	ITER, SIKSHA 'O' ANUSANDHAN (Deemed to be University)		ASSIGNMENT	
Branch	**Computer Science and Engineering, Computer Science and Information Technology**	Programme	**B.Tech**	
Course Name	**Semiconductor Materials And Devices**	Semester	**VIII**	
Course Code	**EET4609**	Year/Period	**2025/Even**	
ASSIGNMENT-01	**Submit All Assignments**	Maximum Marks	**10**	**GP-6**
Learning Level (LL)	**L1**: Remembering	**L3:** Application	**L5**: Evaluation	
	L2: Understanding	**L4**: Analysis	**L6**: Creation	

Q. No.	Questions	COs	LL
1	Derive the relationship between Resistivity and Conductivity.	**CO3**	**L4**
2	Define Node, Bonding and Anti-bonding Orbital.	**CO1**	**L2**
3	State Pauli's Exclusion Principle.	**CO1**	**L3**
4	Differentiate between Metal, Semiconductor and Insulator with the help of the energy band diagram.	**CO5**	**L5**
5	How would you define Fermi energy?	**CO3, CO5**	**L5**
6	Classify the semiconductors with proper examples.	**CO5**	**L6**
7	Write down the difference between Direct band gap Semiconductor and Indirect band gap Semiconductor.	**CO4**	**L6**
8	Discuss the properties of Semiconductor.	**CO2**	**L3**
9	Write the equation for Barrier potential and Total depletion width.	**CO6**	**L5**
10	State 'Mass Action Law'.	**CO2**	**L4**
11	Define 'Effective Mass'.	**CO3**	**L4**
12	Illustrate the mechanism of Drift, Generation and Recombination of electron-hole pairs with proper figure.	**CO1**	**L2**
13	How would you explain the position of Fermi Level in case of Intrinsic and Extrinsic Semiconductor (for both n-type and p-type) with sketch?	**CO1**	**L3**
14	Define Diffusion with Einstein's Relationship.	**CO5**	**L5**
15	Find the concentration of donor atoms to be added to an intrinsic Ge sample to produce an n-type material of conductivity 480 9S/m. The electron mobility in n-type Ge is $0.38 m^2/V.s$.	**CO3, CO5**	**L5**
16	The intrinsic carrier density is $1.5 \times 10^{16}\ m^{-3}$. If the mobility of electron and hole are 0.13 and 0.05 $m^2\ V^{-1}\ s^{-1}$, calculate the conductivity and intrinsic resistivity.	**CO5**	**L6**
17	The band gap of a sample of GaAsP is 1.98eV. Determine the wavelength of the electromagnetic radiation that is emitted upon direct recombination of electrons and holes in this sample. What is the color of the emitted radiation?	**CO4**	**L6**
18	The reverse saturation current at 300K of a p-n junction Ge diode is 5μA. Find the voltage to be applied across the junction to obtain a forward current of 50mA..	**CO2**	**L3**
19	How Ohmic Junction and Schottky Junction formed?	**CO6**	**L5**
20	Define Ohmic contact with appropriate energy-band diagram of a metal and n-type ohmic contact.	**CO2**	**L4**

21	Write a short note on Schottky diode.	**CO2**	**L4**
22	Explain 'Depletion Region' with proper diagram.	**CO3**	**L4**
23	Explain the mechanism of Forward and Reverse-biased p-n junction with proper circuit representation.	**CO1**	**L2**
24	Explain the Current-Voltage characteristics of a p-n junction with proper graphical representation and equation.	**CO1**	**L3**
25	A Si pn junction has 10^{16} cm^{-3} acceptors on the p-side and $5x10^{16}$ cm^{-3} donors on the n-side. What is the built-in potential and total depletion width of the junction? Also, what are the depletion widths on the p and n sides? Take dielectric constant for Si to be 11.2.	**CO5**	**L5**
26	Explain the factors on which the conductivity of a semiconductor depends.	**CO2**	**L4**
27	What is cutin voltage and Breakdown Voltage of the diode?	**CO3**	**L4**
28	Define the DOS and its significance.	**CO1**	**L2**
29	Explain the temperature effect on Intrinsic carrier concentration	**CO1**	**L3**
30	Differentiate n type and p type doping in extrinsic semiconductors	**CO5**	**L5**

Assignment -01	**Topic: Electronic Materials, Semiconductors: Introduction, Electron Statistics in a Solid, Intrinsic and Extrinsic Semiconductors, Metal–Semiconductor Junctions, pn Junctions**	**Date of Assignment-01: 02.04.25**	**Date of submission: 10.04.25**

Note:

1. The Assignments in total carry weightage of **20 marks out of 100**
2. Course outcome CO1 to CO4 was covered.

Course Outcomes	CO1	Have a thorough understanding of semiconductor material properties to underlying physics
	CO2	The ability to understand, analyse charge carrier dynamics and will be able to understand the fundamentals of Semiconductors
	CO3	To understand the metal-semiconductor junction to charge carrier action
	CO4	Analyse and classify the characteristics of various electronic devices (Diode, BJT, JEFT, MOSFET)
	CO5	Illustrate the device manufacturing process including wafer growth and IC fabrication
	CO6	Understanding the various steps behind fabrication of devices and explain the challenges