

## **5V DC POWER SUPPLY BOARD**

### ➤ **ABSTRACT: -**

The main aim of this assignment is to design a 5V DC power supply. For this purpose, we must convert 220V to 5V DC supply. The DC power supply has wide applications in the modern world. Every day we use Mobile charger, Laptop Charger, TV etc. All these equipment's require DC power supply to operate.

### ➤ **INTRODUCTION: -**

A 5V power supplies (or 5VDC power supplies) are one of the most common power supplies in use today. In general, a 5VDC output is obtained from a 50VAC or 220VAC input using a combination of transformers, diodes and transistors. 5V power supplies can be of two types: 5V regulated power supplies, and 5V unregulated power supplies. 5V regulated power supplies come in three styles: Switching regulated AC to DC, Linear regulated AC to DC, and Switching regulated DC to DC.

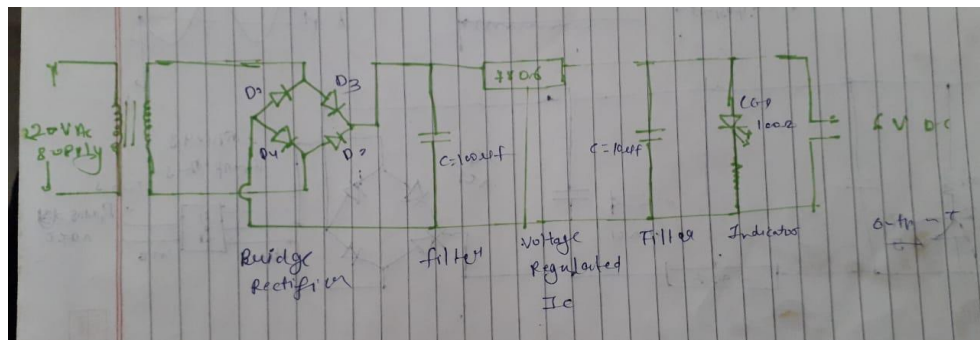
➤ **OBJECTIVE: -** To design a regulated DC power supply of (+5Volt).

➤ **PROBLEM: -** Requirement of a low voltage regulated dc supply source for various power electronic circuit.

### ➤ **APPARATUS: -**

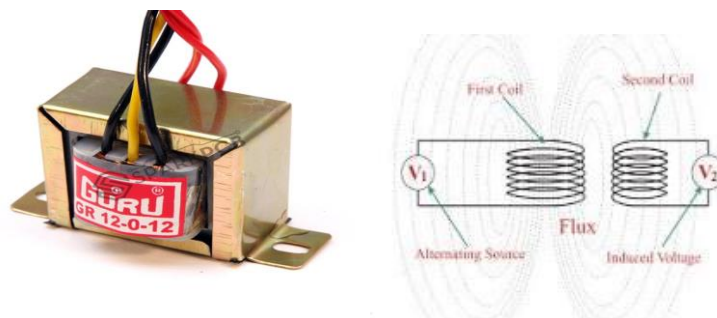
S. No	Component Name	Quantity Of Component	Ratings of componets
1.	Step Down Transformer	1	
2.	PN-Diode	4	1N40007
3.	IC (7085)	1	7085
4.	LED	1	3v
5.	Capacitor (100uf)	1	100uf
6.	Capacitor (10uf)	1	10uf
7.	Resister	1	100ohm
8.	PCB (Zero)	1	0
9.	Solder	As per required	-
10.	soldering flux	As per required	-
11.	Soldering Iron	As per required	25w
12.	Desoldering Pump	As per required	-
13.	Multimeter	As per required	-
14.	Wire Strippers	As per required	-
15.	Needle Nose Pliers	As per required	-
16.	Electrical tape	As per required	-
17.	Jump wire	As per required	-

➤ **METHODOLOGY:** - The circuit configuration in fig 1.1



- **Transformer:** - A transformer is a static device which transfers electrical energy from one circuit to another through the process of electromagnetic induction. It is most used to increase ('step up') or decrease ('step down') voltage levels between circuits

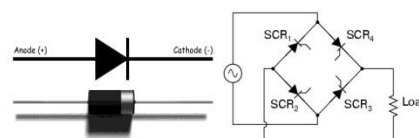
**Circuit Diagram:** -



**Fig 1.1**

- **Bridge rectifier:** - A bridge rectifier circuit is a common part of the electronic power supplies. Many electronic circuits require rectified DC supply for powering the various electronic basic components from available AC mains supply. We can find this rectifier in a wide variety of electronic AC power devices like home appliances, motor controllers, modulation process, welding applications, etc.

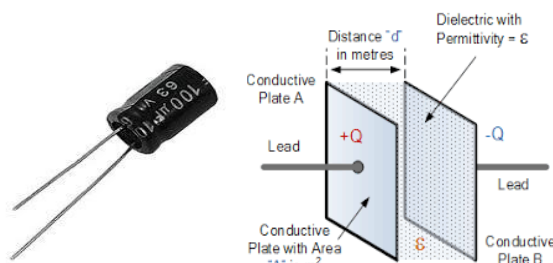
**Circuit Diagram:** -



**Fig 1.2**

- **Filter:** - A capacitor is a passive electronic component that stores energy in the form of an electrostatic field. In its simplest form, a capacitor consists of two conducting plates separated by an insulating material called the dielectric.

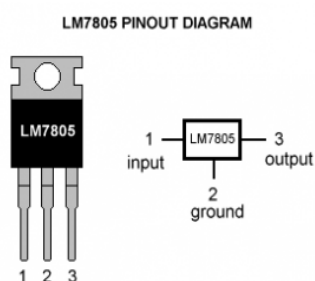
**Circuit Diagram: -**



**Fig 1.3**

- **Integrated Circuit:** - A voltage regulator IC maintains the output voltage at a constant value. 7805 IC, a member of 78xx series of fixed linear voltage regulators used to maintain such fluctuations, is a popular voltage regulator integrated circuit (IC). The xx in 78xx indicates the output voltage it provides. 7805 IC provides +5 volts regulated power supply with provisions to add a heat sink.

