

I Year I Semester

Code: 17CC133

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**NANO TECHNOLOGY
(Elective-I)**

UNIT-I:

Introduction, Size and shape dependence of material properties at the nano scale, scaling relations, can nano robots walk and nano planes fly, Nano scale elements in conventional technologies, Mechanics at nano scale Enhancement of mechanical properties with decreasing size, Nano electromechanical systems, nano machines, Nano fluidics, filtration, sorting, Molecular motors, Application of Nano Technology.

UNIT-II:

Nano material Synthesis Techniques: Top-down and bottom-up nanofabrication, Synthesis of nano composites, The Intel-IBM approach to nanotechnology: lithography, etching, ion implantation, thin film deposition, nano coatings and nano indentation, Electron beam lithography, Soft lithography: nano imprinting and micro-contact printing, Solution/plasma-phasenanofabrication, sol-gel methods, template techniques.

UNIT-III:

Imaging/characterization of nanostructures General considerations for imaging, Scanning probe techniques: XRD, SEM, TEM, AFM and NSOM.

UNIT-IV:

Metal and semiconductor nano particles Synthesis, stability, control of size, Optical and electronic properties, Ultra-sensitive imaging and detection with nano particles, bioengineering applications, Catalysis. Semiconductor and metal nano wires Vapor/liquid/solid growth and other synthesis techniques, Nano wire transistors and sensors.

UNIT-V:

Carbon nano tubes

Structure and synthesis, Electronic, vibration, and mechanical properties, How can C nano tubes enable faster computers, brighter TV screens, and stronger mechanical reinforcement?

TEXT BOOKS:

1. Nanoscale Science and Technology by Kelsall, Hamley, and Geoghegan, Wiley (2005)
2. Introduction to Nanoscale Science and Technology by Di Ventra, Evoy, and Heflin, KluwerAcademic Publishers (2004).

REFERENCES:

1. Introduction to Nanotechnology by Poole and Owens, Wiley (2003)
2. Nanochemistry: A Chemical Approach to Nanomaterials, Ozin and Arsenault, RSC Publishing (2006).