Viva-Voice

Q. 1 What is a P-N junction diode?

Ans. When P-type germanium and N type germanium crystals are joined together then P-N junction diode is formed.

Q. 2 Which type of impurities are added in N-type and P-type semiconductor?

Ans. Impurities from group-V elements, eg. arsenic and antimony are added in N-type semiconductors and Impurities from group III elements eg. Boron, Aluminum are added in P-type semiconductor.

Q. 3 What are the majority and minority carriers in n-type?

Ans. Electrons are majority carriers and holes are minority carriers.

Q. 4 What is meant by Forward and Reverse bias in a diode?

Ans. When positive end of battery or supply is connected to the P-type crystal and negative end to N-type crystal, then the diode is said to be forward based and is said to be in reverse bias if vice-versa happens.

Q. 5 Give the important parameters of PN junction diode to explain its characteristics?

Ans. 1. Cut-in voltage V_0

2. Dynamic resistance r_d

3. Saturation Current I_0.

Q. 6 What is static and dynamic resistance offered by the diode?

Ans. Static resistance is the resistance offered by the diode when only a steady direct current flows through it. But when a varying forward current flows through a diode then the resistance offered by the diode in the forward direction to the varying component of the current is called dynamic resistance.

Q. 7 What are semiconductors?

Ans. Semiconductors are materials whose conductivity lies between conductors and insulators. Its resistance decreases with rise in temperature i.e., It has negative temperature coefficient of resistance. Whereas metals has positive coefficient of resistance i.e. its resistance increases with increase in temperature.

Q. 8 What is energy band gap?

Ans. Energy band gap is the energy difference between the valance band and conduction band.

Q. 9 What are the energy band gap of silicon and germanium?

Ans. For silicon it is 1.1 ev, and for germanium it is 0.72 ev.

Q. 10 How will you differentiate between metals, semiconductors and insulators on the basis of energy level diagram?

Ans. In metals, the valance band and conduction bands overlaps. In semiconductors, their is very less energy gap between valance and conduction band. In insulators, the gap between valance and conduction band is very large.

Q. 11 **Can a semiconductor behave as insulators?**

Ans. Yes, at 0° K the semiconductor behaves as insulators. At this temperature, the valance band is full and conduction band is empty.

Q. 12 **What do you mean by reverse saturation current?**

Ans. When a PN junction is reverse biased, then current is due to minority curriers whose concentration is dependent in energy gap or band gap and the current is called as reverse saturation current.

Q. 13 **What is the dependence of reverse saturation current on temperature?**

Ans. Reverse saturation current increases approximately 7° percent/° C for both Ge and Si. This current doubles for every 10° rise in temperature.

Q. 14 **Which semiconductor is widely used in manufacturing semiconductor device and why?**

Ans. Silicon is widely used because it is abundant in earths crust as SiO_2 (silica) while comparatively germanium is costly material.

Q. 15 **What is a Zener diode ?**

Ans. It is a heavily doped PN junction diode which is designed to operate in the breakdown region under reverse bias condition.

Q. 16 **What is meant by Zener break down?**

Ans. Due to the existence of the electric field at the junction, a sufficiently strong force may be exerted on a bound electron by the field to break the covalent bands and produce new electron-hole pairs which increases the reverse current abruptly. This is called zener breakdown.

Q. 17 **What is the main application of zener diode ?**

Ans. Voltage regulation.

Q. 18 **Can you name the other break down phenomena?**

Ans. Yes, Avalanche breakdown.

Q. 19 **What causes Avalanche breakdown?**

Ans. The increase in the kinetic energy of minority carriers in the reverse bias condition causes Avalanche breakdown.

Q. 20 **Can you name other diode?**

Ans. Yes, Tunnel diodes, schkottky diode, photo diode, light emitting diode, etc. ❑

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