Indian Institute of Information Technology, Allahabad

ELECTRONICS AND COMMUNICATION ENGINEERING DEPARTMENT

Course Name: Fundamental of Electrical and Electronics

EXPERIMENT NO: 3

Objectives:

a. To plot Volt-Ampere Characteristics of Silicon P-N Junction Diode.

b. To find cut-in Voltage for Silicon P-N Junction diode.

c. To find static and dynamic resistances in both forward and reverse biased conditions for Si P-N Junction diode.

Materials /Component Required:

Diode IN4007 (Si)- 1, Resistor (1K, 10K) -1,1

Equipment:

Breadboard, Regulated Power supply (0-30 V DC), Digital Ammeter (0-200μA/20 mA), Digital voltmeter (0-2V/20V DC), connecting Wires.

Theory:

The volt-ampere characteristics of a diode explained by following equation:

$$\mathbf{I=I_0(e^{v/(\eta v_T)}-1)}$$

Where,

I=current flowing in the diode , I_0 = reverse saturation current

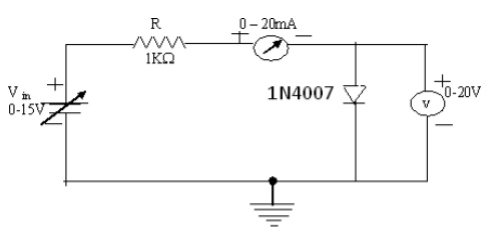
V=voltage applied to the diode

V_T=volt-equivalent of temperature=kT/q=T/11,600=26mV (@ room temp).

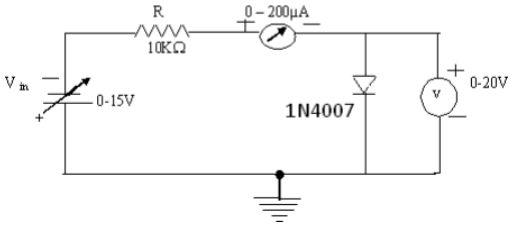
η=1 (for Ge) and 2 (for Si)

Circuit Diagram:

Forward Biased condition



Reverse Biased condition



Observations

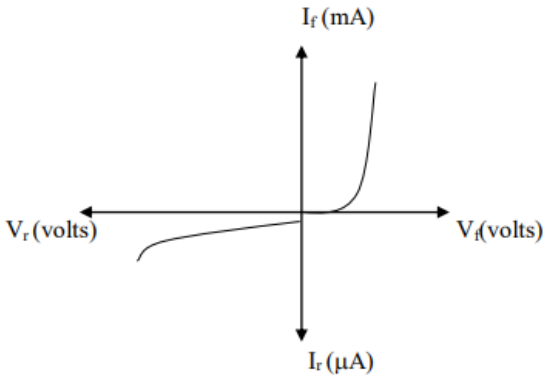
Si diode in forward biased conditions:

Sl. No	RPS Voltage	Forward Voltage across the diode V_f (volts)	Forward current through the diode I_f (mA)

Si diode in reverse biased conditions:

Sl. No	RPS Voltage	Reverse Voltage across the diode V_r (volts)	Reverse current through the diode I_r (μA)

Calculations and Graph:



Static forward Resistance $R_{dc} = V_f / I_f \Omega\Delta$

Dynamic forward Resistance r ac = $\Delta V_f / \Delta I_f \Omega$

Static Reverse Resistance R dc =V r / I r Ω

Dynamic Reverse Resistance r_{ac} = ΔV r /ΔI r Ω

Result:

1. Cut in voltage = …… V

2. Static forward resistance = ...Ω

3. Dynamic forward resistance =..... Ω

Precautions:

1. While doing the experiment do not exceed the ratings of the diode. This may lead to damage the diode.

2. Connect voltmeter and Ammeter in correct polarities as shown in the circuit diagram.

3. Do not switch ON the power supply unless you have checked the circuit connections as per the circuit diagram.