UNIT-IV

SEMICONDUCTORS:

SHORT ANSWER QUESTIONS:

1. What are intrinsic semiconductors?
2. What are extrinsic semiconductors?
3. Define drift and diffusion currents.
4. What are n-type and P-type Semiconductors?
5. Write a relation between diffusion co-efficient and mobility of charge carriers.
6. Define Fermi energy.
7. Show the position of Fermi level in intrinsic semiconductor at 0 K in an energy level diagram
8. Show the position of Fermi level in n-type semiconductor at 0 K K in an energy level diagram
8. Show the position of Fermi level in p-type semiconductor at 0 K K in an energy level diagram
9. What are direct and in-direct band gap semiconductors?
10. State Hall effect and mention any two applications of it.
11. Indicate on an energy level diagram the conduction and valance bands, donor and acceptor levels for intrinsic and extrinsic semiconductors.
12. Mention the value of energy gap in semiconductors.
13. What is doping? Explain how doping makes a semiconductor more useful.
14. Explain the origin of energy bands in solids.
15. Write the continuity equation for holes.
16. Write the continuity equation for electrons
17. Mention the applications of semiconductors.

ESSAY QUESTIONS:

1. Explain the origin of energy bands in solids and based on that explain classification of solids.
2. Write a note on intrinsic and extrinsic semiconductors along with their bond and band structure.
3. Distinguish between intrinsic and extrinsic impurity semiconductors with suitable examples.
4. Show that the Fermi level is nearer to the conduction band in a n-type semi-conductors. Discuss the variation of conductivity with temperature of an n-type semi-conductor.
5. Explain n-type and p-type semiconductors. Indicate on an energy level diagram the conduction and valance bands, donor and acceptor levels for intrinsic and extrinsic semiconductors.
6. Derive an expression for the carrier concentration of an intrinsic semiconductor.
7. Derive an expression for the carrier concentration of an electrons in a n-type semiconductor.

8. Derive an expression for the carrier concentration of an holes in a n-type semiconductor.
9. Derive an expression for the carrier concentration of an holes in a P-type semiconductor.
10. Derive an expression for the carrier concentration of an electrons in a P-type semiconductor.
11. a)Describe the drift and diffusion currents in semiconductors.
    b) Derive Einstein relation (or) Derive a relation between diffusion co-efficient and mobility of charge carriers.
12. a) State and explain Hall effect.
    b) Derive an expression for Hall co-efficient.
13. a) Show that for n-type semiconductor the hall co-efficient $R_H = -\frac{1}{ne}$.
    b) Mention the applications of Hall effect.
14. Explain direct and in-direct band gap semiconductors.
15. Distinguish between direct and in-direct band gap semiconductors.
16. a) Derive the continuity equation for electrons.
    b) What Physical law is manifested in the continuity equation.
16. a) Derive the continuity equation for holes.
    b) What Physical law is manifested in the continuity equation.
17. What is doping? Explain how doping increases conductivity.
18. a) Explain the physical mechanism of conduction in semiconductors.
    b) Mention the applications of semiconductors.