

(ME 518) NANOTECHNOLOGY (ELECTIVE - IV)

Objective of the course:

The course goal is to discuss interesting emerging nanotechnologies by providing interdisciplinary scientific and engineering knowledge necessary to understand fundamental physical differences at the nanoscale.

UNIT - I

Importance of Nano-technology, Emergence of Nano-Technology, Bottom-up and Top-down approaches, challenges in Nano Technology.

General Introduction: Basics of Quantum Mechanics, Harmonic oscillator, magnetic Phenomena, band structure in solids, Mossbauer and Spectroscopy, optical phenomena bonding in solids, Anisotropy.

UNIT - II

Silicon Carbide: Application of Silicon carbide, nano materials preparation, Sintering of SiC, X-ray Diffraction data, electron microscopy sintering of nano particles,

Nano particles of Alumina and Zirconia: Nano materials preparation, Characterization, Wear materials and nano composites.

UNIT - III

Mechanical properties: Strength of nano crystalline SiC, Preparation for strength measurements, Mechanical properties, Magnetic properties.

UNIT - IV

Electrical properties: Switching glasses with nanoparticles, Electronic conduction with nano particles.

Optical properties: Optical properties, special properties and the coloured glasses.

UNIT - V

Process of synthesis of nano powders, Electro deposition, Important nano materials

Investigating and manipulating materials in the nanoscale: Electron microscopies, scanning probe microscopies, optical microscopies for nano science and technology, X-ray diffraction.

TEXT BOOKS:

1. A.K.Bandyopadhyay, "Nano Materials", 1st Edition, New Age Publishers, 2009.
2. T.Pradeep, "Nano the Essentials", 3rd Edition, Tata Mc Graw Hill, 2009.

REFERENCE BOOKS:

1. Guozhong Cao, "Nano structures and Nano Materials: Synthesis, Properties and Applications", 1st Edition, Imperial College Press, 2004.
2. Bharat bhusan, "Springer's Hand Book of Nano-technology", 2nd Edition, Spingers Publihsers, 2007.