SEMESTER II			
Core VII	**Applied Biotechnology**		
Course Code : 21PZOC23	**Hrs / Week : 5**	**Hrs / Sem : 75**	**Credits : 4**

Objective:

To motivate the students to develop scientific attitudes towards emerging technologies

To discover the potential sources of biotechnology and their applications in various fields

To serve as a platform for students to explore their professional skills

Course Outcome

CO. No.	**Upon completion of this course, students will be able to**	**PSO addressed**	**CL**
CO-1	perform biotechnological manipulation of microbes for production of industrially important products	1	Un
CO-2	get more insight on the application of biotechnology in treatment of diseases	3	Un
CO-3	apply biotechnology for production of pharmaceutical products .	7	Ap
CO-1	use biotechnology to monitor environmental pollution	3	Ap
CO-5	apply their knowledge to alleviate the effects of various environmental pollutants using biotechnology.	8	Ap
CO-6	create transgenic animals	3	Ap
CO-7	evaluate the ethical issues related with genetically modified organism	2	Ev
CO-8	imbibe the practical and theoretical knowledge of nanomaterials essential for pursuing higher studies.	6	Un

Unit I Microbial Biotechnology:

Isolation and improvement of microbial strains – microbial production of food – beverages - single cell proteins - methods of enzyme production - production of penicillin - bioethanol – biogas.

Unit II Biotechnology and Health Care

Gene therapy: Ex vivo - gene therapy for adenosine deaminase deficiency, in vivo gene therapy - cancer and AIDS. Pharmaceutical products: Insulin, human growth hormone. Recombinant vaccines: Hepatitis B - influenza virus. Monoclonal antibodies - production and applications.

Unit III Environmental Biotechnology

Biotechnological methods for management of pollution - atmospheric CO_2, metal pollution - biotechnological methods for measurement of pollution - Bioassays – animal test systems - molecular biology – biosensors for environmental monitoring – bioremediation.

Unit IV Genetic Engineering

Construction of animal viral vectors for animal transformations - methods of developing transgenic animals: mice - fish – genetically engineered microbes (GEMOs) - applications of genetic engineering - ethics of genetic modification of animals.

Unit V Nanotechnology

Nanomaterials, synthesis of nanoparticles: RF plasma, chemical methods, thermolysis, biological methods - biofabrication, nanobiosensor, nanofluids, nanocrystals - synthesis of nanodrugs - nanomedicine.

Books for Reference

1. Dubey R.C. *A Text Book of Biotechnology*, 4th edition. New Delhi: S. Chand& Company Ltd. 2006.
2. Singh B.D. *Biotechnology.* Revised edition. New Delhi: Kalyani Publishers. 2005.
3. Kumaresan V. *Biotechnology*. Nagerkoil: Saras Publication. 2009.
4. Rema L.P. *Applied Biotechnology*. Chennai: MJP Publishers, 2007.
5. Satyanarayana U. *Biotechnology.* Kolkatta: Books and Allied (P) Ltd. 2006.

6. Robert Preidt, Laura Costlow and Peter. *Introductory Nanotechnology*. New Delhi: Dominant Publishers and Distributors. 2007.
7. Suhas Bhattacharya. *Introduction to Nanotechnology*. New Delhi: Wisdom Press. 2013.

Practical

Course Code 21PZOCR4

Hrs/ Week : 2 **Credit: 1**

1. Isolation of plasmid DNA
2. Restriction digestion
3. Immobilization of enzymes by sodium alginate method
4. Bioadsorption or phytoremediation of an organic substrate.
5. PCR amplification.
6. SDS-PAGE
7. Mushroom culture
8. Charts and models pertaining to theory for spotters

   pBR322, monoclonal antibodies, transgenesis, organ culture, somatic cell fusion,

   Southern blotting, *Agaricus bisporus,* ultra sonication, laminar flow chamber.
9. Report of visit to biotechnology lab

Books for Reference:

1. Asish Verma, Surajit Das, Anchal Singh. *Laboratory Manual for Biotechnology*. New Delhi: S. Chand and Company. 2008.
2. Harisha S. *Biotechnology Procedures and Experiments Hand Book*. New Delhi: Infenity Science Press. 2007.
3. Joseph Sambrook and David S. Russel. *Molecular cloning - A laboratory manual.* New York, Cold Spring Harbor: Cold Spring Harbor Laboratory Press. 2001.