7. Nano: The Essentials Understanding Nanoscience and Nanotechnology, Pradeep T (2007). 1 Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi.
8. Nanotechnology Lakshman Desai, 2007 1st Edition, Paragon International Publishers.
9. Chemistry of nanomaterials : Synthesis, properties and applications by CNR Rao et al.
10. Nano bio-technology: Concepts, Applications and Perspectives, Christ of M. Niemeyer, Wiley, 2004.
11. K.K.Jain, Nano Biotechnology, Horizions Biosciences, 2006.

BCH 556: NANOTECHNOLOGY: SOFT CORE

Lecture hours: 42   Total Credits: 03

Course objectives:
• To understand the basic concept of nanotechnology.
  • To synthesize nanoparticles and know their applications.
• To study the applications of nanotechnology in food industries.
• To learn its use in agriculture, farming.
• To undertsnd the importance of nano-fertilizers.

Unit I   14 hrs.
Biological nanoparticles and their applications: Introduction to biological nanoparticles and their applications: Exosomes, lipoproteins, ferritin, magnetite viruses. Biological nanomotors and machines, mechanisms of biological machines, protein assemblies: muscle myosin, kinesin, nerve, ATPase, bacteriorhodopsin, haemoglobin dynein, cilia. Bacterial flagella- structure and function; nanomotor. Ion channels: nanopores of high specificity. Bioinspired nanomaterials: DNA and peptide based. Interaction between biomolecules and nanoparticle surfaces.

Unit II   14 hrs.
Biological synthesis: Biological synthesis of nanoparticles using bacteria, fungi, plants, purified enzymes and biological templates, Slayer. Silver nanoparticles, gold nanoparticles, cerium oxide nanoparticles, titanium oxide and zinc oxide nanoparticles. Application of inorganic nanoparticles.

Unit III   14 hrs.
Biosensor and nanobiosensor: Biosensor and nanobiosensor basic concepts, characterization, perception, Enzyme–metal NP hybrids for bio-sensing and for the generation of nanostructures, Biomolecule–semiconductor NPs for biosensing, Different types of nanobiosensors; Nanobiosensors for medical diagnostics. Nanoprobes for analytical applications. **Nanotechnology and its application in food industry:** Nanotechnology and food packaging, natural biopolymers, advantages of nanomaterials in food packaging applications, nanosensors, outstanding issues, risks and regulations, public perception. Nanotechnology in Agriculture, Precision farming, Smart delivery system, Insecticides using nanotechnology, Potential of nanofertilizers.

Course outcome:
• Student gets to know the biological nanoparticles.
• Synthesis of nanoparticles using bacteria, fungi, plants and so on.
• Student learns about biosensors, nanotechnology and its applications.