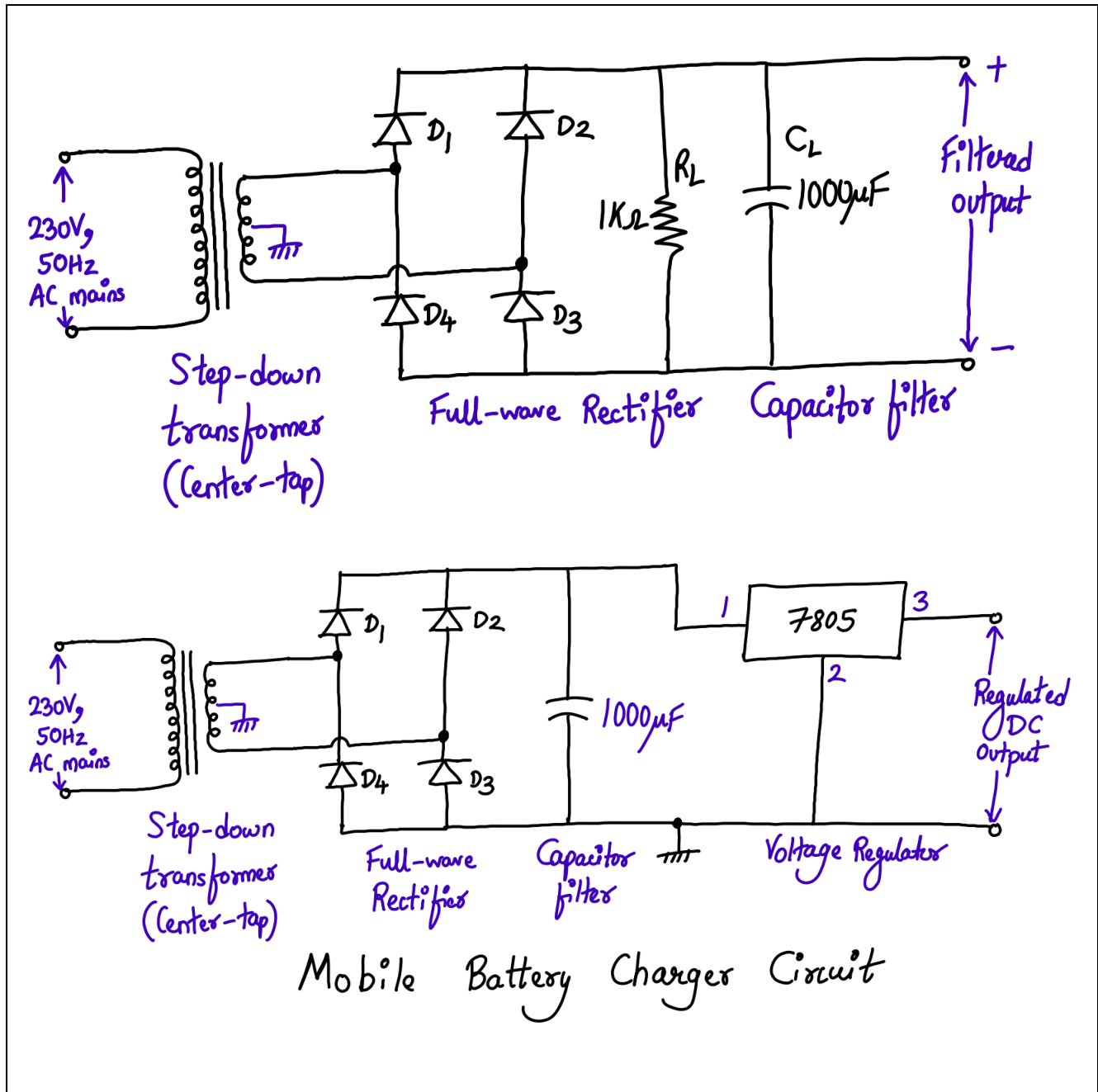
- CO1:** Analyze resistive networks excited by DC sources using various network theorems.
CO2: Demonstrate and analyze steady state response of single phase and three phase circuits
CO3: Understand principles and working of AC and DC machines with their applications.
CO4: Explain rectifier-filter circuits using PN junction diode and voltage regulator circuits using Zener diode

Requirements:

Step-down Transformer (6V-0-6V), Diodes(1N4007), voltage regulator IC 7805, Resistor, Capacitors, CRO, Digital Multimeter (DMM), breadboard, connecting wires, Micro USB cable, etc.

