IARE
INSTITUTE OF AERONAUTICAL ENGINEERING
(An Autonomous Institute affiliated to JNTUH, Hyderabad)
Dundigal, Hyderabad - 500 043

# LABORATORY WORK SHEET

Name of the Student: MADKI SAI CHARAN

Class: CSM-'C' Semester: I ST

| Roll Number | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 3 | 9 | 5 | 1 | A | 6 | 6 | F | 2 |

Course Code: AEE003 Course Name: Electrical and Electronics Engineering Laboratory

Name of the Course Faculty: MS. M. VARALAKSHMI Faculty ID: IARE 11072

Exercise Number: 11 Week Number: 11 Date: 19 January 2024

**DAY TO DAY EVALUATION:**

| Marks | Aim / Preparation | Algorithm / Procedure / Performance in the Lab | Source Code / Calculations and Graphs | Program Execution / Results and Error Analysis | Viva - Voce | Total |
|---|---|---|---|---|---|---|
| Max. Marks | 4 | 4 | 4 | 4 | 4 | 20 |
| Obtained | 4 | 4 | 4 | 4 | 4 | 20 |

Signature of Faculty

**START WRITING FROM HERE :**

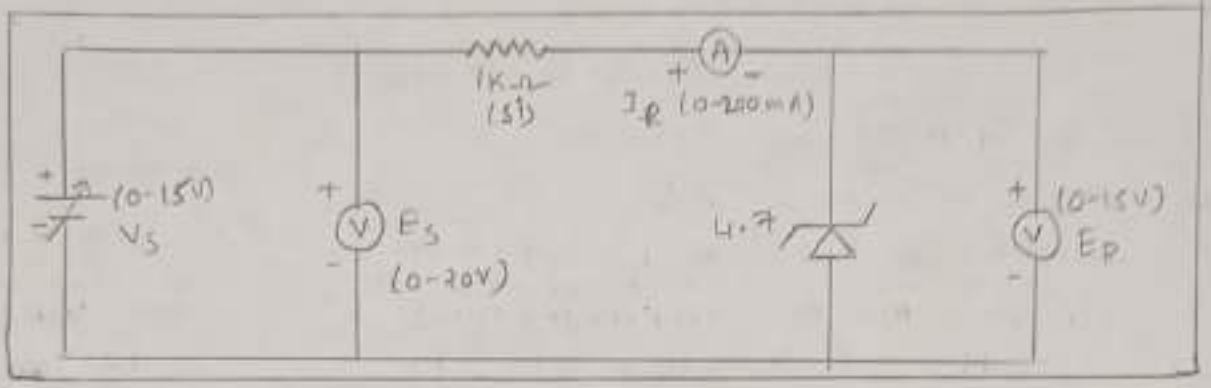
Aim: Plot the V-I characteristics of a Zenerdiode, find Zener breakdown voltage in reverse bias condition, find static and Dynamic resistance in both forward and reverse bias conditions and perform Zenerdiode voltage regulator.

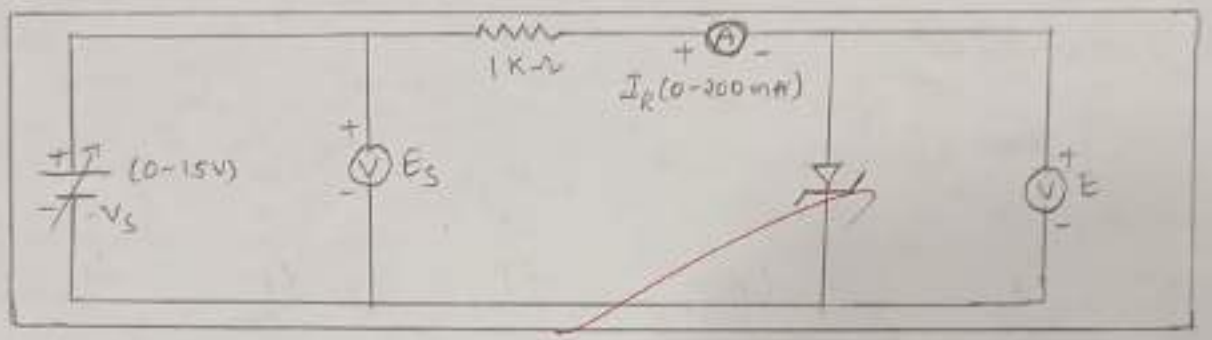
Apparatus:

