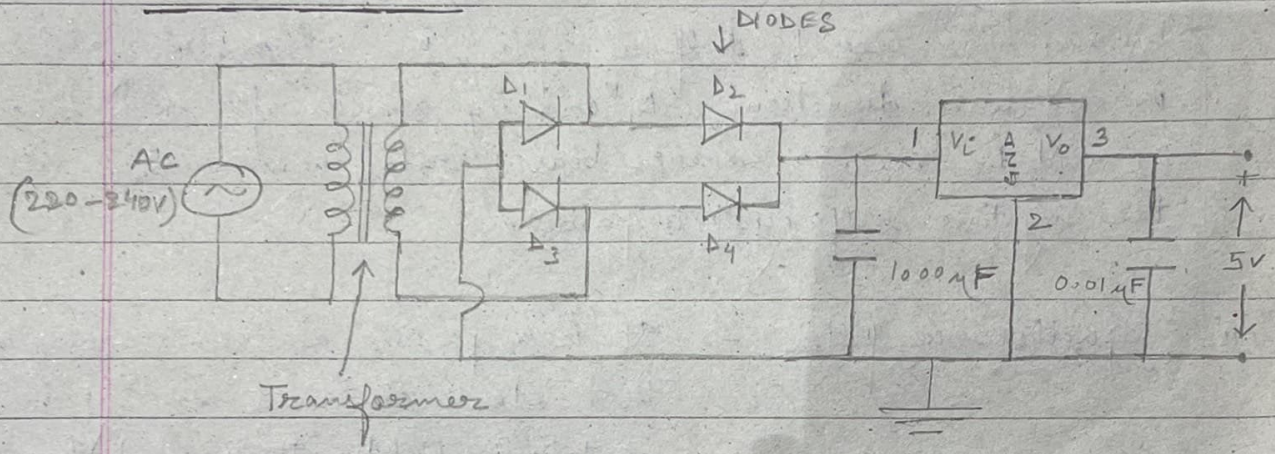
LAB REPORT - Mobile Charger

AIM → The objective of the project is to construct and demonstrate a mobile charger.

COMPONENTS →

- Diodes
- 1000 μF capacitor
- 0.01 μF capacitor
- Transformer (230V - 12V)
- 7805 Ic Regulator
- USB connector
- Bread board

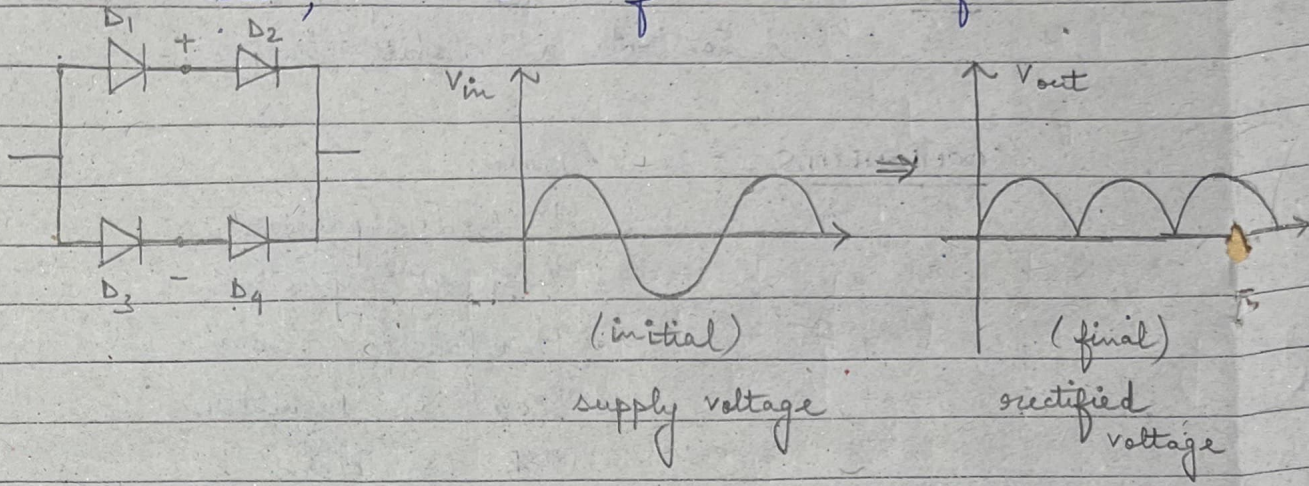
CIRCUIT DIAGRAM



Working PROCEDURE of CIRCUIT

(i) Transformer → Here, it is used to reduce the input AC voltage which supplied to the circuit from 230V to 12V.

