

Course Name:	Elements of Electrical and Electronics Engineering Laboratory	Semester:	I
Date of Performance:	08/10/2024	Batch No:	C5-3
Student Name:	Rajat Kumar	Roll No:	54
Faculty Sign & Date:		Grade/Marks:	/ 20

Experiment No: 2

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

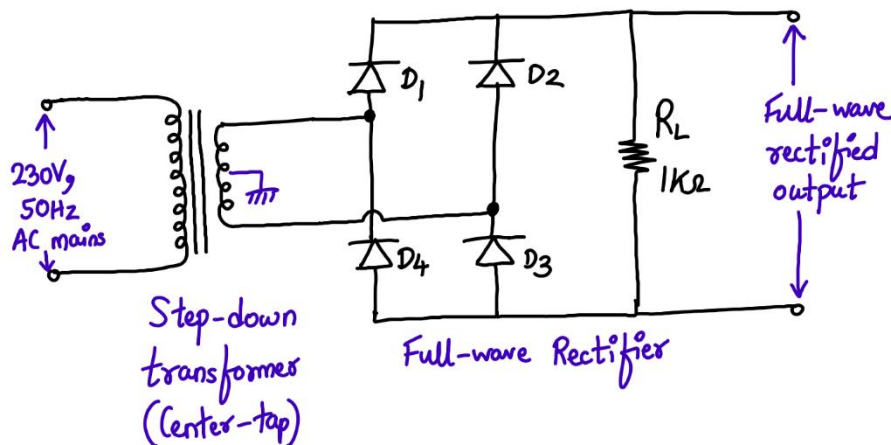
COs to be achieved:

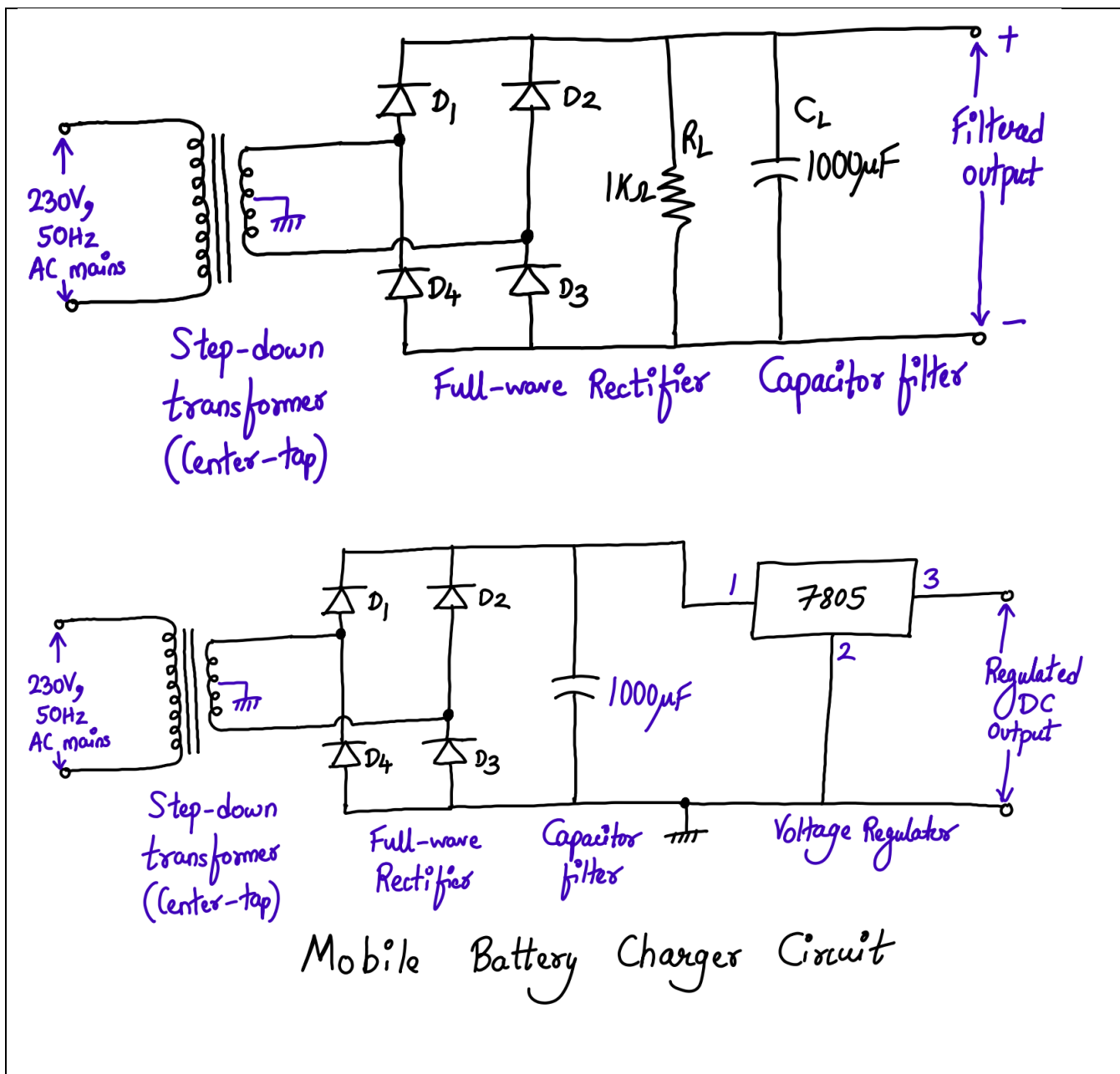
- CO1:** Analyze resistive networks excited by DC sources using various network theorems.
CO2: Demonstrate and analyze steady state response of single phase and three phase circuits
CO3: Understand principles and working of AC and DC machines with their applications.
CO4: Explain rectifier-filter circuits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



