DEPARTMENT OF COMPUTER & SOFTWARE ENGINEERING

COLLEGE OF E&ME, NUST, RAWALPINDI

Subject Name:EDC

LAB PROJECT: DC POWER SUPPLY

SUBMITTED TO:
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DC Power Supply:

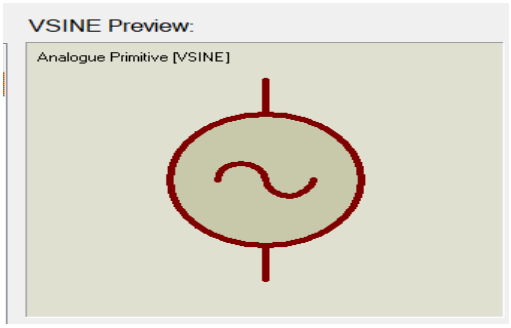
Introduction:

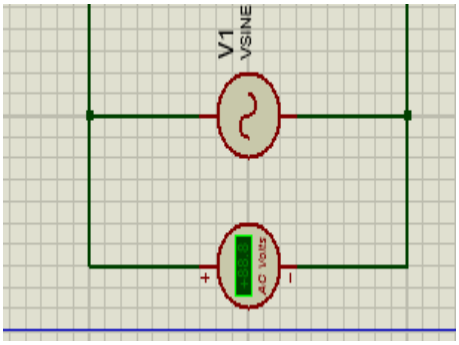
A DC power supply is a type of power supply that gives direct current (DC) voltage to power a device. Because DC power supply is commonly used on an engineer's or technician's bench for a ton of power tests, they are also often called a "bench power supply."

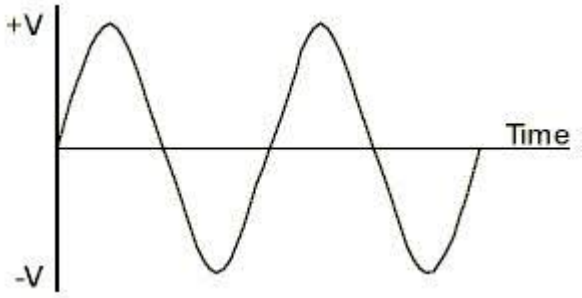
Components of DC Power Supply:

1) Voltage Source:

AC voltage source is used to give voltage sinusoidal signals



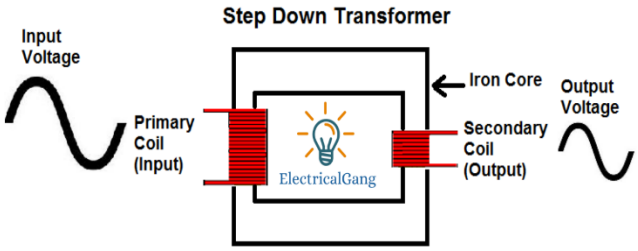




2) Transformer:

- The purpose of transformers in power supply is to make electrical power accessible as it travels from a power utility to an office, home, worksite or other location.
- It sets voltage according to our requirements.

- N2/n1 =v2/v1
- A step-down transformer is used in the first step of AC-DC voltage conversion
- We used center taped transformer because output efficiency is high and ripple factor is less.



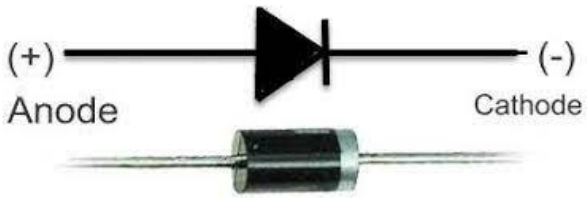
Step Down Transformer

$$\frac{V_s}{V_p} = \frac{N_s}{N_p}$$

V_s = Secondary Voltage
V_p = Primary Voltage
N_s = Number of windings in secondary coil
N_p = Number of windings in primary coil

