

(CH510) NANOTECHNOLOGY

Objective of the Course :

Objective: Nanotechnology is used in determining and analyzing many synthesizing problems which are helpful in bringing down macro sized molecules or processors to nano scale.

UNIT - I

Introduction to Nanotechnology: History of nano-revolution, nano scale materials and their applications, Carbon nano tubes, organic and inorganic nano structures. Future of the nanotechnology.

UNIT - II

Materials used in Nanotechnology: An overview of the physical (mechanical, electrical) and chemical properties of different classes of solid materials such as metals, semiconductors, insulators and polymers. Examples of size effects of properties observed in thin films, colloids and nanocrystals.

UNIT - III

Conventional Fabrication Techniques: Topdown and bottom up process, techniques used in conventional microfabrication including thin film deposition (e.g. CVD, PVD), lithography, chemical etching and electrodeposition.

UNIT - IV

Analytical Techniques: Analytical techniques such as Electron Microscopy, Electron and X-ray Diffraction, Ellipsometry, Photoelectron, Optical and Ion spectroscopy and Probe Microscopy.

UNIT-V

Applications: Examples of applications in Micro and Nano technology including, Micro fluidics, Micro Electron Mechanical Systems (MEMS) membrane technology and catalyst and coatings.

TEXT BOOKS:

1. M. Wilson, K. K. G. Smith, M. Simmons and B, Raguse, "Nanotechnology", Chapman & Hall CRC Press, 2002.
2. M. Meyyappan, "Carbon Nanotubes", Science and Application, CRC Press, 2005.

REFERENCE BOOKS :

1. Alexei Nabok, "Organic and Inorganic Nanostructures", Publisher Artech House, London, 2005.
2. H. Watarai, N. Teramae and T Sawada, "Interfacial Nanochemistry, Kluwer Academic Plenum Press, 2005.