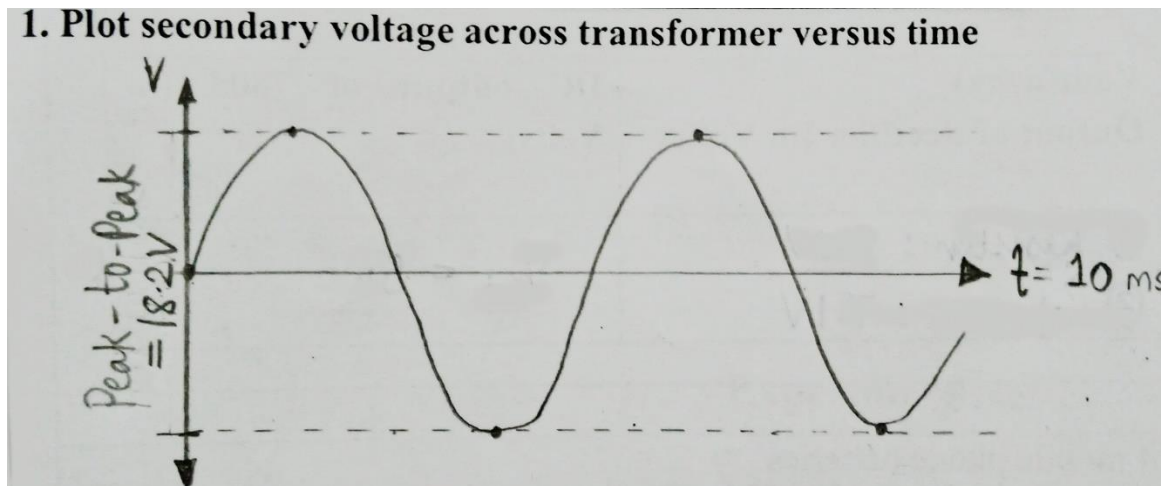


Stepwise-Procedure:

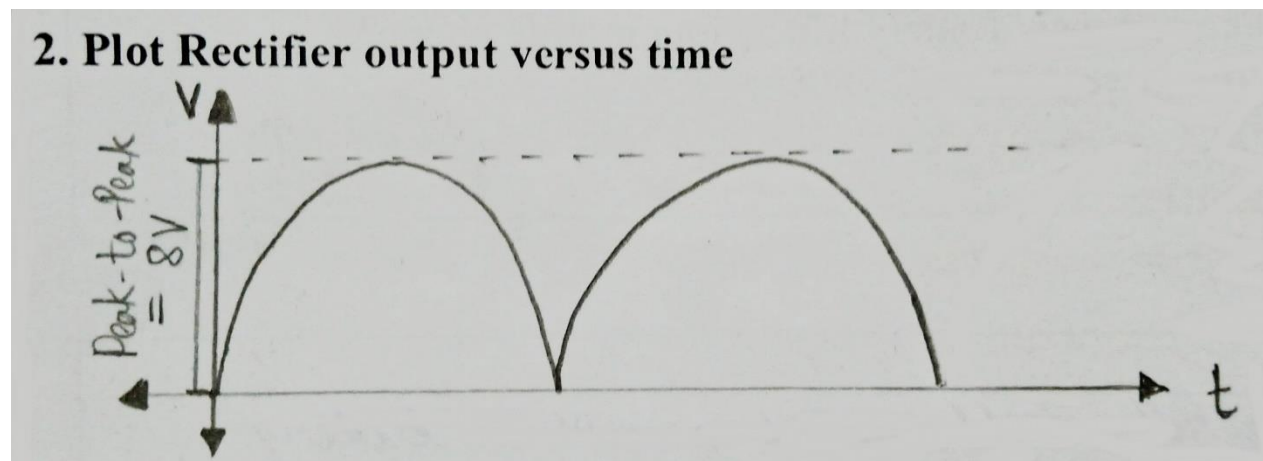
1. Design circuit and connect it as shown in the circuit diagram
2. Observe the waveform on the CRO at different points in the circuits.