3) Rectifier

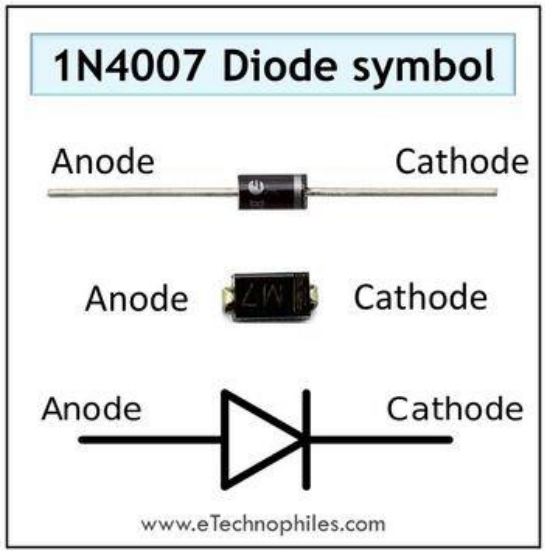
- **Rectifier** is a device which converts the sinusoidal ac voltage into either positive or negative pulsating dc.
- We have used Bridge rectifiers because they are widely used for large appliances, which can convert high AC voltage to low DC voltage.



Pin Configuration Pin No.

1. Anode Current always Enters through Anode
2. Cathode Current always Exits through Cathode

1N4007 Diode



Characteristics of 1N4007 Diode:

- Average forward current is 1A.
- Non-repetitive Peak current is 30A.
- Reverse current is 5uA.
- Peak repetitive Reverse voltage is 1000V.
- Power dissipation 3W.

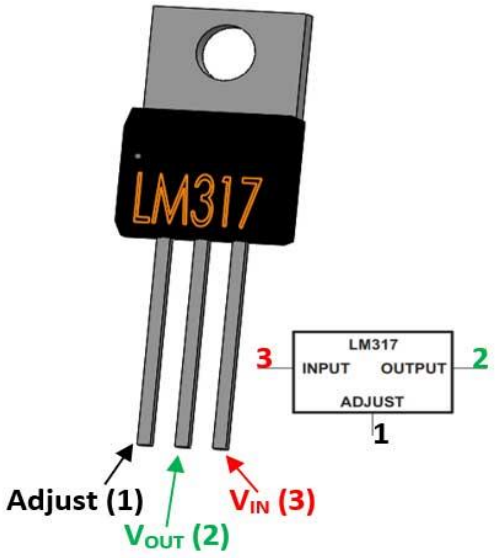
- Available in DO-41 Package

4) Filter capacitors

- The capacitor is a reactive component.
- The capacitor increases the DC voltage and decreases the ripple voltage components of the output.
- It is followed by voltage regulator which virtually eliminates any remaining ripple voltage.
- The important property of the capacitor is that it passes the AC signal but blocks the DC signal and hence capacitor is used in the rectifier circuit.

5) Voltage regulator LM317EMP IC:

- 3 terminal adj regulator
- Positive Adjustable Output 1.25V to 37V 1A
- INPUT voltage range is 4.2V to 40V.
- Constant current limit with temperature

