GUJARAT UNIVERSITY
Syllabus for Second Year B.Sc.: Semester – III
Effective from June 2024
SEC-236: 2 Credits

PROPERTIES OF NANOMATERIALS

Unit I **[15 Hours]**

Electronic & Magnetic Classification of materials: Metal, Semiconductor, Insulator, Band structures, Brillouin zones, Mobility, resistivity, relaxation time, and recombination centres, Hall effect Quantum Hall effect. Quantum Tunneling, Coulomb Blockade, single electron transistor. Origin of magnetic Moment in materials, Revisit to Different kind of magnetism in nature: Dia, para, ferro magnetic, Domain structure, antiferro, feri & superparamagnetism, nanomagnetic materials: Fe, Fe_3O_4, Ferrites, Ferro-fluids

Unit II **[15 Hours]**

Optical & Thermal Photo-conductivity, Photovoltaic effect, optical absorption & transmission, photoluminescence, fluorescence, phosphorescence, electroluminescence, LED, Concept of phonon, thermal conductivity, specific heat, exothermic & endothermic heat, Thermoelectric effect, Thermoelectric material (TEM) properties.

Text & References:

1. Processing & properties of structural nanomaterials by Leon L. Shaw (editor).
2. Chemistry of nanomaterials: Synthesis, properties and applications by CNR Rao et.al. Wiley VCH Verlag Gmbh & Co, Weinheim.
3. Nanostructure and Nanomaterials: Synthesis, Properties and Application by G. Cao, Imperial College Press, 2004.