Subject Code: 02BT0505

Subject Name: Lab III

M. Sc. Semester - III

Objectives: To enable students with practical skills of advanced and applied subjects of biotechnology.

Credits Earned: 6 Credits

Course Outcomes: After completion of this course:

1. Students will be able plan and execute experiments of Industrial and environmental importance.
2. Students will be able to synthesize and use nano-particles for experiments.
3. Students will become trained in experiment optimization.
4. Students will be able to relate the lab scale studies with industrial setup.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE(I)	Viva (V)	Practicals/ TW	
0	0	12	6	0	0	0	100	100	200

Contents:

Module	List of Experiments	Contact Hours
1	**Bioprocess Technology (Core)** 1. Primary screening of microorganisms for Enzyme/ Antibiotic/ Organic acid production. 2. To perform Bioassay of Antibiotics. 3. Strain improvement programme by mutation using physical and/or chemical method. 4. Laboratory scale fermentation for Alcohol production. 5. Laboratory scale fermentation for Enzyme production. 6. Laboratory scale fermentation for Organic acid production. 7. Effect of physicochemical parameters on fermentation process and product yield. **8.** Purification of fermentation product using chromatography. 9. Immobilization of enzyme. 10. Sterility test of pharmaceutical products. 11. Solid substrate fermentation.	70
2	**Genetics and Genetic Engineering (Core)** 1. To perform Bacterial Transformation of *E. coli* by chemical competence method. 2. To perform restriction endonuclease digestion of given plasmid. 3. To design primers using various Online/Offline tools for PCR application. 4. To perform PCR for given DNA template. 5. To perform DNA cloning using positive selection/ blue-white screening method. 6. To perform over expression of given gene using *E. coli* protein expression strain. 7. To design strategies for deletion, insertion and point mutation using mutagenic PCR 8. To perform mapping of Plasmid DNA using theoretical approach. 9. To harness the use of online/offline tools to analyse design strategies for genetic engineering.	65
3	**Nano-Biotechnology (Elective)** 1. Synthesis of metallic Nanoparticles – Gold seeds, Gold Nanorods, Silver, dimetallic- trimetallic NPs, quantum dots 2. Green Synthesis of Nanoparticles 3. Spectroscopic studies of nanoparticles 4. Interaction of nanoparticles with microbes. 5. Detection of biomolecules via nanosensors.	45

4	**Food and Dairy Technology (Elective)** 1. Isolation of probiotic culture from various sources. Evaluation and efficacy of probiotic culture 2. Isolation and identification of lactic acid bacteria and production of lactic acid 3. Production of fermented food and characterization of acidity, alkalinity and its microbial profile 4. Estimation of ascorbic acid in beverage/juices. 5. Determination of water activity of different food materials. 6. Determination of adulterant ($NaHCO_3$) in wheat flour/ Maida. 7. Determination of Gluten content in wheat flour samples. 8. Determination of microbiological quality (TPC/SPC) of any food sample: pasteurized and sterilized/ flavored milk/cheese/butter/veg/fruit/bread/meat samples. 9. Tests for Milk and Dairy products a. Phosphatase test b. MBRT test c. Test for mastitis d. Milk fat estimation e. Standard Plate Count (for milk / milk product e.g. milk powder) f. Direct Microscopic count g. Somatic cell count 10. Pyrogen Testing 11. Determination of moisture content in food sample.	45
	Environmental Technology (Elective) 1. Wastewater analysis of TDS, TSS and TS. 2. Determination of BOD in wastewater. 3. Analysis of COD in wastewater. 4. Vermicomposting: Collection, Preparation and Analysis of composted material for Nitrogen, Phosphate and Potassium (NPK). 5. Effect of pesticides/heavy metals on soil microorganisms. 6. Microbial degradation of textile dyes/pesticides/hydrocarbons and oils. 7. Determination coliform bacterial count. 8. Constructed wetlands – Modelling (Tutorial).	
	Total Hours	**180**