

Introduction to Nanotechnology

Module-I

Background and Definition of Nanotechnology, MEMS/NEMS, Microelectronics fabrication methods, Principles of MEMS, Mechanical MEMS, Thermal MEMS, Magnetic MEMS.

Module-II

Nanomaterial Synthesis and Applications: Molecule-Based Devices, Introduction to Carbon Nanotubes, Structure, Synthesis, Growth, Properties and Application, Nanowires, Introduction to Micro/Nanofabrication, Stamping Techniques for Micro and Nanofabrication: Methods and Applications, Materials Aspects of Micro and Nanoelectromechanical Systems, MEMS/NEMS Devices and Applications, Introduction to Micro Fluids.

Module-III

Micro/Nanotribology and Materials Characterization Studies Using Scanning Probe Microscopy, Surface Forces and Nanorheology of Molecularly Thin Films, Scanning Probe Studies of Nanoscale Adhesion Between Solids in the Presence of Liquids and Monolayer Films, Friction and Wear on the Atomic Scale, Nanoscale Mechanical Properties-Measuring Techniques and Applications, Nanomechanical Properties of Solid Surfaces and Thin Films, Mechanical Properties of Nanostructures, Kinetics and Energetics in Nanolubrication.

Module-IV

Application of Nanotechnology: Nano-Grating System, Nano Lithography, Nanotechnology for Data Storage Applications, Microactuators for Dual-Stage Servo Systems in Magnetic Disk Files, Micro/Nanotribology of MEMS/NEMS Materials and Devices, Mechanical Properties of Micromachined Structures, Thermo and Electromechanics of Thin-Film Microstructures, High Volume Manufacturing and Field Stability of MEMS Products, MEMS Packaging and Thermal Issues in Reliability.

Books:

1. Nanotechnology: N. Taniguchi, Oxford University Press
2. Handbook of Nanotechnology: B. Bhushan, Springer Verlag
3. Micromanufacturing and Nanotechnology: N. P. Mahalik, Elsevier Science
4. Foundation of MEMS: C. Liu, Prentice Hall
5. Introduction to Nanotechnology: C. P. Poole, F. J. Owens, Wiley Interscience