



BTECH
(SEM V) THEORY EXAMINATION 2023-24
ADVANCE SEMICONDUCTOR DEVICE

TIME: 3 HRS

M.MARKS: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.

Qno.	Question	Marks	CO
a.	What is Non-uniform Doping?	2	1
b.	Explain Depletion Region	2	1
c.	Enumerate the special features of MESFETs.	2	2
d.	What is the pinch-off voltage in a JFET?	2	2
e.	What is meant by resonant tunneling?	2	3
f.	What do you mean by tunneling?	2	3
g.	Write the differences between Transistor and Thyristor.	2	4
h.	List the advantages of Laser devices	2	4
i.	Define Chemical Sensors.	2	5
j.	What is the photodiode?	2	5

SECTION B

2. Attempt any three of the following:

a.	Discuss the operation of SCR with latching and holding current in detail. Also discuss the operation, application and symbol of tunnel and zener diode.	10	1
b.	Discuss the operation of N channel JFET with the condition of pinch-off. Deduce the result of transconductance of this amplifier.	10	2
c.	Draw and explain the working principle of TRAPATT diode.	10	3
d.	Explain Radioactive Transitions. What is the difference between power devices and conventional semiconductor devices?	10	4
e.	Explain the working principle of photo detector. And also explain the solar cell with input output characteristics.	10	5

SECTION C

3. Attempt any one part of the following:

a.	Explain n-type and p-type semiconductor with example. Define and derive the expression for minority carrier life time.	10	1
b.	Derive the expression for Conductivity and Mobility and the expression for Diffusion of carriers in semiconductors.	10	1

4. Attempt any one part of the following:

a.	Explain Basic Structures and the Operating Principle with I-V Characteristics of MOSFET	10	2
b.	Define and derive the expression for the threshold voltage for MOS transistor. What are the factors which affect it?	10	2

5. Attempt any one part of the following:

a.	Explain IMPATT Diode and it's working. What is Transferred electron Mechanism?	10	3
b.	What is tunneling phenomenon? Explain the V-I characteristics of Tunnel diode. Discuss the semiconductor material required for its fabrication. How do they differ from conventional semiconductor?	10	3

6. Attempt any one part of the following:

a.	What do you understand by thyristors? Draw and explain the V-I characteristics of a thyristor.	10	4
b.	What is Light emitting diode? Explain its working principle. What are the materials used in LED? Explain its uses.	10	4

7. Attempt any one part of the following:

a.	Discuss the phenomenon of photoconductivity in detail with its examples and applications.	10	5
b.	Explain the principle of operation, storage, and transfer of charge in basic charge coupled device (CCD)	10	5