Output waveforms observed on CRO:

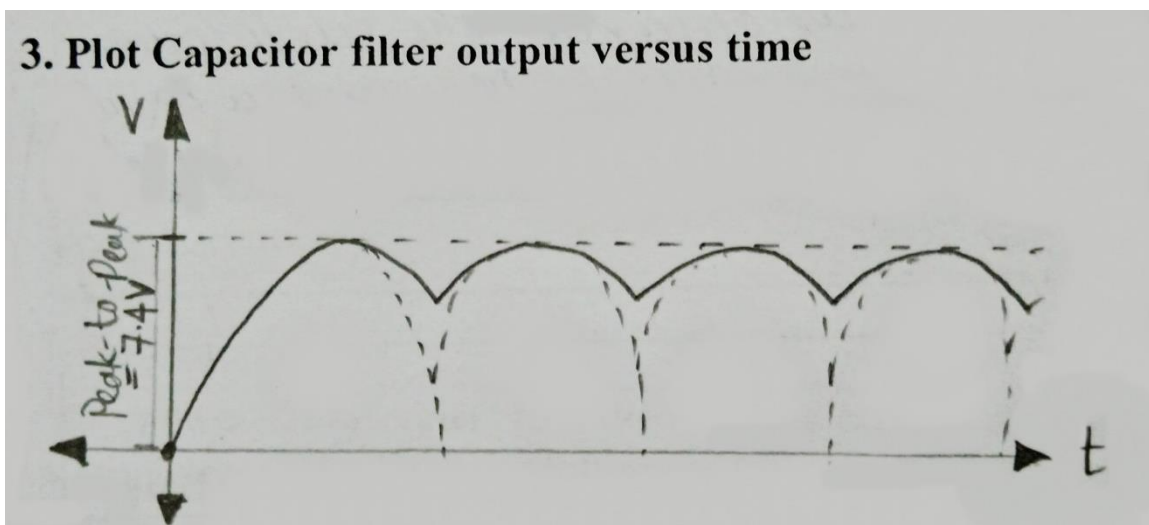
1. Plot secondary voltage across transformer versus time



