

Experiment No. 11: Characteristics of P-N Junction Diode

1. Objective

The objective of this experiment is to observe and plot forward and reverse V-I Characteristics of a P-N junction diode.

2. Apparatus

- Resistor (470Ω , $1k\Omega$)
- Bread Board
- Digital Multi-meter
- Variable DC power supply(maximum 30V)
- Diode

3. Theory

Diodes are semiconductor devices which have conductivity between conductors and insulators. By the process of doping, P type and N type semiconductors are formed. By doping with penta-valent and trivalent element, P-N junction diode is form.

Application of voltage across a diode, transistor etc. is called Biasing. A diode can be in three states. It can be in an unbiased, forward biased or reverse biased condition. In forward biased condition, positive terminal of diode is connected to positive terminal of battery while in reverse biased condition; they are connected in reverse polarities as shown in the Figure 11.1 (a) and (b).

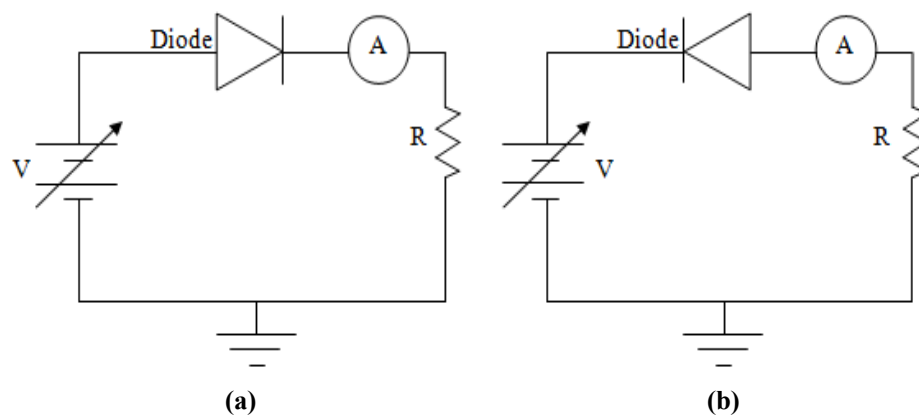


Figure 11.1: Biasing of a Diode (a) Forward (b) Reverse

4. Procedure

16. Construct the circuit as shown in the Figure 11.1(a).
17. Do not switch on the power supply. Connect the resistor R of value 470Ω .
18. Turn on the power supply and increase voltage from the power supply from 0.1V to 1V in given steps as shown in the Table 11.1.
19. Measure and record in turn, the voltage V_F (V) and current I_F (mA) at each of the voltage settings shown in the Table 11.1.
20. Plot VI characteristics for forward bias of diode in the Figure 11.2.
21. Now construct the circuit as shown in the Figure 11.1(b).
22. Do not switch on the power supply. Connect the resistor R of value $1k\Omega$.
23. Turn on the power supply and increase voltage from the power supply from 0V to 20V in given steps as shown in the Table 11.2.
24. Measure and record in turn, the voltage V_R (V) and current I_R (μA) at each of the voltage settings shown in the Table 11.2.
25. Plot VI characteristics for forward bias of diode in the Figure 11.3.

Table 11.1: Forward Characteristics of Diode

S. No.	Voltage (V)	V_F (V)	I_F (mA)
1	0.1		
2	0.2		
3	0.3		
4	0.4		
5	0.5		
6	0.6		
7	0.7		
8	0.8		
9	0.9		
10	1.0		

Table 11.1: Reverse Characteristics of Diode

S. No.	Voltage (V)	V_R (V)	I_R (μA)
1	2		
2	4		
3	6		
4	8		
5	10		
6	12		
7	14		
8	16		
9	18		
10	20		

Figure 11.2: Forward V-I Characteristics of Diode

Figure 11.3: Reverse V-I Characteristics of Diode

5. Questions

1. Examine your graph of Figure 11.3 and describe the change in the current.

6. Conclusions
