



Roll No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

BTECH
(SEM III) THEORY EXAMINATION 2023-24
ELECTRONIC DEVICES

TIME: 3HRS

M.MARKS: 100

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

SECTION A

1. Attempt all questions in brief.

Q no.	Question	Marks	CO
a.	Define Pauli's Exclusion principle.	2	1
b.	Define Mass Action Law.	2	2
c.	Define Wave Particle Duality.	2	1
d.	Consider a Si p-n junction at room temperature with doping densities $N_a=10^{18} \text{ cm}^{-3}$ and $N_d = 10^{15} \text{ cm}^{-3}$. Calculate built in potential barrier in a p-n junction.	2	3
e.	Define thermal Equilibrium Condition.	2	5
f.	Illustrate the energy band diagram for PN Junction in Reverse Mode.	2	3
g.	Draw the Energy Band gap diagram of Schottky diode in Forward Biasing	2	4
h.	Calculate the de Broglie wavelength of a particle when an electron travelling at a velocity of 10^5 m/s .	2	2
i.	A transistor has an α of 0.98. Determine the value of β .	2	4
j.	Illustrate Electroluminescence.	2	5

SECTION B

2. Attempt any three of the following:

a.	Derive the relation of diode current for p-n Junction diode.	10	1
b.	Describe Fermi Level for Intrinsic and Extrinsic semiconductor with proper diagram and illustrate Quasi Fermi Level.	10	2
c.	Illustrate photoelectric effect. justify how this effect verifies the particle nature of light.	10	3
d.	Explain Ebers Moll Model of a Transistor in detail.	10	4
e.	Explain the Photo Diode Basic Structure and its VI Characteristics in detail	10	5

SECTION C

3. Attempt any one part of the following:

a.	Determine the solution of wave function using Schrodinger equation when particle in one dimensional box, consider infinite potential well. And also describe the effect of length of box, and mass on energy of wave function.	10	1
b.	Classify Direct and Indirect bandgap semiconductors with the help of E-k diagram.	10	1

4. Attempt any one part of the following:

a.	Demonstrate Einstein relationship in terms of diffusion coefficient and mobility for the non-uniformly doped semiconductor.	10	2
b.	Calculate the thermal-equilibrium hole concentration in silicon at $T = 400 \text{ K}$. Assume that the Fermi energy is 0.27 eV above the valence-band energy. The value of N_v for silicon at $T = 300 \text{ K}$ is $N_v = 1.04 \times 10^{19} \text{ cm}^{-3}$	10	2

5. Attempt any one part of the following:

a.	Determine the small signal equivalent of p-n junction diode.	10	3
b.	Describe Space charge width. Calculate the space charge width for a silicon p-n junction at $T = 300 \text{ K}$ with doping concentrations of $N_a = 10^{16} \text{ cm}^{-3}$ and $N_d = 10^{15} \text{ cm}^{-3}$.	10	3



Roll No:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

BTECH
(SEM III) THEORY EXAMINATION 2023-24
ELECTRONIC DEVICES

TIME: 3HRS**M.MARKS: 100****6. Attempt any one part of the following:**

a.	Explain the mechanism of PNP transistor using energy band gap diagram. Explain the terms current gain and base transport factor.	10	4
b.	Describe Schottky diode. Draw the energy band gap diagram for forward biasing and reverse biasing condition.	10	4

7. Attempt any one part of the following:

a.	Explain the working principle and V-I Characteristic of LED in detail.	10	5
b.	Illustrate photovoltaic principle in solar cell. Draw and explain V-I Characteristic, open circuit voltage and short circuit current.	10	5

QP24DP2_143
| 21-03-2024 13:35:50 | 182.71.247.82