Circuit Diagram:



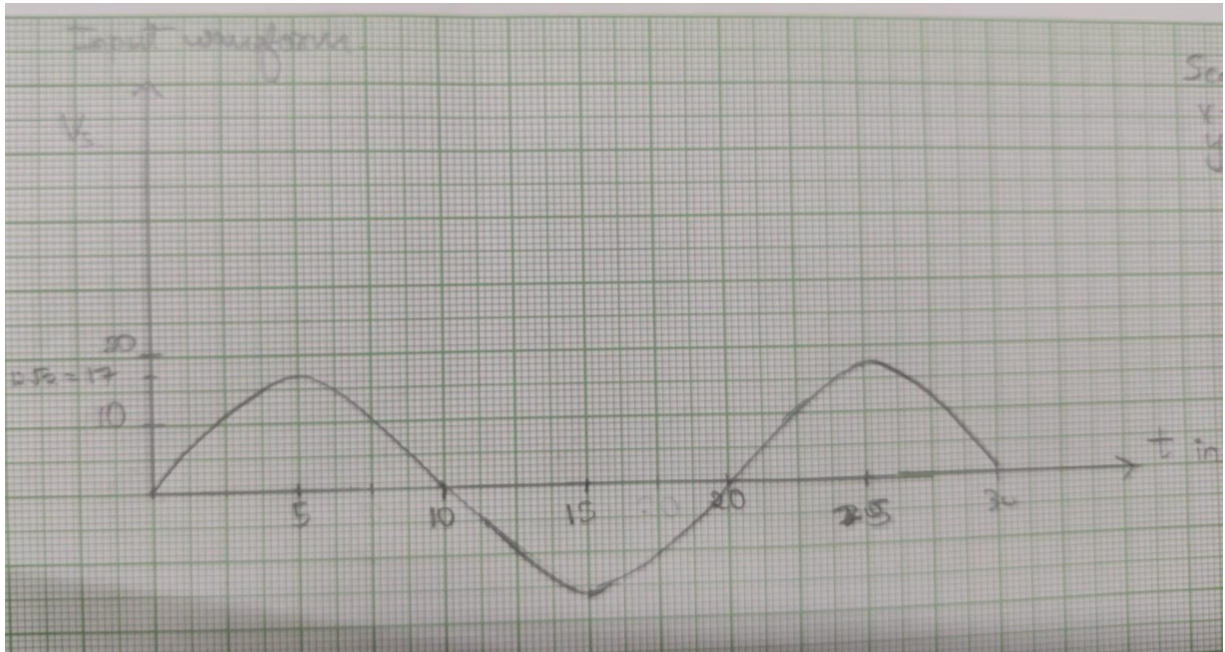


Stepwise-Procedure:

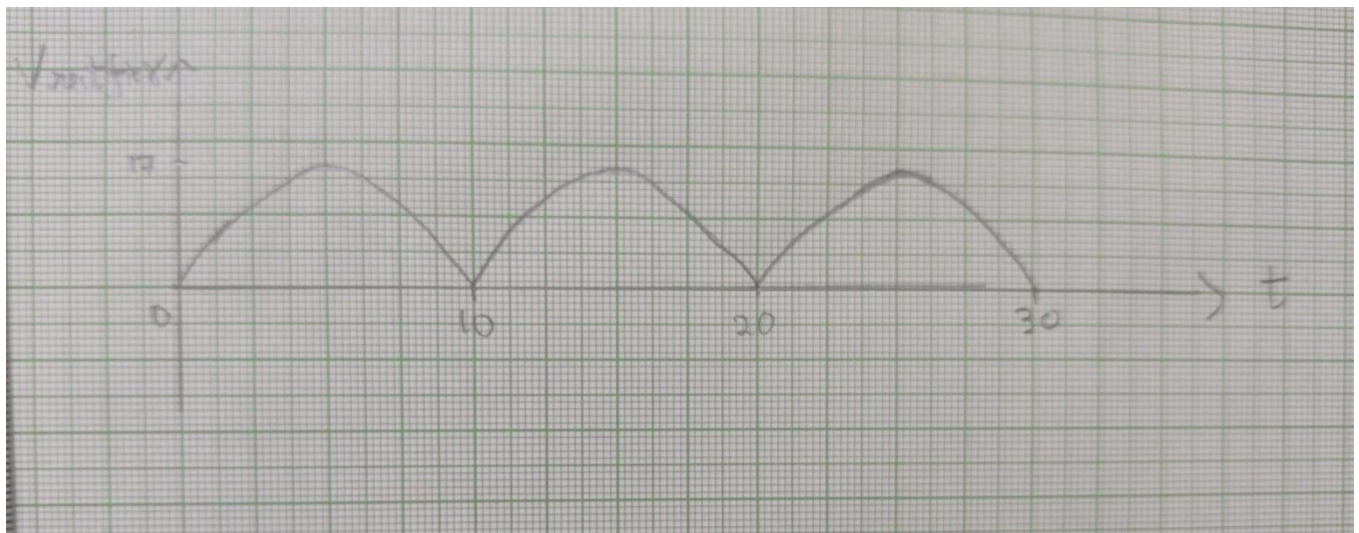
1. Design circuit and connect it as shown in the circuit diagram
2. Observe the waveform on the CRO at different points in the circuits.

