

CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (A)

ECE Department

Value added courses

20ECV05

Course Title: Nano Science and Nanotechnology

Instructions	30L Hours per Week
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Band theory of Solids - Basic properties of Conductors, Insulators, and Semiconductors. Band theory of typical semiconductors, Statistical mechanics – Fundamental concepts of classical statistics (Maxwell-Boltzmann) and Quantum statistics (Bose-Einstein, Fermi-Dirac statistics). Effects of the nanometre length scale- Change in physical, chemical, mechanical, magnetic, electronic and optical properties at Nano scale.

Engineering Nano materials, Basic Types of Nanostructures- Fundamental concepts on semiconductor hetero structure (super lattice and quantum wells), Carbon Nanotubes, Nanowires, and Quantum Dots.

Top-down processes- Ball milling, Optical lithography, E-Beam lithography, Micro machining, Etching, Bottom-up processes- Physical vapour deposition, Chemical vapour deposition, Self-assembly, Molecular beam epitaxy.

Classification of characterization methods, Microscopy: Principles of Electron Microscopy - Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM), Spectroscopy: Principle and operation of UV-vis-NIR Spectroscopy.

Books

- 1) B.S. Murty, P. Shankar, Baldev Raj, B B Rath, James Murday, Textbook of Nanoscience and Nanotechnology, 2013, 1st edition, Springer-Verla Berlin, Heidelberg
- 2) Gregory L. Timp, Nanotechnology, 2012, 3 rd edition, Springer, New York
- 3) T. Pradeep, A Textbook of Nanoscience and Nanotechnology, 2012, 2nd edition, Tata McGraw-Hill Education, New Delhi