# SRTM University, Nanded

**M.Sc. Biotechnology IV Semester**

**BT - XIV : Applied Biotechnology Marks: 100 Hours: 45**

**Unit-I: Food Biotechnology-I**

Biotechnology of microbial polysaccharides, flavors in food.

Food safety: HACCP System to food protection, Responsibility for food safety.

Food Additives: Definition, Types and Functional characteristics. Natural Colors: Types, Applications, Advantages of natural colors over Artificial Sweeteners. Sweeteners: Types and Applications. Causes of food spoilage, processing and packaging for food preservation.

**Unit-II: Food Biotechnology II**

Genetic engineering of bakers yeast. wine yeast. Diagnostics methods in food biotechnology, Genetic mechanisms involved in regulation of mycotoxin biosynthesis. Biosensors for food quality assessment. Biotransformation applicable to food industries.

SCP, Spirulina and Chlorella as food soruce. Functional foods: Concept of Prebiotics, Probiotics and Neutraceuticals

**Unit III: Nano-Biotechnology**

Introduction, The nanoscale dimension and paradigm. Types of nanomaterials and their classifications. D, 2D and 3D etc. Nanocrystal, Nanoparticle, Quantum dot, Quantum Wire and Quantum Well etc. Polymer, Carbon, Inorganic, Organic and Biomaterials –Structures and characteristics. Physical and Chemical Fundamentals of Nanomaterial

**Unit IV: Nano-Biotechnology Applications**

Proteins - Lipids - RNA and DNA Protein Targeting - Small molecule/Nanomaterial - Protein Interactions Nanomaterial-Cell interactions-Manifestations of Surface Modification (Polyvalency) MRI, Imaging Surface Modified Nanoparticles MEMS/NEMS based on Nanomaterials Peptide/DNA Coupled Nanoparticles. Lipid Nanoparticles for Drug Delivery Inorganic Nanoparticles for Drug Delivery Metal/Metal Oxide Nanoparticles (antibacterial/anti fungal/anti viral) Anisotropic and Magnetic Particles (Hyperthermia)

**Unit V Intellectual Property Rights**: IPR, Patents, Trademarks, Copyrights, Secrets. Patenting of biological materials. International cooperation, obligations with patent applications. Current issues, hybridoma technology etc. Patenting of higher plants, animals, transgenic organisms and isolated genes. Patenting of genes and DNA sequences. Right of plant breeders and farmers.

**Text & References**

1. Kalidas Shetty G.Paliyath, A Pometto R,E. Levin-Food Biotechnology-CRC Taylor & Francis
2. Adam M.R and Moss M.O -Food Microbiology, New Age International Pub. .
3. Frazier W.C and Westhoff D.C -Food Microbiology, 4th Edi., Tata McGraw Hill
4. Sivsankar B Food Processing and Preservation, Prentice Hall of India
5. Knorr D. (Ed) - Food Biotechnology*.* Marcel Dekker, Inc.,
6. Spencer J.F.T. and de Spencer A.L.R. -Food Microbiology Protocols*.* Humana Press.
7. Madhuri Sheron, Sunil Pande- Bio-Nano technology concept and applications Ane Books New Delhi
8. Mark Ratner, Daniel Ratner-Nanotechnology-Pearson
9. Ramsden-Nanotechnology- an Introduction-Elsevier
10. Ed. Vincent Rotello – Nanoparticles- Springer
11. Philip W. Grubb- Patents for Chemicals, Pharmaceuticals and Biotechnology- Oxford
12. H.K. Das- T.B. of Biotechnology-Wiley India

**Practical (Lab course work VII)**

* 1. Isolation and Characterization of food fermenting organism from idli, butter.
  2. Estimation of ascorbic acid from given food sample by titrimetric method.
  3. Analysis of mycotoxin (Aflatoxin) in fungus contaminated food material.
  4. Microscopic examination of Food/Milk by breed method.
  5. Estimation of lactose from milk.
  6. Quality characterization of pasteurized milk by MBRT method.
  7. Detection of microbial count in Milk by SPC method.
  8. Isolation and biochemical testing of probiotic cultures (Lactobacilli) from food samples (curd, intestine)
  9. Isolation and detection of nano particles from plant extract (silver nano particles)
  10. Spectrophotometric analysis (UV/IR) of nano particles
  11. Antimicrobial activity of nano particles
  12. Study of IPR , Patent applications process

# SRTM University, Nanded

**Lab Course Project Work-VIII (Dissertation/ Elective Lab Course Work)**

# **Guidelines for Dissertation work**

1. The dissertation will be allotted during III semester
2. Students will design experiment of dissertation under guidance of supervisor
3. Selection of topic relevant to priority to areas of biotechnology
4. Collection of literature from various sources
5. Planning of research experiments
6. Performing the experiments with scientific and statistical analysis
7. Writing and compilation of dissertation report
8. Presentation of experimental data in schedule of practical examination
9. Dissertation to be carried out individually by each student