**Circuit Diagram: -**



**Fig 1.4**

- **LED:-** A light-emitting diode (LED) is a semiconductor device that emits visible light when an electric current passes through it. The light is not particularly bright, but in most LEDs it is monochromatic, occurring at a single wavelength. The output from an LED can range from green (at a wavelength of approximately 520-530 nanometres).

**Circuit Diagram: -**

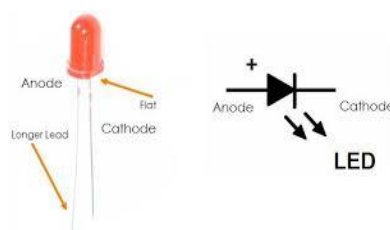


Fig 1.5

- **Carbon resistor:** -Carbon composition resistor definition. The carbon composition resistor is a type of fixed resistor that reduces or restricts the electric current flow to a certain level. These resistors are the most used resistors in the 1960's and earlier.

Circuit Diagram: -



- **Breadboard:** - A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

Circuit Diagram: -

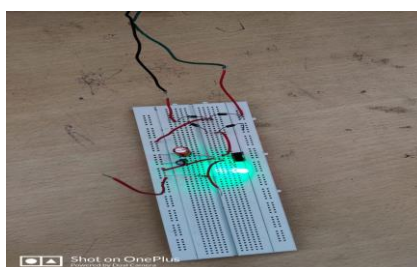
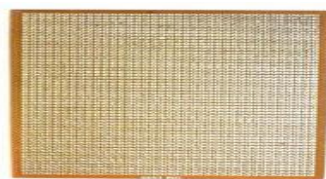


Fig 1.6

- **PCB (Printed Circuit Board):** -A printed circuit board (PCB) mechanically supports and electrically connects electronic components or electrical components using conductive tracks, pads and other features etched from one or more sheet layers of copper laminated onto and/or between sheet layers of a non-conductive substrate.

**Circuit Diagram: -**



**Fig 1.7**

- **JUMPER WIRE:**-A Jumper wire is an electrical wire, or group of them in a cable, with a connector or pin at each end which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.<sup>[1]</sup>



**Fig 1.8**

- **WIRE STRIPPER:** -It is a portable handheld tool which is use for removing the insulation from electric wires. This tool is used by workers and electricians.



**Fig 1.9**

- **NOSE PLIER:** -Needle-nose pliers (also known as pointy-nose pliers, long-nose pliers, pinch-nose pliers or snipe-nose pliers) are both cutting and holding pliers used by artisans, jewellery designers, electricians, network engineers and other tradesmen to bend, re-position and snip wire.



**Fig 1.10**

- **MULTIMETER:** -A multi meter or a multi tester, also known as a VOM (volt-ohm-milliammeter), is an electronic measuring instrument

that combines several measurement functions in one unit. A typical multi meter can measure voltage, current, and resistance. Analog multi meters uses a microammeter with a moving pointer to display readings.



Fig 1.11

### ➤ WORKDONE FOR HARDWARE: -

#### Steps to convert 220V AC to 5V DC

- First connect primary side of transformer with free end of power chord. To identify which side is primary follow either any one of these steps
- Always red colour wire end will be primary and black colour wire end will be secondary. if you have multi meter, check the resistance, primary side will have higher resistance and secondary will have lower resistance (Sometimes you may not notice the difference as you might be using transformer for smaller size) or else, if possible, supply lower AC voltage on either side and check the output on other side. By that you can identify which side is stepping down.

DO NOT forget to cover the joints with insulation tape, as this going to interface directly with 220V AC.

connect secondary sides to bread board (or to which ever you are using).

Arrange the IN4001 as shown in figure

connect the capacitor across two wire outs from diode.

connect the wire out from diode after capacitor to 7805.

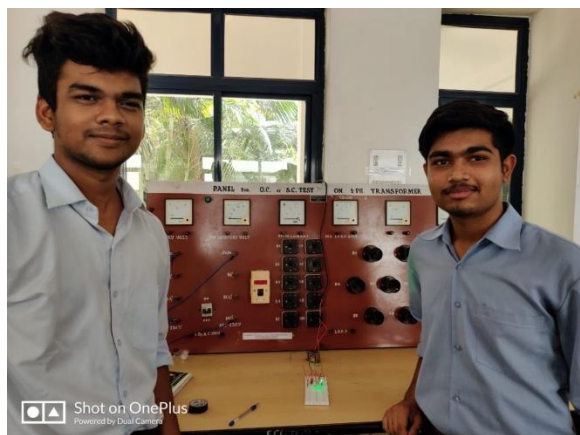
it has three pins, in, and out.

Take the wire from out and from 7805 and use wherever you want.

That has voltage 12V and amp rating of which ever transformer you used.







➤ **ADVANTAGE & DISADVANTAGE: -**

**Advantages: -**

- Simplicity of design
- Lower parts count
- Space savings (unless a heat sink is used)
- Low noise
- Fast transient response
- Low cost

**Disadvantage: -**

- low efficiency if input-output difference is large
- Low efficiency = significant heat dissipation
- May require a heat sink
- Capable exclusively of step-down operation

➤ **APPLICATION: -**

Industrial automation  
TTL circuit power  
Precision control circuit  
Research project

➤ **CONCLUSION: -**

The power supply that has been designed to provide a good alternative to give a constant and cost-effective dc power supply board. It is provided exact 5v dc at output and it is checked by multi meter.