

**BASIC
ELECTRONICS
WITH EXPERIMENTS (PART ONE)
PN JUNCTION
AND
APPLICATIONS**
(For B.Sc. Students)

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BASIC ELECTRONICS WITH EXPERIMENTS (PART ONE) PN JUNCTION AND APPLICATIONS

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: VSRD Academic Publishing

A Division of Visual Soft India Pvt. Ltd.

ISBN-13: 978-93-87610-90-3

FIRST EDITION, APRIL 2024, INDIA

Printed &Published by:

VSRD Academic Publishing

(A Division of Visual Soft India Pvt. Ltd.)

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Printed &Bound in India

VSRD ACADEMIC PUBLISHING

A Division of Visual Soft India Pvt. Ltd.

REGISTERED OFFICE

154, Tezab mill Campus, Anwarganj, KANPUR–208003 (UP) (IN)

Mb:9899936803, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

MARKETING OFFICE

340, FF, Adarsh Nagar, Oshiwara, Andheri(W), MUMBAI–400053 (MH) (IN)

Mb:9956127040, Web: www.vsrdpublishing.com, Email: vsrdpublishing@gmail.com

PREFACE

Devices in which a controlled flow of electrons can be obtained are the basic building blocks of all the electronic circuits. Before the discovery of transistor in 1948, such devices were mostly vacuum tubes like the vacuum diode, triode, tetrode and pentode. These vacuum tube devices are bulky, consume high power, operate generally at high voltages (~ 100 V) and have limited life and low reliability. The seed of the development of modern solid-state semiconductor electronics in 1930's when it was realized that some solid-state semiconductors and their junctions offer the possibility of controlling the number and the direction of flow of charge carriers through them. Simple excitations like light, heat or small applied voltage can change the number of mobile charges in a semiconductor. Note that the supply and flow of charge carriers in the semiconductor devices are within the solid itself, while in the earlier vacuum tubes/valves, the mobile electrons were obtained from a heated cathode and they were made to flow in an evacuated space or vacuum. No external heating or large evacuated space is required by semiconductor devices. They are small in size, consume low power, operate at low voltages and have long life and high reliability. Even the Cathode Ray Tubes (CRT) used in television and computer monitors which work on the principle of vacuum tubes are being replaced by Liquid Crystal Display (LCD/LED) monitors with supporting solid state electronics. In present book, I have introduced the basic concepts of semiconductor physics and discuss some semiconductor devices like junction diodes and bipolar junction transistor etc with experiments.

Most of the currently available semiconductor devices are based on elemental semiconductors Si or Ge and

compound inorganic semiconductors. However, after 1990, a few semiconductor devices using organic semiconductors and semiconducting polymers have been developed signaling the birth of a futuristic technology of polymer electronics and molecular-electronics. This book restricts study of elemental semiconductors devices and inorganic semiconductor (CdS, GaAs, CdSe, InP, etc.) devices.

 *Author*

ACKNOWLEDGEMENT

Writing a book is a harder and complicated process, I faced many complications while completing this book, but I would like to thank every member of my *family* who supported me a lot especially my little *daughter Agranee* who is just 8 years old, she gave me that time which I always spend with her at home, to complete my book.

I am grateful to my *father Late Shri Brijesh Chandra Srivastava* who always wanted to see me at top and never restricted me to move ahead.

I specially thanks to my *teacher and motivator professor Savita Rani Singh* who always motivated me to write a book.

At last, my sincere thanks to all my friends who emotionally supported me to complete this book.

DEDICATION

Heartily
dedicated
to

my father

Shri Brijesh Chandra Srivastava

TABLE OF CONTENTS

CHAPTER ONE: PN JUNCTION DIODE.....	1
1.1 INTRODUCTION.....	1
1.2 N-TYPE SEMICONDUCTOR	2
1.3 P-TYPE SEMICONDUCTOR.....	3
1.4 PN JUNCTION	4
1.5 HALF WAVE RECTIFIER.....	10
1.6 FULL WAVE RECTIFIER	14
1.7 EXPERIMENT 1.....	20
1.8 EXPERIMENT 2.....	25
1.9 VIVA QUESTIONS.....	31
CHAPTER TWO: ZENER AND CAPACITANCE EFFECT IN PN JUNCTION DIODE.....	34
2.1 ZENER DIODE.....	34
2.2 VARACTOR DIODE	42
2.3 EXPERIMENT 1.....	45
2.4 EXPERIMENT 2.....	47
2.5 EXPERIMENT 3.....	51
2.6 VIVA QUESTIONS.....	53
CHAPTER THREE: OPTICAL EFFECT IN PN JUNCTION	56
3.1 LIGHT EMMITING DIODES.....	56
3.2 PHOTO DIODE	63
3.3 TYPES OF PHOTODIODES.....	66

3.4	EXPERIMENT 1.....	69
3.5	EXPERIMENT 2.....	72
3.6	VIVA QUESTIONS.....	74

CHAPTER FOUR: SOLAR EFFECT IN PN JUNCTION ... 76

4.1	SOLAR CELL.....	76
4.2	EXPERIMENT	83
4.3	VIVA QUESTIONS.....	87

CHAPTER FIVE: THREE TERMINALS DOUBLE PN JUNCTION 89

5.1	TRANSISTOR.....	89
5.2	BIPOLAR JUNCTION TRANSISTOR (BJT).....	92
5.3	JFET	110
5.4	MOSFET.....	117
5.5	EXPERIMENT 1.....	123
5.6	EXPERIMENT 2.....	131
5.7	EXPERIMENT 3.....	136
5.8	VIVA QUESTIONS.....	140