Syllabus

Regulations: R 2023

Branch: BE CSE, B Tech IT

Course Name: PHYSICS FOR INFORMATION SCIENCE

Course Code: PH23211

UNIT I ELECTRICAL PROPERTIES OF MATERIALS

-Classical free electron theory

-Expression for electrical conductivity

-Matthiessen rule, Thermal conductivity, expression

-Wiedemann-Franz law

-Success and failures electrons in metals

-Fermi-Dirac function

-Density of energy states

-Electron in periodic potential

-Energy bands in solids

-Tight binding approximation

-Electron effective mass

-Concept of hole.

UNIT II SEMICONDUCTOR PHYSICS

-Intrinsic Semiconductors

-Energy band diagram

-direct and indirect band gap semiconductors

-Carrier concentration in intrinsic semiconductors

-extrinsic semicon-ductors

-Variation of carrier concentration with temperature

-variation of Fermi level with temperature and impurity concentration

-Hall effect and devices.

UNIT III MAGNETIC PROPERTIES OF MATERIALS

-Magnetic dipole moment

-atomic magnetic moments

-magnetic permeability and susceptibility

-Magnetic material classification: diamagnetism ,paramagnetism ferromagnetism ,antiferromagnetism , ferrimagnetism

-Ferromagnetism: origin and exchange interaction

-saturation magnetization and Curie temperature

-Domain Theory- M versus H behaviour

-Hard and soft magnetic materials examples and uses

-Magnetic principle in computer data storage

-Magnetic hard disc (GMR sensor).

UNIT IV OPTICAL STORAGE MATERIALS

-Classification of optical materials

-carrier generation and recombination processes

-Absorption emission and scattering of light in metals, insulators and semiconductors (concepts only)

-photo current in a P-N diode

-solar cell

-LED ,Organic LED

-Laser diodes

-Optical data storage techniques.

UNIT V QUANTUM COMPUTING

-Introduction quantum cellular automata

-Quantum system for information processing

-quantum states

-classical bits

-quantum bits or qubits

-CNOT gate

-multiple qubits

-Bloch sphere

-quantum gates

-advantage of quantum computing over classical computing.