LAB SESSION 02
THE SEMICONDUCTOR DIODE

Name of Student: ……

Roll No.: ……Section: ……

Date of Experiment: …….

Report submitted on: ……

Marks obtained:
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Remarks:
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Instructor's Signature:
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DEPARTMENT OF MECHANICAL ENGINEERING
UNIVERSITY COLLEGE OF ENGINEERING AND TECHNOLOGY

OBJECTIVES:

1. Ability to recognize diodes in various physical forms.
2. Ability to determine the diode polarity and to understand the need for correct connection.
3. To obtain knowledge of the forward voltage/current characteristic and the conduction voltage for germanium and silicon types.

EQUIPMENT REQUIRED:

Qty	Apparatus
1	Electricity & Electronic Constructor
1	Basic Electronics, Kit 2
1	Power supply unit 0 to 20V variable d.c, regulated (e.g. Feedback Power Supply PS445)
2	Mica diode
1	Resistor of 3.3k
1	DMM

INTRODUCTION:

A Semiconductor Junction Diode (or just diode) is made from a piece of P-type and a piece of N-type semiconductor joined together. See fig2.1.

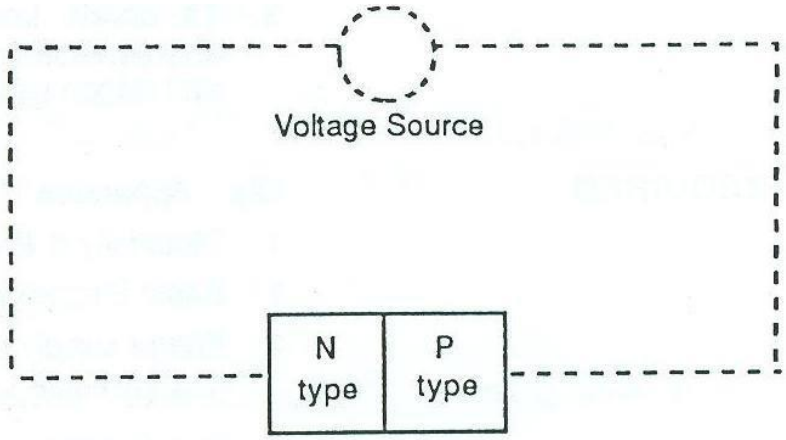


Fig 2.1 Function Diode

If a voltage (potential difference) is applied across the two terminals, the Diode will conduct electricity. The amount of current that flows depends upon the size and polarity of the applied voltage.

The Diode is represented in circuits by the symbol shown in fig 2.2.

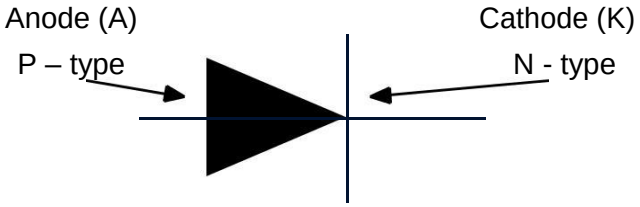
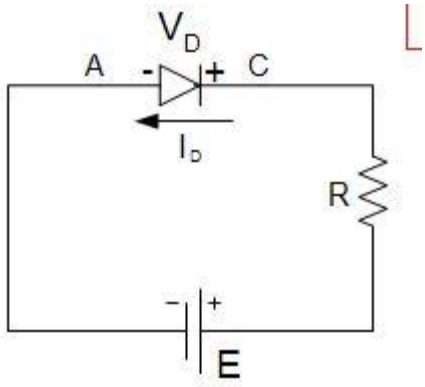


Fig 2.2 Diode Symbol

EXPERIMENTAL PROCEDURE:

Determining Diode Polarity:

Construct the circuit of fig 2.3. Note that use resistor of 3.3k.



Switch on the power supply.

Set the power supply control to give 10V on the meter.

Copy the result table as shown in fig.2.4, reproduced at the end of this assignment, and record the current measurement in the first row of the table.

Now, switch off the power supply and reverse the Mica diode to give the circuit of fig 2.4.

Switch on the power supply and readjust the voltage to 10V.

Read the new value of diode current and record it in the second row of your table.

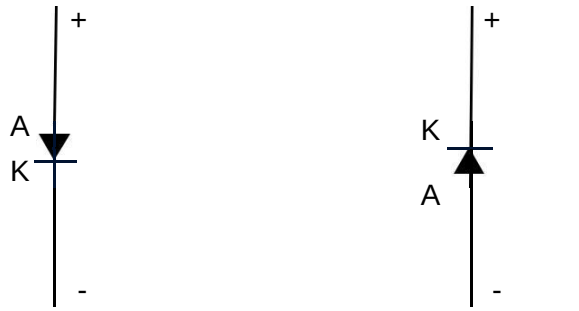
Study your results and answer the questions on the next page.

Forward /Reverse Biased Connections:

When a diode is connected so as to conduct it is **FORWARD BIASED.**

When a diode is connected so as NOT to conduct it is **REVERSE BIASED.**

Fig 2.5 shows the two methods of connecting diodes.