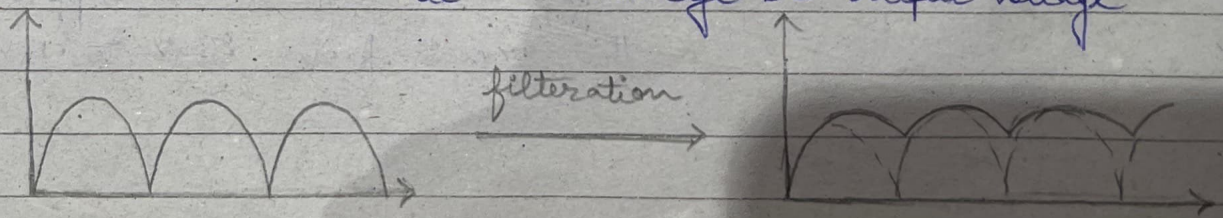
(ii) Diodes → It allows the current to flow in one direction. In this experiment, a bridge wave rectifier is used, which consists of combination of the diodes.



These combination of diodes during the first half of cycle, i.e, when voltage flow is in positive direction, D_2 and D_3 are in forward bias & D_1 and D_4 are in reverse bias. During the second half of cycle, i.e, when voltage flow is in negative direction, D_1 and D_4 are in forward bias & D_2 and D_3 are in reverse bias. Bridge wave rectifier converts the negative half cycle to positive.

(iii) Capacitor as filter → It is a passive electronic component that stores electrical energy in an electrical field. It is used to maintain voltage across the load circuit. It helps to low ~~load~~ the ripple factor.

$$\text{Ripple factor} = \frac{V_{ac}}{V_{dc}} = \frac{\text{Rectified RMS voltage}}{\text{Average DC output voltage}}$$



Consider, value of filter capacitor :

$$C = \frac{I \times t}{V}$$

where,

I = maximum output (500 mA for given transformer)

C = capacitance

$t = \frac{1}{f}$; Voltage before rectification had frequency of 50Hz & after rectification it had 100Hz.

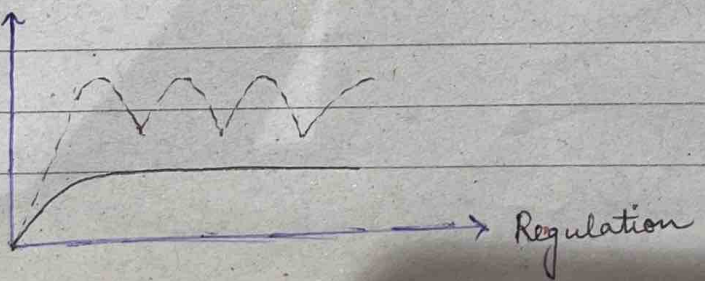
$$\therefore t = \frac{1}{100} \text{ s} = 10 \text{ ms}$$

The KA-7805 regulator operates between 7V and 32V and it returns the output voltage in the range of 4.8V to -52V.

$$\therefore V = 5V$$

$$C = \frac{500 \times 10^{-3} \times 10 \times 10^{-3}}{5} = 1000 \mu F$$

(iv) KA-7805 Voltage Regulator : In order for IC to work properly, the input voltage should be 2-3 volts more than the output voltage value, i.e, the minimum required voltage is 7V. It helps in providing a regulated DC voltage. A 0.01μF is connected to output in order to eliminate the noise.



PRECAUTIONS →

- Be careful while making the circuit as 230V AC mains is being used.
- The positive and negative terminals of capacitor should be connected properly as it is a bipolar capacitor.

CONCLUSION → The project successfully acheived its objectives by designing and constructing a reliable mobile charger with regulated 5V output. The result suggests that charger is suitable for practical applications.