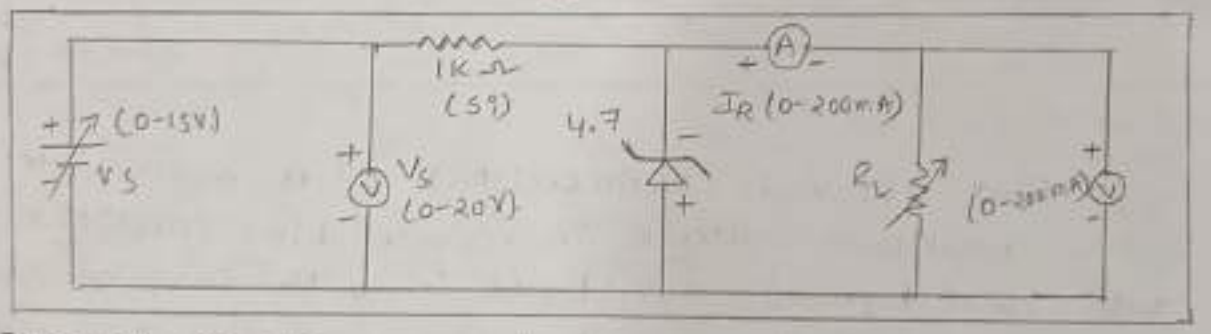
| S.NO | DEVICES | RANGE/ RATING | QUANTITY |
|---|---|---|---|
| 01. | Zener diode trainer Board containing | | |
| | a) DC power supply | (0-15V) | 01 |
| | b) Zener diode | 4.7 V | 01 |
| | c) Zener diode | 6.2V | 01 |
| | d) Carbon Film resistor | 1K-Ω, ½ W | 01 |
| 02. | DC voltmeter | (0-1V) | 01 |
| | DC voltmeter | (0-20V) | 01 |
| 03. | DC Ammeter | (0-200μA) | 01 |
| | DC Ammeter | (0-20mA) | 01 |
| 04. | Connecting wires | SA | 10 |

