CHEMISTRY (BSC -105)

Band Theory

Q 1: Differentiate between *n-type* semiconductors and *p-type* semiconductors?

Ans:

	p-type Semiconductor	*n*-type Semiconductor
(i)	In *p*-type semiconductor trivalent impurities are used for doping.	In *n*-type semiconductor, pentavalent impurities are used for doping.
(ii)	The impurity is called acceptor impurity.	The impurity is called donar impurity.
(iii)	In *p*-type semiconductor, the holes act as a majority charge carriers.	In *n*-type semiconductor, the electrons act as a majority charge carriers.
(iv)	In *p*-type semiconductor, conductivity is mainly due to holes, which are positively charged.	In *n*-type semiconductor, conductivity is mainly due to electrons, which are negatively charged.

Q 2: Differentiate between intrinsic and extrinsic Semiconductors?

Ans:

S.No	Intrinsic Semiconductor	Extrinsic Semiconductor
1.	Semiconductor in a pure form is called intrinsic semiconductor.	Semiconductor which are doped with impurity is called extrinsic semiconductor
2.	Here the change carriers are produced only due to thermal agitation.	Here the change carriers are produced due to impurities and may also be produced due to thermal agitation.
3.	They have low electrical conductivity.	They have high electrical conductivity.
4.	They have low operating temperature.	They have high operating temperature.
5.	At 0K, Fermi level exactly lies between conduction band and valence band.	At 0K, Fermi level exactly lies closer to conduction band in "n" type semiconductor and lies near valence band in "p" type semiconductor.
	Examples: Si,Ge,etc.	**Examples:** Si and Ge doped with Al, In,P,As etc

Q 3: Differentiate between conductor, insulator and Semiconductor?

Ans:

S.No	Conductors	Semiconductors	Insulators
1	Easily conducts the electrical current.	Conducts the electric current less than conductor and greater than insulator.	Does not conduct any current.
2	Has only one valence electron in its outermost orbit.	Has four valence electron in its outermost orbit.	Has eight valence electron in its outermost orbit.
3	Conductor formed using metallic bonding.	Semiconductors are formed due to covalent bonding.	Insulators are formed due to ionic bonding.
4	Valence and conduction bands are overlapped.	Valence and conduction bands are separated by forbidden energy gap of 1.1eV.	Valence and conduction bands are separated by forbidden energy gap of 6 to 10eV.
5	Resistance is very small	Resistance is high	Resistance is very high
6	It has positive temperature coefficient	It has negative temperature coefficient	It has negative temperature coefficient
7	Ex: copper,aluminium,etc	Ex: silicon, germanium, etc	Ex: Mica, Paper, etc