

## **NANOBIOTECHNOLOGY: CONCEPTS AND APPLICATIONS (IBT-829) Credit Hrs 3 (3-0)**

### **Educational Objectives:**

To acquaint the students with key integrative technologies and use of nanoparticles in biological systems.

### **Course Outcomes:**

Students will be equipped with a basic understanding of the following:

- What is meant by "nanotechnology"
- Nanotechnology material platforms
- In vivo and in vitro biomedical applications
- How nano-assisted technologies compare to conventional medical devices
- How to fabricate nanostructures
- Know the new materials, techniques, phenomena, frontiers and trends in the field of nanotechnology
- Learn a well-founded, wide-ranging basis of knowledge for developing, implementing and evaluating nanobiotechnological applications.
- Assess the manifold interrelationships and effects of this new technology.

### **Course contents:**

- A brief introduction to Nanotechnology,
- Interface between Nanotechnology and Bionanotechnology,
- Manipulating molecules,
- Carbon Fullerene,
- Carbon Nanotubes,
- Non- Carbon Nanotubes and Fullerene like materials,
- Quantum Dots and other Nano-particles,
- Nano-wires, Nano rods and other Nanomaterials,
- Magnetic Nanoparticles.
- Natural Biological assembly at Nano-Scale,

- Nanometric biological assemblies (complexes),
- Nanobionics and Bio-Inspired Nanotechnology,
- Applications of biological assemblies in Nanotechnology,
- Medical,
- Cosmetics,
- Agriculture,
- water and other applications of Nanobionanotechnology,
- Future prospect of Nanobiotechnology.

### **Recommended Books:**

1. “Plenty of room for biology at the bottom: an introduction to Bionanotechnology” by Ehud Gazit (2007). Published by Imperial College Press.
2. “Bionanotechnology: proteins to nanodevices” by Vencatesan Renugopalakrishnan, Randolph V. Lewis (2006). Published by Springer.
3. “Nanoscale technology in biological systems” by Ralph S. Greco, F. B. Prinz, Robert Lane Smith (2004). Published by CRC Press.
4. “Nanobiotechnology II: More Concepts and Applications” by Chad A. Mirkin, Christof M. Niemeyer (2007). Published by John Wiley & Sons, 2007