Output waveforms observed on CRO:

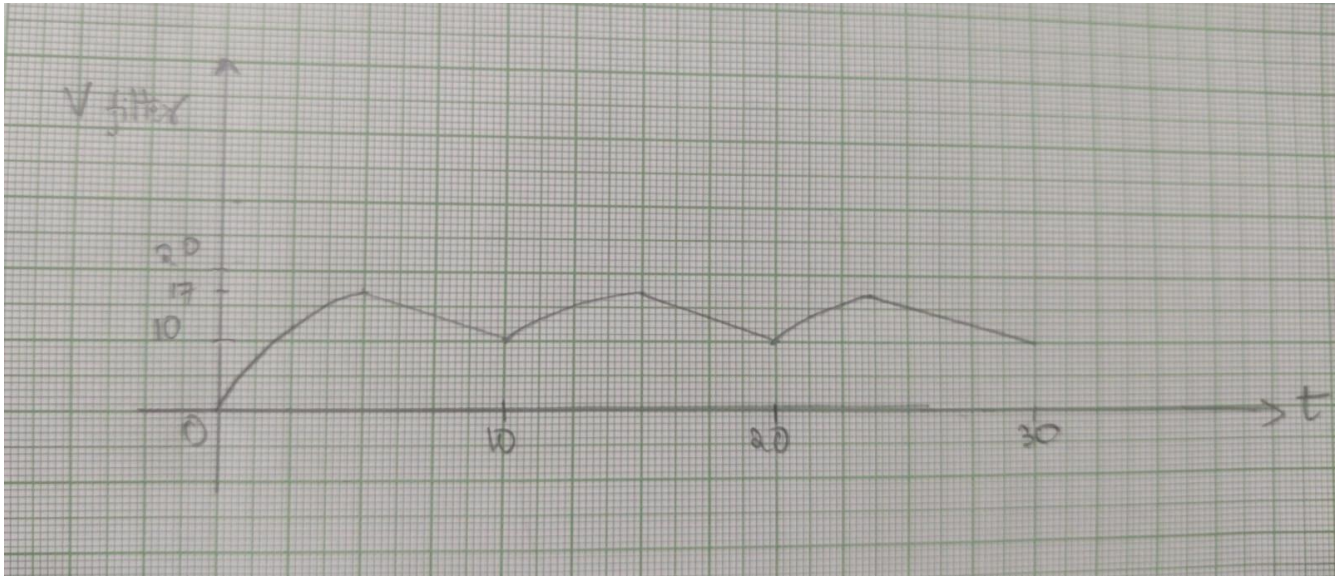
1. Plot secondary voltage across transformer versus time



