





## PART – B

(5×16=80 Marks)

11. a) i) Write Fermi distribution function. Explain how Fermi function varies with temperature. (14)  
ii) Evaluate the Fermi function for an energy  $kT$  above the Fermi energy. (2)  
(OR)
- b) i) Obtain the Eigenvalues and Eigenfunctions of an electron enclosed in a three dimensional potential box. (12)  
ii) What is meant by degenerate and non-degenerate states ? (4)
12. a) Derive an expression for density of electrons in the conduction band and density of holes in the valence band of an intrinsic semi-conductor. (16)  
(OR)
- b) With a neat sketch, describe the principle, working and applications of  
i) Tunnel diode.  
ii) Schottky diode. (8+8)
13. a) Explain ferromagnetic domain theory. Briefly explain different types of energy involved in domain growth. (16)  
(OR)
- b) i) What is meant by dielectric breakdown and dielectric strength ? (4)  
ii) Discuss in detail the various dielectric breakdown mechanisms and mention the remedies to avoid breakdown in dielectric material. (12)
14. a) i) Describe the principle, construction and working of a photo diode. (12)  
ii) Give the advantages, disadvantages and application of photo diode. (4)  
(OR)
- b) i) Describe the principle, construction and working of a GaAlAs diode Laser. (14)  
ii) Calculate the wavelength of emission from GaAs semiconductor laser whose band gap energy is  $1.44\text{eV}$  (Plank's Constant is  $6.625 \times 10^{-34}\text{Js}$  and velocity of light is  $3 \times 10^8\text{ m/sec.}$ ) (2)
15. a) Explain the density of states in quantum well, quantum wire and quantum dot structure. (16)  
(OR)
- b) Write a short note on :  
i) GMR  
ii) Spin Valve. (8+8)