LAB-4 REPORT

TABLE NO:-42

ROOM NO:-117

NAME:-SANTHOSH

ROLL NO:-2024102054

NAME:-AKSHAY

ROLL NO:-2024102014

OBJECTIVE:-

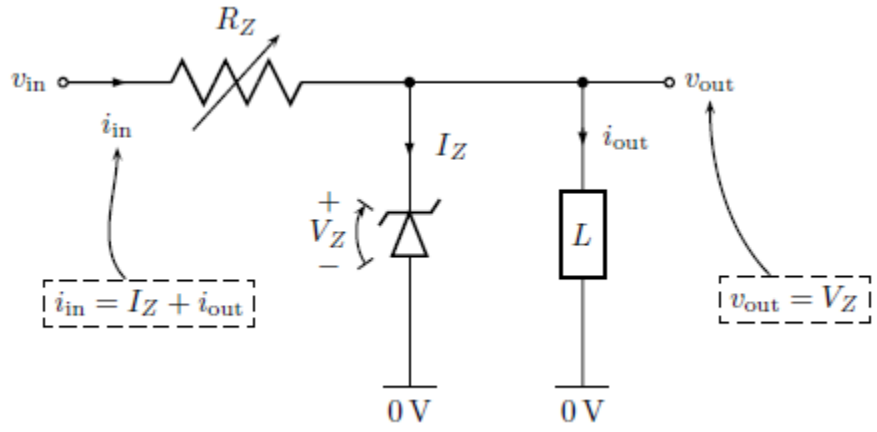
To show that At breakdown, the diode presents very little incremental resistance to current flow, and so it can act like a good voltage reference.

EQUIPMENT REQUIRED:-

Zener diode,wires,Load resistance,zener resistance

PROCEDURE:-

Construct a circuit with v input given to the Zener resistance and the zener diode is connected in series across the zener resistance and connect a resistance parallel to the zener diode which is known as load resistance which is variable give the other end of diode to ground and then calculate the v output which is the potential difference across zener diode



OBSERVATIONS AND RESULTS:-

We can observe that the diode regulates at different voltages And we can also observe that after a certain voltage by increasing the load resistence we can cannot see much difference in v out and that voltage is known as breakdown voltage

IMAGES AND CALCULATIONS:-

We can observe from below observations that the break down voltage of the zener diode we have taken is approximately 5.24 volts

④ 05-10-24

78XX → regulates +XX Voltage

79XX → regulates −XX Voltage

$R_1 = 11.81\ k\Omega$

$R_2 = 9.8\ k\Omega$

$R_3 = 0.97\ k\Omega = R_2$

$R_4 = 22\ k\Omega$

$R_5 = 1.9 \times 10^6\ \Omega$

$R_6 = 390\ \Omega$

$R_7 = 100\ \Omega$

L (load) Ω	V_{out} (V)	i_m (mA)
① 22 kΩ	5.24V	9.76 mA
② 1.9 × 10⁶ Ω	5.25 V	9.77 mA
③ 11.81 kΩ	5.23V	9.76 mA
④ 380 Ω	4.14 V	10.90 mA
⑤ 100 Ω	1.38 V	14.4 mA
⑥ 9.8 kΩ	5.27 V	9.9 mA

$$I_{in} = \frac{-V_{out} + V_{in}}{R_2}$$

CONCLUSION:-

We can conclude that the zener diode break down at certain voltage after which by even increasing the current there will be no change in the potential differnence

(PART-2)

OBJECTIVE:-

The objective of this experiment is to design a zener voltage regulator

EQUIPMENT REQUIRED:-

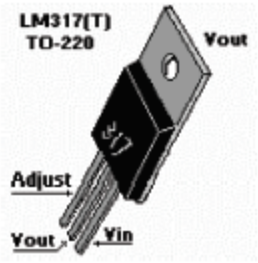
Potentiometer wire,LM317,load resistance

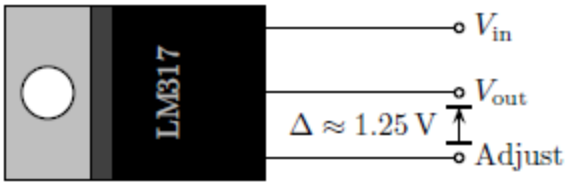
PROCEDURE:-

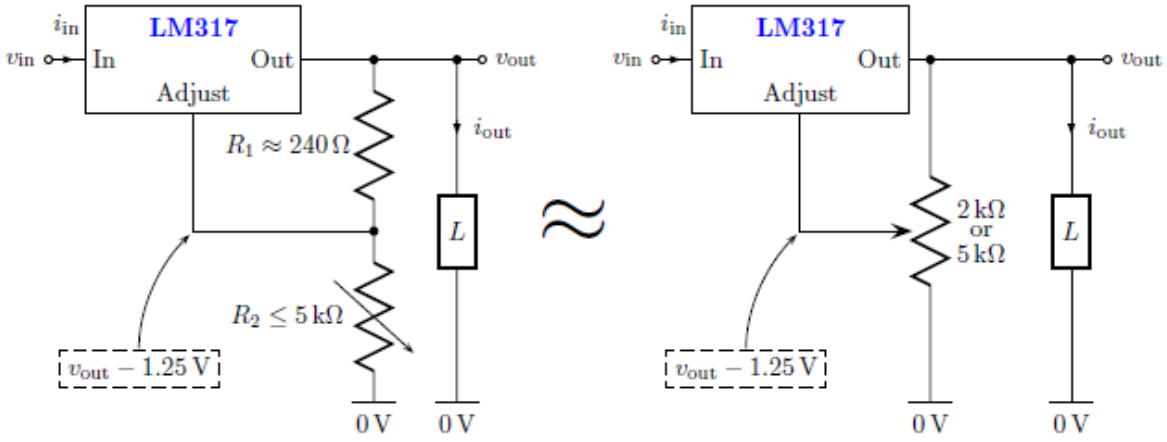
First we have to take the LM317 which contains 3 pins(input,output,adjust)give the v input to the input pin then ground the resistance of the potentiometer wire then adjust the wire between the resistance then connect a load resistance parallel to the potentiometer wire resistance now calculate the vout which is potential difference across the load resistance

