

EXPLORING SCIENCE

Unit 1: Scientific Methodology:

Hypothesis, experimentation, data analysis, inferences.

Unit 2: Crystal Structure:

Lattice, Unit cells, Lattice parameters, crystal systems, Bravais lattice, BCC, FCC, SC, Miller Indices, Bragg's law and X-ray diffraction method, packing fraction calculation for BCC, FCC and SC numericals

Unit 3: Nanoscience And Its Applications:

Introduction to Nanoscience and Nanotechnology (Difference between bulk and nanomaterials), advantages of miniaturization, surface to volume ratio, properties of nanomaterials. Techniques of synthesis of nanomaterials: top down, bottom up, photolithography, Ball milling, applications of nanotechnology.

Unit 4: Quantum Mechanics:

Prequantum era-Young's double slit experiment; emission spectra; blackbody radiation; photoelectric effect; Planck's Law; Einstein's photoelectric

equation; Bohr's model; de Broglie wavelength; Heisenberg's principle; wavefunction; Schrodinger equation; list of postulates.

Unit 5: Introduction To Bioinformatics:

Introduction to the biomolecules (DNA, RNA, Proteins, Lipids and Carbohydrates); Central dogma; DNA and protein sequences and structures. Mutations and diseases. sequence assembly, sequence comparison, biological databases, similarity searches, multiple sequence alignment, Visualizing protein and DNA 3- Dstructures (web based-Experiment).