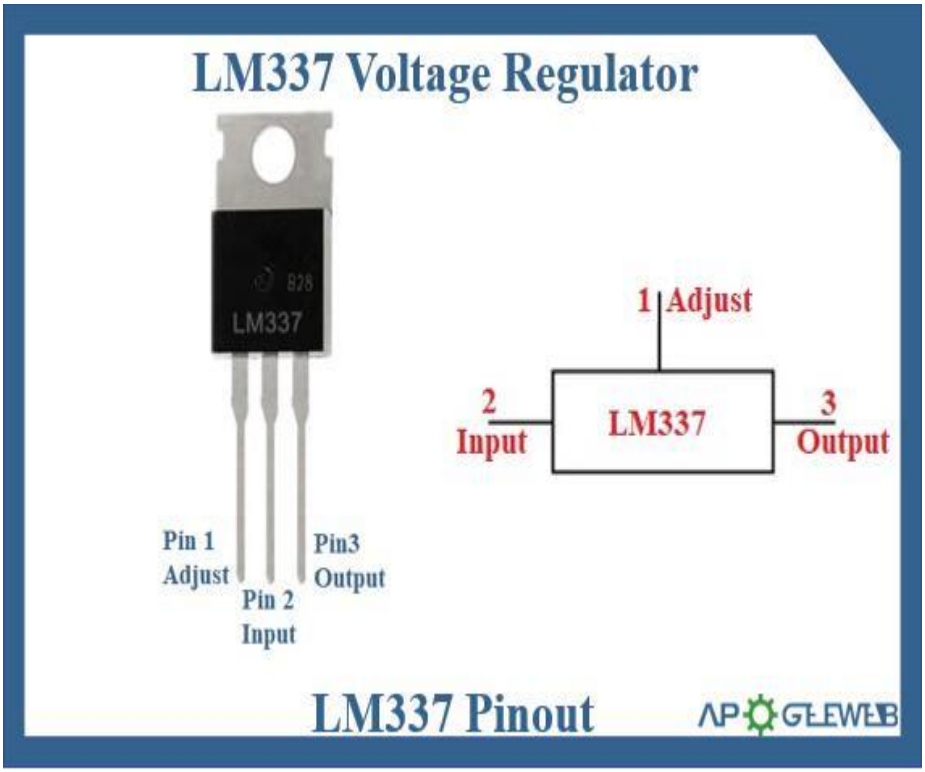


LM317 Pin Configuration

Pin Number	Pin Name	Description
1	Adjust	This pin adjusts the output voltage
2	Output Voltage (Vout)	The regulated output voltage set by the adjust pin can be obtained from this pin
3	Input Voltage (Vin)	The input voltage which has to be regulated is given to this pin

6) **Voltage regulator LM337EMP IC:**

- 3 terminal adj regulator
- Output voltage can be set to range from -1.25V to -37V
- Maximum Output current is -1.5A
- Operating junction temperature is 125°C.



Potentiometer:

Potentiometers are variable resistances as they can provide a variable resistance by simply varying the knob on the top.

20k Potentiometer:

Specifications:

Type: Trimpot Potentiometer
Max Resistance: 20kΩ
Max Supply Voltage: 60Vdc

Enclosure Material: Plastic

Final Output

Positive voltage = 1.86 to 15.89

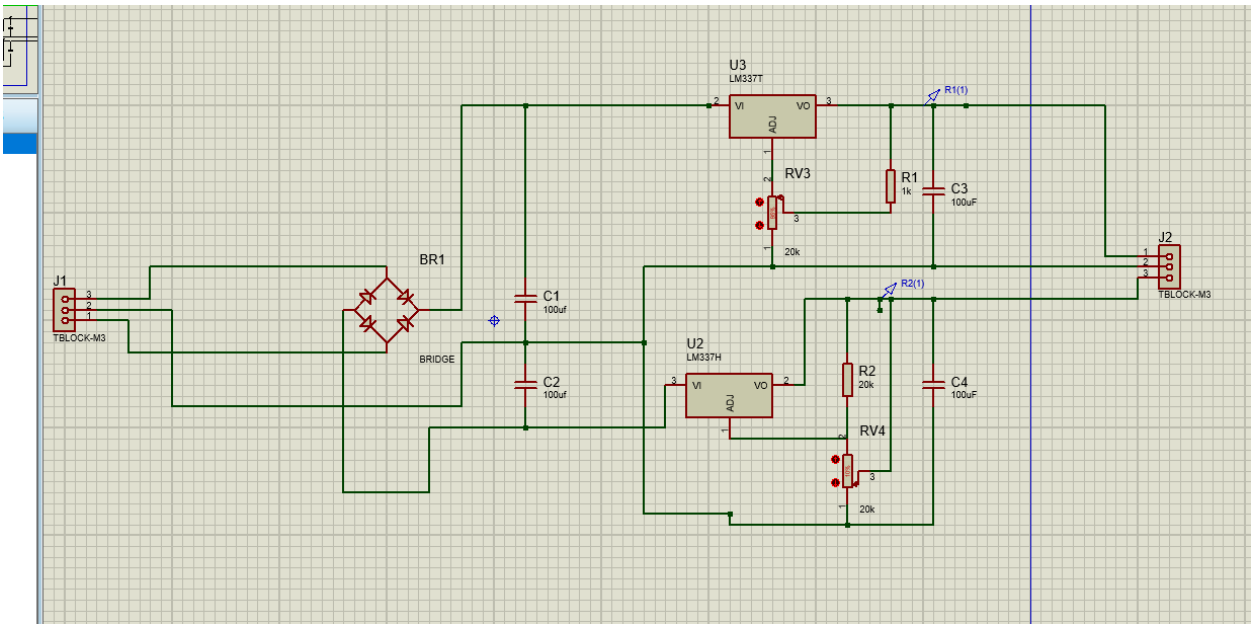
Negative voltage =-1 to -16.88

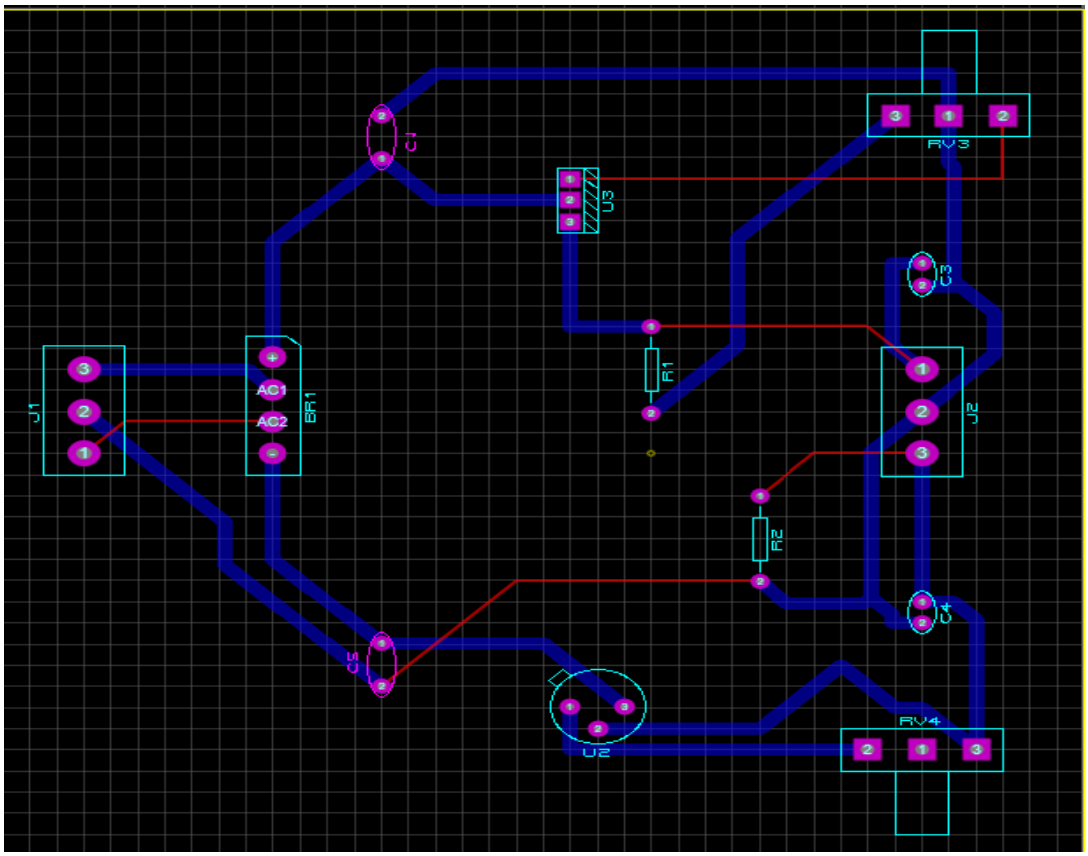
PCB layout:

How is PCB Board made?

