

PH3256 PHYSICS FOR INFORMATION SCIENCE

IMPORTANT QUESTIONS AND QUESTION BANK

UNIT-I ELECTRICAL PROPERTIES OF MATERIALS

2-Marks

1. What is meant by a free electron?
2. Define drift velocity of electron?
3. Define mobility of electron?
4. Define electrical conductivity?
5. Define thermal conductivity?
6. Success of classical free electron theory?
7. What are the Density of energy states?
8. Define Electron effective mass?
9. Define concept of hole?
10. Define Tunneling process?

Part-B

1. What are the drawbacks are classical free electron theory? (or) state the demerits of classical free electron theory?
2. Distinguish between electrical conductivity and thermal conductivity?
3. Explain in details about the Wiedemann-Franz law?
4. Explain the quantum free electron theory?
5. Explain the density of energy state and its their classification?
6. . Explain the details with quantum interference devices?
7. Explain the advantages and disadvantages of Quantum free electron theory?
8. Write a neat sketch with the working and applications of Tunneling process?
9. Explain about the Density of energy states? And give their applications?
10. Explain the different types of Energy bands in solids?
11. Discuss and derive the functions of Electron effective mass?
12. Explain in details about in concept of hole?
13. Determine the process of an degenerate states in various stages?
14. Explain the details of Fermi-Dirac statistics?

UNIT-II SEMICONDUCTOR PHYSICS

2-Marks

1. What are the elemental semiconductors?
2. Give important elemental semiconductors?

3. What are the properties of semiconductors?
4. Mention any two advantages of semiconducting materials?
5. What are the compound semiconductors?
6. What is semiconductors?
7. What id n-type semiconductors?
8. What is p-type semiconductors?
9. Define hall effect and hall voltage?
10. Mention the application of hall effects?

Part-B

1. Describe the conductivity of conductors, semiconductors, and insulator with the help of energy bands diagram?
2. Describe the details in intrinsic semiconductors and extrinsic semiconductors?
3. Discuss the formation and operation of N type and P type semiconductors?
4. Give some important compound of semiconductors? And differentiate between the elemental semiconductors and compound semiconductors?
5. What is meant by intrinsic and extrinsic semiconductors?
6. Compare p-type and n-type semiconductors?
7. Define impurity range exhaustion range and intrinsic range in n-type semiconductors?
8. Explain the variation of carrier concentration with temperature?
9. Explain in details about transport semiconductors?
10. Write a short note on; (i) n-type semiconductor (ii) p-type semiconductor
11. Explain the details of hall effects and it their application?
12. Explain in details about ohmic contacts?
13. Write a detail of Schottky diode? And explain the working principle?
14. Draw and explain the energy band diagram?
15. Obtain an expression for intrinsic carrier concentration in an intrinsic semiconductor?

UNIT-III MAGNETIC PROPERTIES OF MATERIALS

2-Marks

1. Define magnetic susceptibility and permeability?
2. Define intensity of magnetization and flux density?

3. Iron has relative permeability of 5000. Calculate its magnetic susceptibility?
4. A magnetic field of 2000 A/m is applied to a material which has a susceptibility of 1000. Calculate the (i) Intensity of Magnetisation and (ii) Flux density?
5. What are paramagnetic materials? Give some examples?
6. What are magnetic storage devices? Give examples?
7. Define anti ferromagnetism. Mention any two materials that exhibit anti ferromagnetism?
8. What are paramagnetic materials? Give some examples?
9. What are the four types of energies involved in the growth of magnetic moments?
10. What are the parameters required for magnetic recording?

Part-B

1. Explain how magnetic materials are classified based on atomic magnetic moments?
2. State the origin of magnetic moment? How are magnetic material classified based on magnetic moments? Compare their properties?
3. Write a note on anti ferro magnetism? Write the difference between hard and soft magnetic materials with examples?
4. Explain ferromagnetic domain theory. Explain different types of energy involved in domain growth?
5. Draw the M-H curve (Hysteresis) for a ferromagnetic material and explain the hysteresis on the basis of domain theory?
6. What are reversible and irreversible domains? Based on that explain the phenomenon of hysteresis in ferromagnetic materials?
7. Discuss the Weiss theory of ferromagnetism? Write the merits and demerits?
8. What are ferri magnetisms? Describe the different types of ferrites structure with suitable diagrams and mention its applications?
9. Explain the magnetic principle in computer data storage? Write notes on any two magnetic storage devices?
10. Discuss the concepts of magnetic recording and reading on a storage medium with suitable diagrams?
11. Describe the working of magnetic hard disc based on GMR sensor. Mention its advantages and disadvantages?
12. Explain the magnetic principle in computer data storage?
13. Explain the examples and uses of magnetic materials?

14. Explain the principle of magnetic data storage in Floppy disc and computer hard disc?
15. Explain the magnetic optical method of recording data?

UNIT-IV OPTICAL PROPERTIES OF MATERIALS

2-Marks

1. Mention any three advantages of led electronic supply?
2. Mention any four advantages of fiber optic?
3. Mention some any fiber optic source?
4. What is meant by injection luminescence? Give its examples?
5. Define solar cell?
6. State the application of optical fiber?
7. Define optical absorption emission?
8. Define the basic principle of optic materials?
9. Define light emitting diode?
10. Define Plasmonics?

Part-B

1. Give their application of optical process in semiconductors?
2. Write the classification of optical materials?
3. Explain the optical process in semiconductors?
4. Write a process and construction, working principle of optoelectronic devices? And give their applications?
5. Differentiate the liner optical materials and non-linear optical materials?
6. Write a neat explain with the modulator and switching devices and its their examples?
7. What is meant by LED give it's the explain their principles?
8. Explain the optical process in organic semiconductors device and its examples are given?
9. Explain about the light detectors and solar cells give the application and their limitations?
10. Write a short note on; (i) light emitting diode (ii) laser diode
11. Write an explanation at optical process in quantum walls?
12. Explain about the details of optical absorption and emission?
13. Explain the details of light detectors?
14. Write the explanation of plasmonics in details and give its their applications?

UNIT- NANODEVICES AND COMPUTING

2-Marks

1. What is meant by quantum confined structure?
2. Define quantum well?
3. What is quantum mechanical tunnelling?
4. Define quantum conductance?
5. Write any two drawbacks of quantum dot lasers?
6. What are the applications of quantum dot laser?
7. Write any two advantages of single electron transistor?
8. What are single electron transistors?
9. How band gap of a bulk material is different from nano materials?
10. Define density of states?

Part-B

1. Explain the electron density in bulk material and size dependence of Fermi energy?
2. Explain Quantum confinement and quantum structures in nano materials?
3. Derive an expression for density of states in quantum well, quantum wire and quantum dot structures?
4. Show that density of states in three dimensions is directly proportional to square root of energy?
5. Explain density of states in zero dimensions? Show that density of states in one dimensional is $E^{-1/2}$?
6. Write a note on (i) Band gap of nano materials? (ii) quantum confinement?
7. Discuss quantum size effect and band structures of nano crystals?
8. Describe single electron phenomena and single electron transistor?
9. (i) Explain the working and principle of quantum dot laser? (ii) Describe the single electron transistor?
10. Explain the construction and working of quantum dot laser? What are the advantages and disadvantages of quantum dot laser?
11. Derive an expression for quantum resistance and conductance?
12. Explain the conductivity of metallic nano wires and also explain the I-V characteristics of copper nano wire?
13. Write a note on (i) Ballistic transport? (ii) Tunnelling?
14. Describe carbon nano tubes with their properties and applications?

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Notes

Syllabus

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