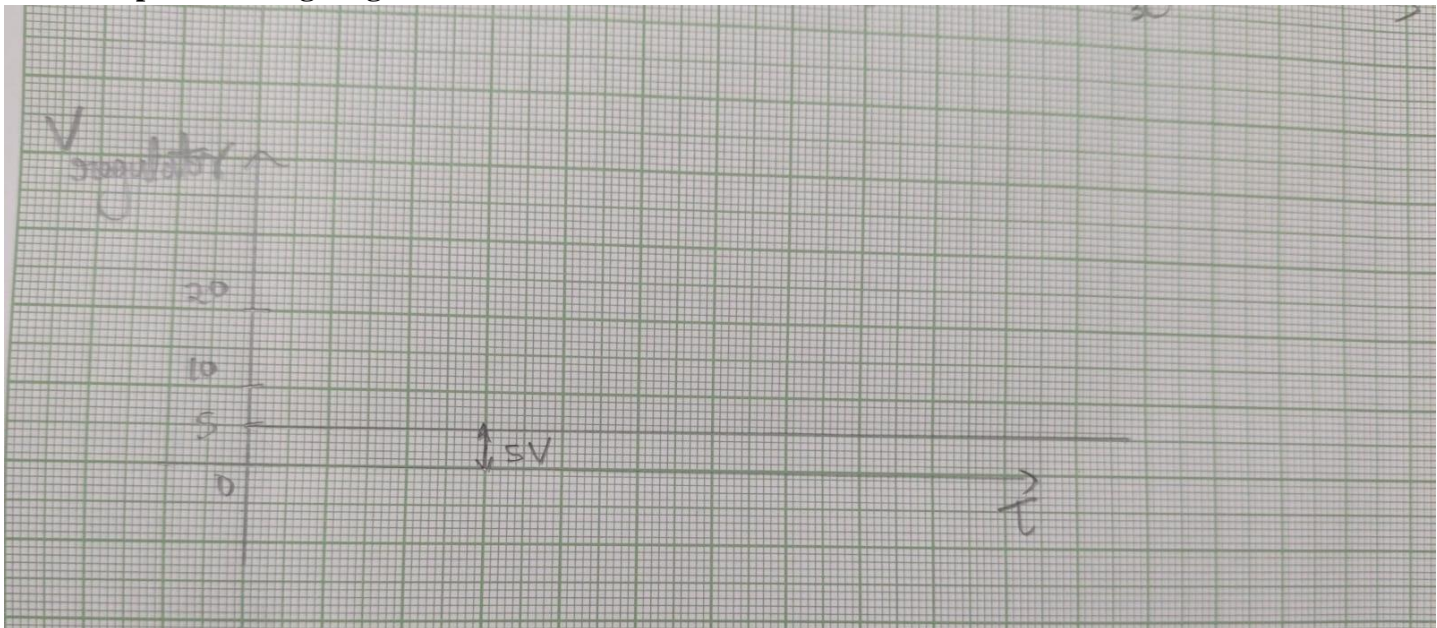
2. Plot Rectifier output versus time



3. Plot Capacitor filter output versus time



4. Plot output of Voltage regulator versus time



Observation Table:

Vin (p-p & rms) (input of Rectifier in Volts)	Vout(peak) Output of Rectifier (in Volts)	DC output of 7805 (in Volts)
Rms = 12.7 Peak = 36.7	18V	5V

Post Lab Subjective:
1. Explain working of Mobile Battery charger circuit .

For the reason of smaller in size, the mobile charger has a different charging circuit than a normal battery charger circuit.

- At first, the 220-230V AC supply passes through the bridge rectifier which made by four diodes and then it rectified by the bridge rectifier.
- The DC output is filtrated by a capacitor.
- Then 220-230V DC passing through the two transistors and being converted into a high-frequency AC signal.
- The high-frequency AC signals again passing through capacitors for power factor correction and filter which increases the efficiency of the circuit.
- Then the filtrate high-frequency AC signal goes to the pulse transformer which steps down the voltage to 5V.

- The 5v AC is converted to DC by a diode.
- The DC output is filtrated by a capacitor.

Then the pure DC is supplied to mobile for charge the battery.

2. State commonly used types of mobile phone batteries

There are two very commonly used types of batteries used in modern cell phones- *Lithium Polymer and Lithium Ion*.

Lithium-ion batteries are found not just on smartphones but on laptops, PDAs, cars, and iPods. Most smartphone brands including Samsung, iPhone, Infinix, Nokia use lithium-ion batteries. Lithium Polymer batteries are used in most modern gadgets and most of the new flagship devices.

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

The battery life of a mobile phone can be maximised as follows-

- Phones should be kept out of direct sunlight for prolonged periods, especially in summer when surface temperatures can increase to above 70°C.
- The easiest way to conserve battery life while maintaining full function is to reduce the brightness of the screen. For devices that have an organic light emitting diode (OLED) display, you can also use the “light on dark” option for viewing.
- To maximize the battery capacity in the future we should avoid that 0% battery mark altogether, while also keeping those batteries at least partially charged if storing them for a prolonged period of time to avoid deep discharge.
- Charging at lower rates allows more complete shuttling to occur, which enhances the battery’s charge capacity. Therefore, charging up your phone in that 30% to 80% range keeps the voltage lower and might slightly prolong the battery’s lifespan.
- Use Airplane Mode. When turning off all such auxiliary functions due to this mode, the device will use only up to 5% of its usual energy consumption with the screen off. For comparison, simply having your device in idle can still use more than 15%.
- Avoid charging overnight or in a cradle during the day because continuous trickle charging of a full battery can cause plating of the metallic lithium, which reduces stability in the long term and can, in rare cases, lead to system-wide malfunctions and reboots. Secondly, it leaves the battery at a higher stress voltage when at 100%. Third, and most important, it creates excess heat caused by wasted power dissipation.

4. Write important specifications of Voltage regulator IC 7805

Important specification of Voltage regulator IC 7805 are-

- 5V Positive Voltage Regulator to power microcontrollers and sensors in most of the projects.
- Minimum Input Voltage is 7V.
- Maximum Input Voltage is 25V.
- Operating current(IQ) is 5mA.



- Internal Thermal Overload and Short circuit current limiting protection is available.
- Junction Temperature maximum 125 degree Celsius.
- Available in TO-220 and KTE package.
- Adjustable Output Regulator.

Regulated Dual Supply. Output Polarity-Reversal-Protection Circuit

Conclusion:

This experiment taught us how to implement the circuit of a mobile battery charger by meticulously observing the waveforms at different points. Output voltage was calculated after the correct implementation of circuit. We also learned about the working of the mobile battery charger.

Signature of faculty in-charge with Date: