Department of Electrical and Computer Engineering
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EEE111 Project

Regulated DC power supply converts AC line voltage to a constant DC voltage for 4.3V

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Objective:

Regulated DC power supply converts AC line voltage to a constant DC voltage of 4.3.

Introduction:

A regulated power supply (also known usually as a linear power supply) ensures that the output current remains constant, even if the input changes, by converting unregulated AC (alternating current) to a constant DC (direct current).
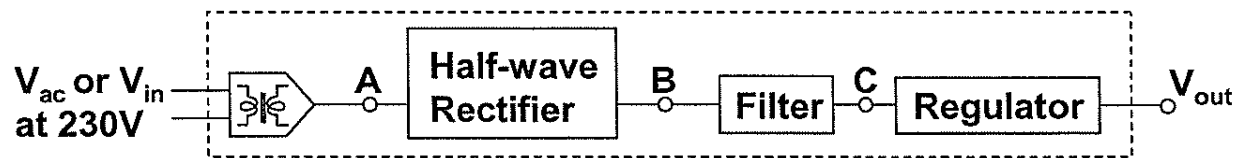

Fig1: Regulated DC Power Supply Diagram

Equipment List:

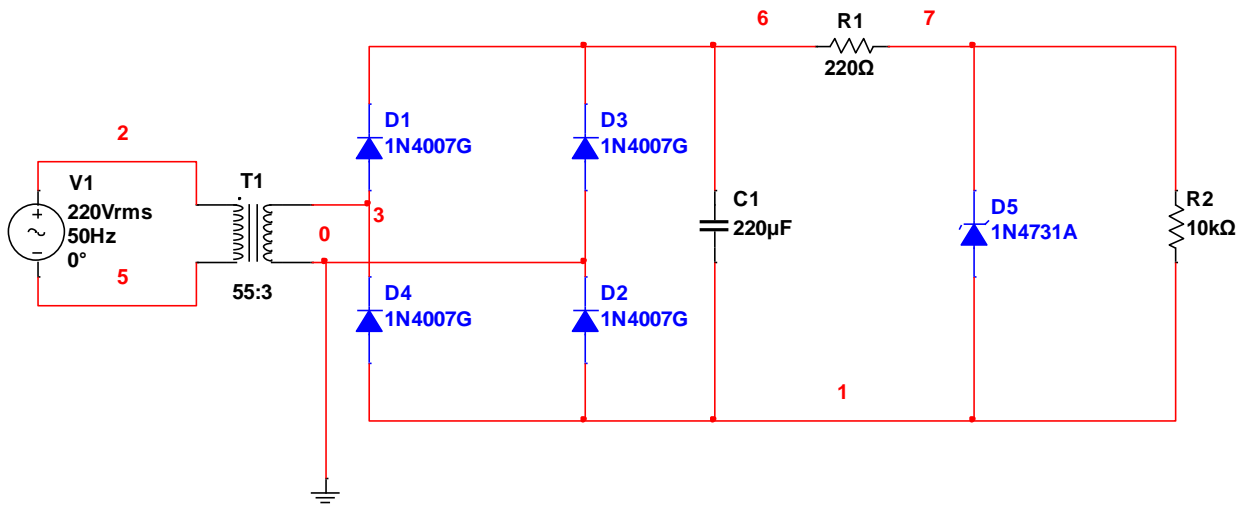| Serial No	Component Details	Specification	Quantity
1	P-N Junction Diode	1N4007	4
2	Resistor	220Ω, 1KΩ	1
3	Stepdown Transformer	Input-220v 50hz Output-12v	1
4	Capacitor	220Uf	1
5	Zener Diode	1N4731A	1
6	Chords and wire		as required
7	Bread Board		1

Circuit Diagram:

Fig2: Regulated DC power supply multisim diagram

Result (Simulation Result):

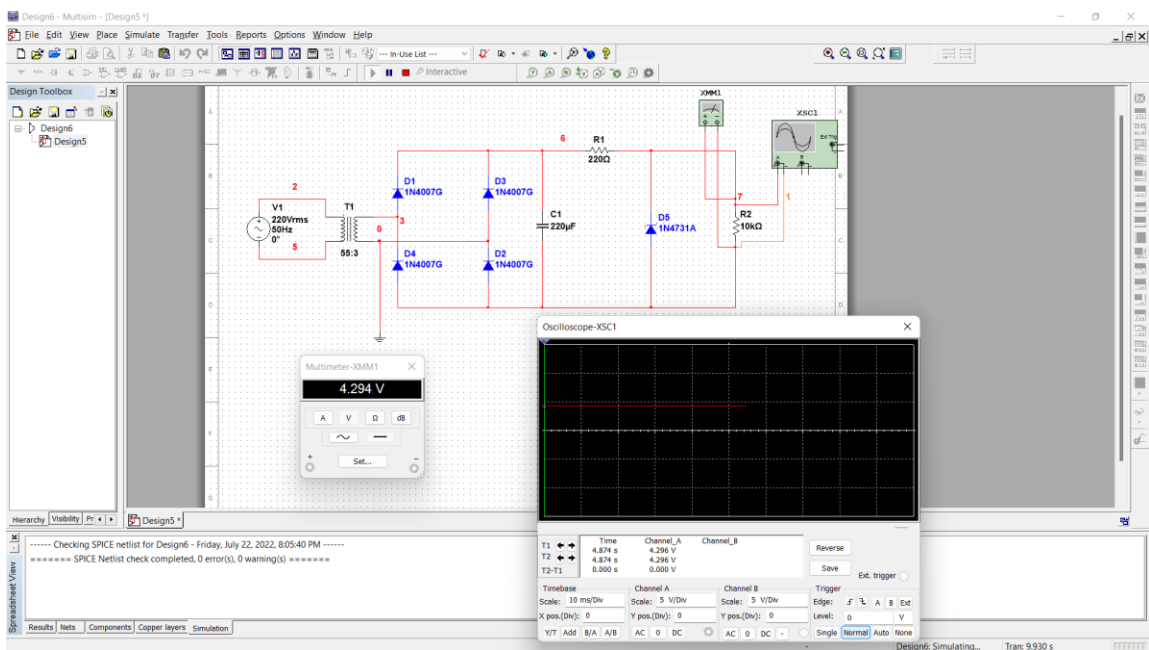**Fig3:** Simulation result

Mathematical Calculation:

$V2(PK) = (N2/N1) * V1$

$= (3/55) * 220$

$= 12v$

$V2(PK) = 12* √2$

$= 16.97v$

$V(R1) = 16.97 - 1.4$

$= 15.57v$

$I(R1) = 15.57/220 = 70.77mA$

$T = 1/2f = 1/100 = 0.01$

$Vr = (I*t) / C = (70.77*0.01)/220 = 3.21mV$

$V(R1)>Vzd = 15.57 > 4.3$; so, Zenner will Work.

Assume, $Vzd = V(R2) = 4.3$.

$V(R2) = I2* R2$

$=> 4.3 = I2 *10Kohm$

$=> I2 = 4.3 / (10Kohm)$

$=> I2 = 0.43mA$

So, $I2 = 0.43mA$

$Iz = I(R1) - I2 = 70.77mA -0.43mA = 70.34 mA$

So, $Izm = 217mA$ & $Izk= 58 mA$; $Izk < Iz < Izm$.

$V(R2)= 0.43mA * 10Kohm = 4.3 V$.