CSE - 1

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 21450

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Second Semester

Computer Science and Engineering

PH 3256 – PHYSICS FOR INFORMATION SCIENCE

(Common to: Computer Science and Design/Computer Science and Engineering (Artificial Intelligence and Machine Learning)/Computer Science and Engineering (Cyber Security)/Computer and Communication Engineering/Artificial Intelligence and Data Science/Computer Science and Business Systems and Information Technology)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the failures of classical free electron theory?

2. Calculate the Fermi energy of copper at 0 K. Atomic weight and density of copper are 63.54 and 8950 kg/m^3 respectively.

3. Why do we prefer extrinsic semiconductors than intrinsic semiconductors?

4. Distinguish between direct and indirect band gap semiconductor.

5. In a magnetic material, the field strength is found to be 10^6 *ampere/m*. If the magnetic susceptibility of the material is 0.5×10^{-5}, calculate the intensity of magnetization and flux density in the material.

6. What is Gaint magneto resistance?

7. Define Rayleigh scattering.

8. What is OLED?

9. Distinguish between bits and qubits.

10. Define Coulomb blockade effect.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive an expression for energy eigen value and eigen function for a particle moving in the potential $V(x)=0$ for $0<x<a$ and $V(x)=\infty$ for $0\geq x\geq a$. (10)

(ii) Extend the above eigen value and eigen function for a particle in three dimensional rectangular box and discuss the degenerate states of the particle. (6)

Or

(b) (i) Explain in detail about tight binding approximation. (8)

(ii) What is effective mass of electron? Derive an expression for effective mass of electron moving in a periodic potential. (8)

12. (a) (i) Derive an expression of electron concentration in the conduction band of an n – type extrinsic semiconductor. (10)

(ii) Explain with a neat sketch, the variation of Fermi level with temperature in an n – type semiconductor. (6)

Or

(b) Explain in detail

(i) Schottky diode

(ii) Ohmic contacts. (8+8)

13. (a) (i) Distinguish between soft and hard magnets. (6)

(ii) Explain in detail about the magnetic principle in computer data storage. (10)

Or

(b) Explain in detail about the domain theory of ferromagnetism. (16)

14. (a) Explain carrier generation and recombination in semiconductor. (16)

Or

(b) (i) Describe the construction and working of a photo diode. (8)

(ii) Describe the construction and working of a solar cell. (8)

15. (a) Explain quantum confinement and quantum structures in nano materials. (16)

Or

(b) (i) Explain in detail about Bloch sphere. (10)

(ii) Distinguish between Classical and quantum computing. (6)