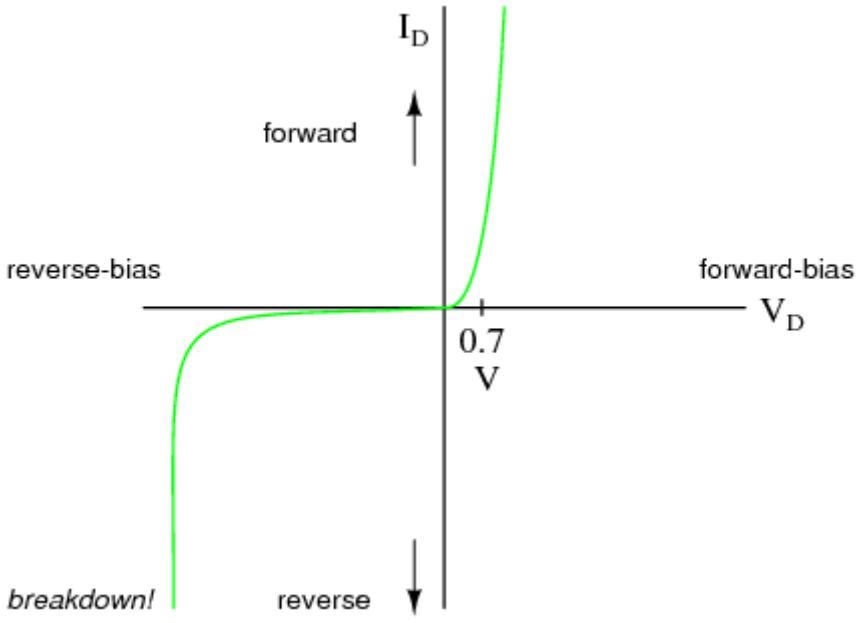
a) Forward Biased b) Reverse Biased

Fig 2.5 Diode Bias

Knowledge of the conduction characteristic when a diode is forward biased is very important and is the subject of the rest of this of this Assignment.

The Characteristics of Forward Biased Diodes:

Construct the circuit of fig 2.4. The 3.3k resistance will provide fine control over the applied voltage.



Copy the results table as shown in fig 2.9, reproduced at the end of this Assignment, for your results.
Switch on the power supply and adjust it to supply 5V.

Now use the power supply variable control to set V_s to:

0, 0.1V, 0.2V, etc, up to 5.0V.

Note V_s for each setting and enter it in your table.

ow, with the power supply variable control set to supply 20V,
1.5V, 2.0V, 2.5V and 3.0V.

SUMMARY:

In this assignment you have learnt that:

A diode conducts when its anode is positive relative to its cathode, and does not conduct when the voltage is reversed.
Diodes have different shapes and sizes according to their voltage, current and power ratings.
Silicon diodes have a conduction voltage of about 0.6V whereas Germanium diodes have one of about 0.2V.
The forward characteristic of a diode is not a straight line trough zero but looks like fig.2.10.

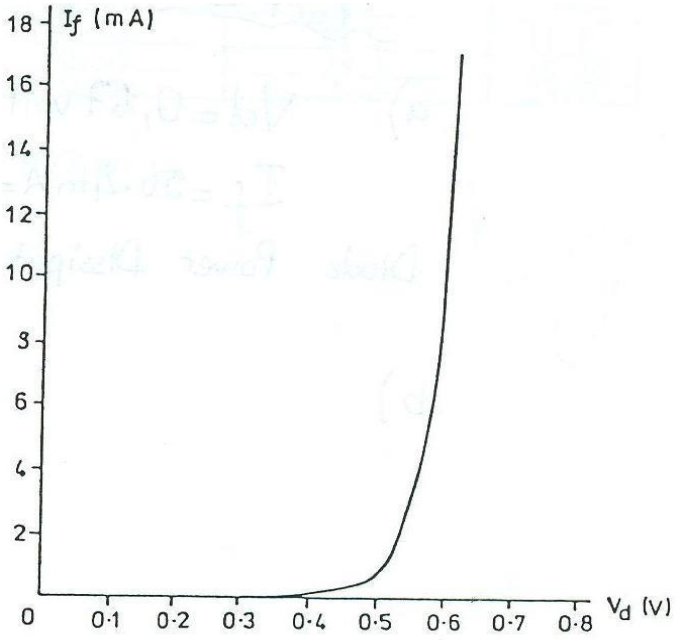


Fig 2.7 Typical Silicon Diode – Forward Characteristic

EXERCISE:

Construct the circuit of 2.4 and apply the method used earlier in this Assignment to find V and I .

Fig 2.8 Diode Power Dissipation

Diode:_____

V_s (V)	V_r (V)	V_d (V)	$I_d = V_d/R$ (mA)
0			
0.1			
0.2			
0.3			
0.4			
0.5			
0.6			
0.7			
0.8			
2.0			
4.0			
6.0			
8.0			
10.0			
12.0			

Now construct the circuit as per fig 2.9 and measure the values as per table given below:

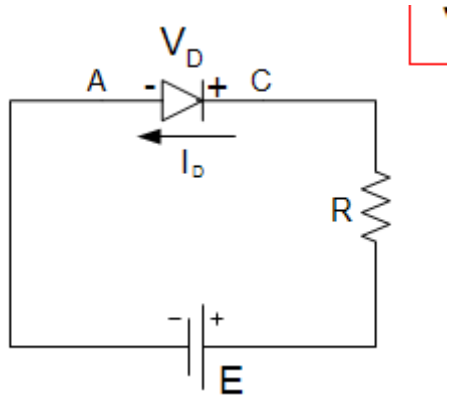


Fig 2.9

Diode: _____

V_s (V)	V_D (V)	I_D (A)
5		
10		
15		
20		
30		

Mention the name of diode you are using and draw the graph as per table for forward and reverse bias diode characteristics.

Answer the following questions:

Q No. 1: What is difference between Analog and Digital Electronics?

_____

_____

_____

_____

_____

Q No. 2: What is reverse saturation current?

_____

_____

Q No. 3: One eV is equal to?

_____

Q No. 4: Write down the applications of diodes?

_____

_____

_____

_____

Q No. 5: What is Breakdown voltage?

_____

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