12/5/2022

EXPERIMENT NO.3

EC111

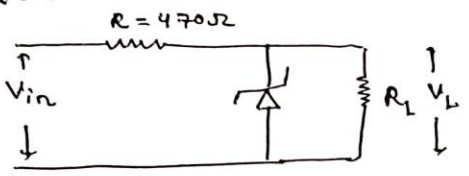
VISHAL KUMAR PRAJAPATI
ROLL NO. 2101227
GROUP NO.18

Name - Vishal Kumar Prajapati
Roll No: 2101227

Experiment No: 3

Objective:
(i) Design a simple voltage regulator using zener diode
(ii) Find line regulation and input regulation factor.
(iii) Find load regulation and % of load regulation factor.

circuit:



① Line Regulation:

R_L (KΩ)	Vin (V)	V_o
10	5.16	4.892
10	7.054	5.158
10	9.127	5.202

Regulation factor $= \frac{\Delta V_o}{\Delta V_i} \times 100\%$

$= 2.122\%$

② Load Regulation:

Vin (V)	R (KΩ)	V_o	V_{NC}
10	10	5.153	5.167
10	1	5.157	5.167

Load Regulation $= \frac{(V_{NL} - V_L)}{V_L} \times 100\%$

for, 10 KΩ = 0.271%

1 KΩ = 0.194%

12.5.22

EXPERIMENT NO. 3

TITLE: TO STUDY ZENER DIODE AS VOLTAGE REGULATION

OBJECTIVE:

- Design a simple voltage regulator using a Zener diode.
- Find line regulations and input regulation

APPARATUS REQUIRED:

- Resister 1kohm
- power supply
- breadboard
- diode IN4007
- wires, etc.

THEORY:

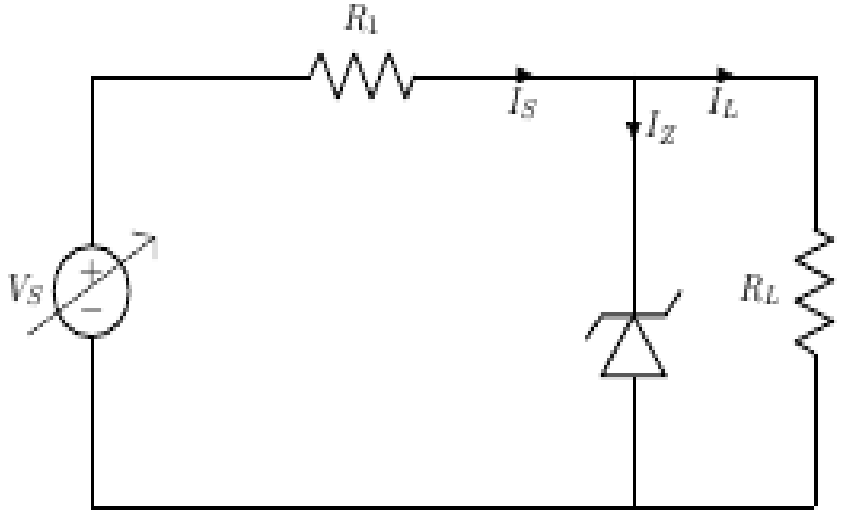
ZENER DIODE AS A VOLTAGE REGULATOR:

A voltage regulator is an electronic circuit that provides a stable DC

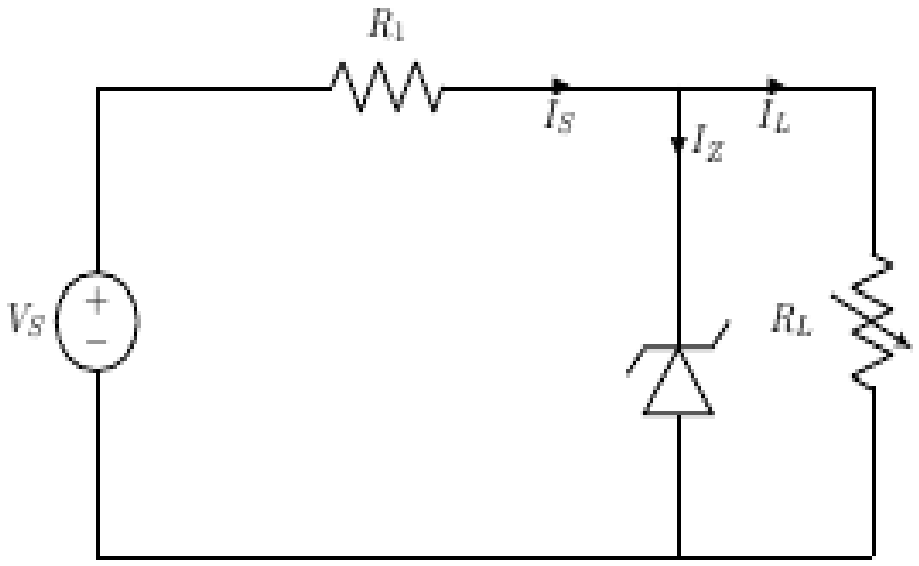
voltage independent of the load current, temperature, and AC line voltage variations. A Zener diode of breakdown voltage VZ is connected to an input voltage source VI across a load resistance RL and a series resistor RS. The voltage across the Zener will remain steady at its breakdown voltage VZ for all the values of Zener current IZ as long as the current remains in the breakdown region. Hence a regulated DC output voltage V0=VZ is obtained across RL, whenever the input voltage remains within a minimum and maximum voltage. Basically, there is two types of regulations such as Line Regulation: In this type of regulation, series resistance and load resistance are fixed, and the only input voltage is changing. The output voltage remains the same as long as the input voltage is maintained above a minimum value. Load Regulation: In this type of regulation, the input voltage is fixed and the load resistance is varying. The output voltage remains the same, as long as the load resistance is maintained above a minimum value.

CIRCUIT DIAGRAM:

LINE REGULATION:



LOAD REGULATION:



OBSERVATIONS:

LINE REGULATION:

R_L (Kohm)	V_{in} (V)	V_z (V)
10	5.16	4.892
10	7.05	5.158
10	9.12	5.202

LOAD REGULATION:

V_{in}	R(l)	V_o	V_{NC}
10	**1**	**5.157**	**5.167**
10	**10**	**5.153**	**5.167**

CALCULATIONS:

- Regulation factor = $(\Delta V_O / \Delta V_I) * 100\% = 2.122\%$
- Load regulation = $(V_{NL} - V_I) * 100 / V_L$
  For 10kohm, load regulation =0.271%
  For 1kohm, load regulation =0.194%

RESULT:

Successfully designed the circuit, took readings and calculated Input voltage factor and load regulation factor.

The calculated value of the Regulation factor: 2.122%

The calculated value of the load Regulation factor: 0.194%