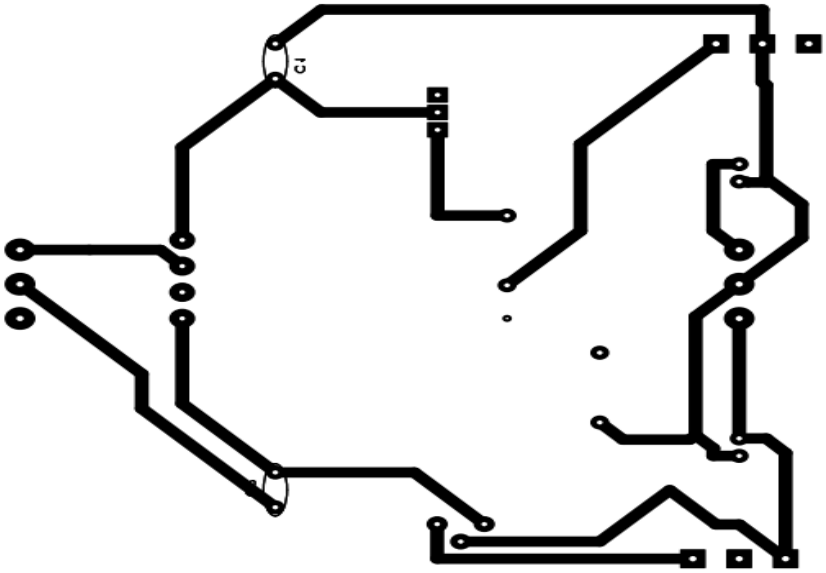
We should keep in mind while making PCB a few steps.

- Stick the PCB paper on copper board.
- Start ironing to the copper board for tracing the PCB circuit.
- Use permanent marker for proper lining.
- Add it in FeCl3 solution.
- Drill holes
- Put components.
- Soldering
- Verify by using voltmeter.

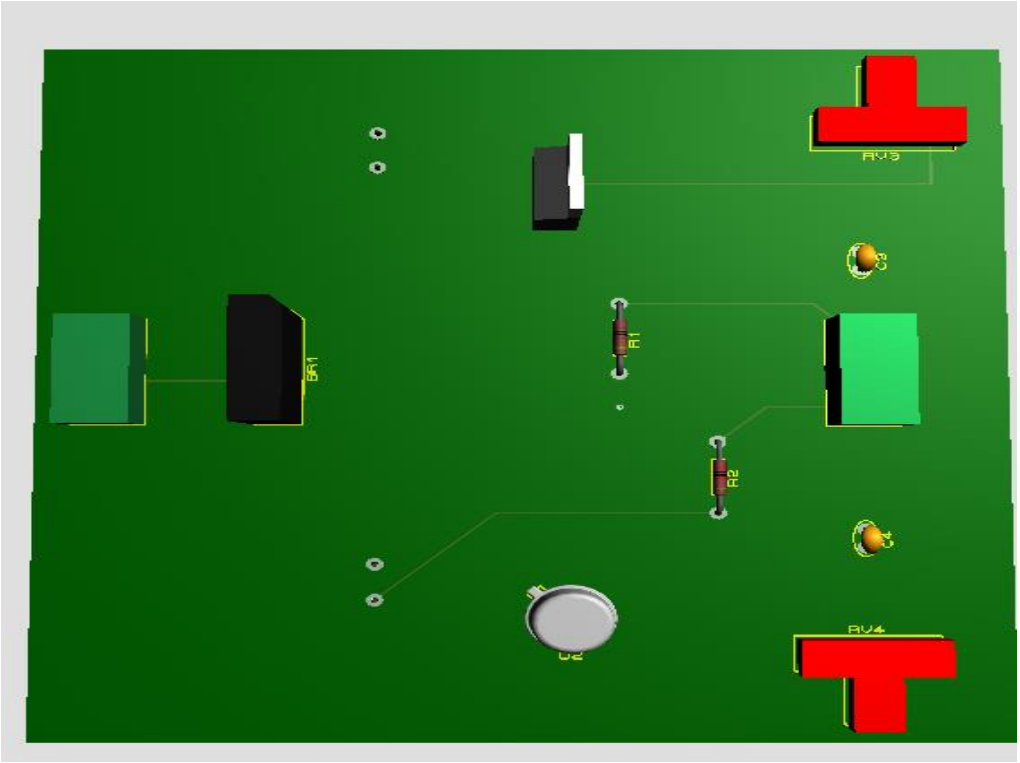

U3
LM337T
VI
VO
ADJ
R1(1)
RV3
R1
1k
C3
100uF
20k
J2
TBLOCK-M3
J1
TBLOCK-M3
BR1
BRIDGE
C1
100uf
C2
100uf
U2
LM337H
R2(1)
R2
20k
C4
100uF
RV4
20k


U3
RV3
R1
J1
AC1
AC2
BR1
J2
R2
U2
RV4

PCB For Printing:



3D Visualizer



Schematic Circuit: