1. **What is a semiconductor? What is the difference between intrinsic and extrinsic semiconductors?**

The main difference between intrinsic and extrinsic semiconductor is that **intrinsic semiconductors are pure in form**, no form of impurity is added to them while extrinsic semiconductors being impure, contains the doping of trivalent or pentavalent impurities.

2. **What are valence band and conduction bands?**

The valence band is **the band of electron orbitals that electrons can jump out of**, moving into the conduction band when excited. The valence band is simply the outermost electron orbital of an atom of any specific material that electrons actually occupy.

3. For conduction to take place is it always necessary that the electrons are available in conduction band.

No if there are free ions then it is not necessary

4. For solid sodium, there is a considerable gap between the conduction band and valence band; yet it is a good conductor. How it is so?

In **sodium**,

- The band is partially filled, thus a "little bit" of energy can be added to the electrons -- no quantum jump is involved.
- The final electrons "added" to make sodium, the **3**s1 electrons, are very easy to strip from the "neon" ion core. They become the conduction electrons, often known as the **free electrons** in the metal.

6. Are there any materials for which energy gap is zero? Are there any materials for which energy gap is infinity?

Graphene and nothing respectively

7. In a doped semiconductor. How the conduction occurs at room temperature/ Explain why there is no conductivity at temperature close to 00K.

Excitation of electrons from the valence band to conduction band

8. The electrical conductivity increases with rise of temperature in semiconductors, where as it decreases in the case of conductors. Explain.

In case of conductors the resistivity increase and no. of free eletrons remains the same whereas in case of semiconductor no. of free electrons increases with the increase in temperature