Now by taking vout to be 10 adjust the potentiometer wire

We can calculate the ratio of the resistances by the formula $vout$ = (1.25) ∗ (1 + $R2$ /R1)







(a) Using variable-resistor divider. (b) Using potentiometer.

OBSERVATIONS AND RESULTS:-

We can observe that the resistences ratio is independent on the input current and dependent only on Output voltage

IMAGES AND CALCULATIONS:-

$$(I_{in}) = \frac{5.24 + 14.98}{970} \simeq 10\,mA$$

(2)

	Load	V_{out}	i_{in}	R_2/R_1
①	390Ω	10 V	29 mA	7

$$V_{out} = 1.25\left(1 + \frac{R_2}{R_1}\right)$$

$$= 10 = 1.25\left(1 + \frac{R_2}{R_1}\right) \quad R_1 + R_2 = 5000\Omega$$

$$\Rightarrow 8 = 1 + \frac{R_2}{R_1} \Rightarrow \frac{R_2}{R_1} = 7$$

②	390Ω	5V	14.34mA	3

$$V_{out} = 1.25\left(1 + \frac{R_2}{R_1}\right)$$

$$5 = 1.25\left(1 + \frac{R_2}{R_1}\right)$$

$$4 = 1 + \frac{R_2}{R_1}$$

$$\frac{R_2}{R_1} = 3 \qquad R_1 + R_2 = 5000\Omega$$

③	100Ω	5V	52.8mA	3

$$5 = 1.25\left(1 + \frac{R_2}{R_1}\right)$$

CONCLUSION:-

The value of resistances in the potentiometer is dependent only on output voltage and independent on input current but the input current is dependent on the load resistance

(PART-3)

OBJECTIVE:-

To design a regulator

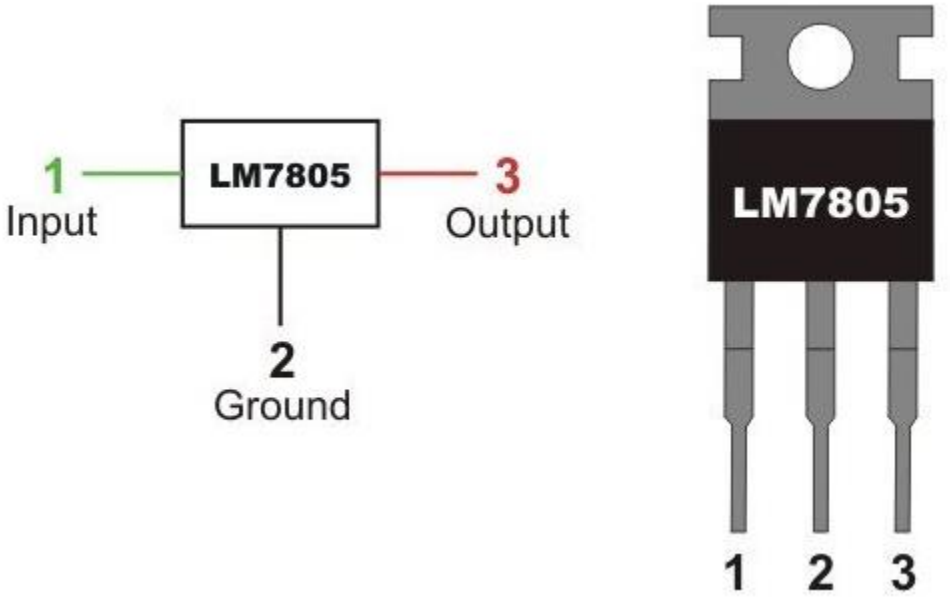
EQUIPMENT REQUIRED:-

LM7805,potentiometer wire,load resistance

PROCEDURE:-

LM7805 pin also contains three pins (input,ground,output) Repeat the same experiment as done in the previous ont but the difference between these two is the output voltage is always 5

Now calculate the i in for different values of load resistances



OBSERVATIONS AND RESULTS:-

We can observe the ratio of R2 and R1 is always fixed as 3

As the output voltage is always fixed

IMAGES AND CALCULATIONS:-

(3) $V_{out} = 5V$

As V_{out} is fixed

$$5 = (1.25)\left(1 + \frac{R_2}{R_1}\right)$$

$$\Rightarrow \frac{R_2}{R_1} = 3$$ always constant

Load	i_{in}
100Ω	59.8 mA
390Ω	16.6 mA

Tanuj B

CONCLUSION:-

We can conclude that the ratio of resistances are always constant and the value of the input current depends on the load resistance

NOTE:-i am very sorry for not uploading the photos taken in lab we actually forgot to take the photos and our TA told that the sign is enough

I will not repeat this again