ROLL NUMBER : 23951A66F2

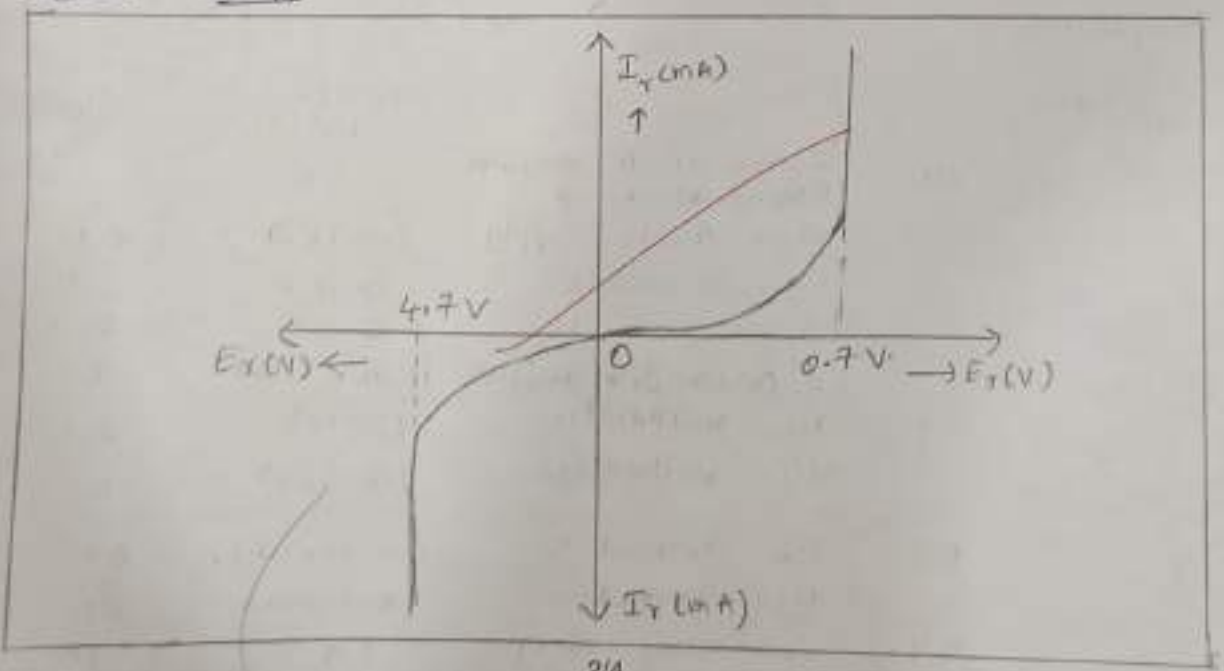
## Circuit Diagram:




## Expected graph:



Procedure :

Forward Bias

1) Connect the circuit as shown in figure 1.
2) Vary the supply voltage $E_s$ in steps and note down the corresponding values of $E_f$ and $I_f$ as shown in table.

Reverse Bias

1) Connect the circuit as shown in figure 2.
2) Repeat the procedure as in forward bias and note down the corresponding values of $E_r$ and $I_r$ as shown in table.

Precautions :

1) Ensure that polarities of power supply and meters as per circuit.
2) Keep the input voltage knob of regulated power supply in minimum position both when switching ON & OFF the supply.
3) No loose contacts at the junction.
4) Ensure that the ratings of meters are as per the circuit design for precision.

Result :

1) V-I characteristics of Zener diode are plotted and verified in both forward and reverse directions.
2) Zener breakdown voltage for 4.7V Zener diode = 4.7V.

ROLL NUMBER : 2395 1A66F2

3) (i) Forward Bias:

a) static resistance at 6mA =

b) Dynamic resistance at 6mA =

(ii) Reverse Bias:

a) static resistance at 6mA =

b) Dynamic resistance at 6mA =

Tabular Column:

Forward

| $E_S$ (V) | $E_f$ (V) | $I_f$ (mA) |
|---|---|---|
| 0.1 | 0.25 | 0 |
| 0.5 | 0.61 | 0 |
| 1 | 0.7 | 0.4 |
| 2 | 0.77 | 1.4 |
| 4 | 0.90 | 3.3 |
| 6 | 1.17 | 5.2 |
| 8 | 1.14 | 7.1 |
| 10 | 1.16 | 9.2 |
| 12 | 1.21 | 11.3 |
| 14 | 1.33 | 13.3 |

Reverse

| $E_S$ (V) | $E_r$ (V) | $I_r$ (mA) |
|---|---|---|
| 0.1 | 0 | 0 |
| 0.5 | 0.58 | 0.5 |
| 1 | 1.14 | 1.1 |
| 2 | 2.10 | 3.1 |
| 4 | 3.05 | 5.1 |
| 6 | — | — |
| 8 | — | — |
| 10 | — | — |
| 12 | — | — |
| 14 | — | — |

Calculations :

Forward static resistance at 6mA = $E_f/I_f$

Forward Dynamic resistance at 6mA = $\Delta E_f/\Delta I_f$

Reverse static resistance at 6mA = $E_f/I_f$

Reverse Dynamic resistance at 6mA = $\Delta E_f/\Delta I_f$