

UNIT I: Introduction to Nanomaterials: Size dependence of properties – Surface to volume ratio and Quantum confinement. Electrical, optical, mechanical, chemical and magnetic properties of nanomaterials.

UNIT II: Microscopic techniques to study nano structures - SEM, AFM – TEM and STM. Spectroscopic techniques to characterize nanostructures - Raman, XPS, Auger, EDAX.

UNIT III: Synthetic approaches: Colloidal, Self assembly, electrochemical methods, sol-gel, Langmuir-Blodgett (LB), chemical vapour deposition, plasma arcing and ball milling, lithography.

UNIT IV: Synthesis, properties and biomedical applications of Fullerenes, Carbon nanotubes and Graphenes. Semiconducting Quantum Dots, wells and wires.

UNIT V: Biofunctionalisation of nanomaterials - Noncovalent Assembly - Covalent assembly - Biofunctional Nanomaterials - Semiconductor Nanoparticles - Magnetic Nanoparticles. Applications of Biofunctional nanomaterials.

**TEXT BOOKS/ REFERENCES:**

1. Alexei Nabok, “Organic and Inorganic Nanostructures”, Artech House, Inc., 2005
2. Huangxian Ju, Xueji Zhang and Joseph Wang, “NanoBiosensing, Principles, Development and Application”, Springer, 2011.
3. M. Reza Mozafari (Editor), “Nanomaterials and Nanosystems for Biomedical Applications”, Springer 2007.
4. Zhong Lin Wang (Editor), “Characterisation of Nanophase Materials”, Wiley VCH, 2000.