



DEPARTMENT OF SCIENCE AND HUMANITIES
PH3256– PHYSICS FOR INFORMATION SCIENCE
Most Important Anna University Part-B Questions
Unit-I Electrical Properties of Materials

1. What are the basic assumptions of classical free electron theory? Based on the assumptions derive an expression for electrical and thermal conductivity of metals. What are the success and failures of this theory?
2. Derive Schrödinger equation for a particle in 3- dimensional box. Determine the Eigen values and Eigen functions for the same.
3. Derive an expression for the density of states. Based on that obtain suitable expression for carrier concentration in metals and Fermi energy of electrons at 0 K.
4. Write down the Fermi Dirac distribution function. Explain how the function varies with temperature?

Unit II Semiconductor Physics

5. Derive an expression for the carrier concentrations of electron and holes in an intrinsic semiconductor. And also explain the variation of carrier concentration with temperature.
6. What is Hall Effect? Derive an expression for Hall coefficient. Describe an experimental setup for the measurement of the hall coefficient and mention its applications.
7. Describe the construction and working of Schottky Diode and Ohmic contact with neat diagrams.

Unit III Magnetic properties of materials

8. Describe (classify) dia, para, ferro, antiferro and ferrimagnetic materials and their properties with example
9. (i) Explain about the origin of ferromagnetism and exchange interaction in ferromagnetic materials.
 (ii) Discuss about saturation magnetisation and Curie temperature.
 (iii) Explain M versus H behaviour
 (iv). Write the difference between hard and soft magnetic materials with examples.
10. Explain Magnetic principle in computer data storage and GMR sensor.

Unit IV Optical properties of materials

11. How optical materials are classified depending on the interactions of the materials with visible light.
12. Explain the three types of carrier generations and recombination in semiconductors.
13. Explain absorption and emission of light in metals, insulators and semiconductors.
14. Explain the principle, construction and working of
 (i). Semiconductor diode laser with necessary diagrams.
 (ii). Photocurrent in P-N diode and solar cell
15. Explain the principle and working of LED and OLED with a neat diagram.

Unit V NANO DEVICES

16. Explain Quantum confinement and quantum structures in nano materials.
17. Write a note on (i) Band gap of nano materials. (ii) Quantum confinement. (iii). Coulomb blockade.
18. Describe single electron phenomena and single electron transistor.
19. Explain in detail about tunneling process and also give an account on resonant tunneling diode with neat diagram.
20. Briefly explain (i) Quantum system for information processing, (ii). Quantum states,
 (iii). Classical bits, (iv). Quantum bits