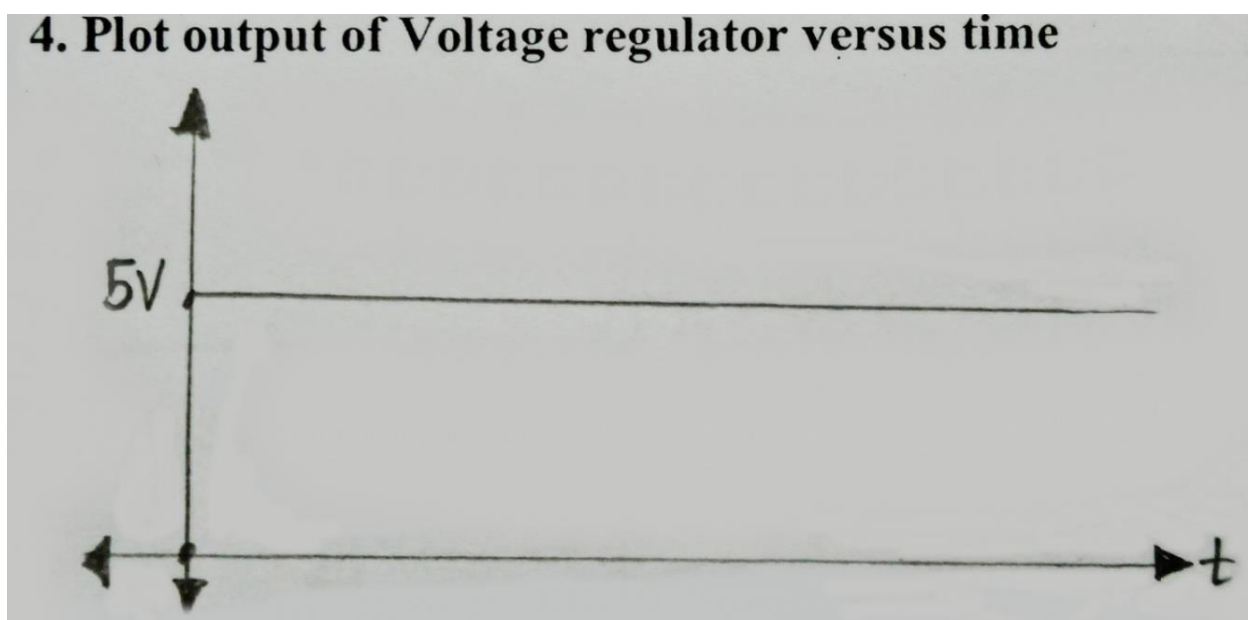
2. Plot Rectifier output versus time



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)
1. 22.30 & 7.80	Resistor : 8.00V	5.00V
2. 20.50 & 7.21	Capacitor : 7.40V	

Post Lab Subjective:

1. State commonly used types of mobile phone batteries.

Ans: There are two commonly used types of batteries in modern cell phones:

- **Lithium-Ion** (Li-ion) batteries are widely found not only in smartphones but also in laptops, PDAs, electric vehicles, and iPods. Major smartphone brands, including Samsung, iPhone, Infinix, and Nokia, utilize lithium-ion batteries in their devices.
- **Lithium Polymer** (Li-Po) batteries are prevalent in most modern gadgets and are often found in new flagship devices due to their lightweight and flexible design.
- Some other commonly used mobile phone batteries-
Nickel Metal Hydride (NiMH), Nickel-Cadmium (NiCd), Solid-State Batteries, Graphene Batteries.

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

Ans:

- **Optimize Charging Habits:**
Avoid charging your phone to 100% or letting it drop to 0%. Keeping the battery between 20% and 80% helps extend battery lifespan.
- **Reduce Screen Brightness:**
Lowering brightness or using auto-brightness can significantly save battery, as the screen is a major power consumer.
- **Turn Off Unnecessary Features:**
Disable GPS, Bluetooth, Wi-Fi, and NFC when not in use. Also, use power-saving modes available on most smartphones.

- **Manage Background Apps:**
Close unnecessary apps running in the background and restrict background data for non-essential apps.
- **Update Software:**
Keep your phone's OS and apps updated to benefit from the latest power management optimizations.

3. Write important specifications of Voltage regulator IC 7805.
(You can attach data sheet of IC 7805)

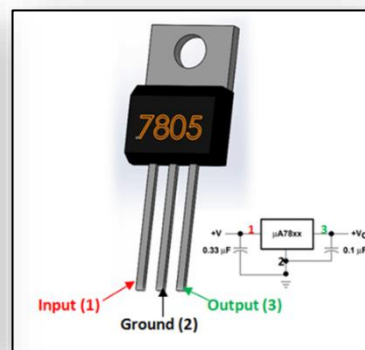
Ans: The 7805 Voltage Regulator IC is one of the *most widely used linear voltage regulators*. It provides a **stable 5V output** from **higher voltage inputs**.

Here are the important specifications:

1. **Output Voltage:** $5V \pm 2\%$
2. **Input Voltage Range:** 7V to 35V
3. **Maximum Output Current:** 1.5A
4. **Quiescent Current:** 5mA to 8mA (typical)
5. **Thermal Overload Protection:** Yes
6. **Short Circuit Protection:** Yes
7. **Package Types:** TO-220, TO-3, SMD (varies with manufacturer)
8. **Operating Temperature:** -40°C to $+125^{\circ}\text{C}$

These features make it **ideal for powering 5V systems** like *microcontrollers, sensors, and other digital electronics*.

Pin No .	Pin	Function	Description
1	INPUT	Input voltage (7V-35V)	In this pin of the IC positive unregulated voltage is given in the regulation.
2	GROUND	Ground (0V)	In this pin where the ground is given. This pin is neutral for equally the input and output.
3	OUTPUT	Regulated output 5V (4.8V-5.2V)	The output of the regulated 5V is taken out at this pin of the IC regulator.





Conclusion:

In this experiment, we successfully implemented a **mobile battery charging circuit** on a breadboard. We observed the **rectification process**, where the **AC input** was converted to **DC** using a **bridge rectifier**, and the **output voltage** was **regulated** to a **stable level suitable for charging**. The main objectives were to understand the operation of the circuit, observe its behavior at various stages, and plot the respective graphs.

Through this experiment, we gained practical insights into how mobile battery charging circuits are **constructed** and **operate**—from **AC rectification** to **voltage regulation**—ultimately delivering a **stable DC voltage** for charging mobile devices.

Signature of faculty in-charge with Date: