PERIYAR UNIVERSITY
SALEM – 636 011

PERIYAR INSTITUTE OF DISTANCE EDUCATION [PRIDE]
NON- SEMESTER PATTERN [ PRIDE]
M.Sc., BIOTECHNOLOGY
REGULATIONS AND SYLLABUS

[Candidates admitted from 2007-2008 onwards]
M.Sc., BIOTECHNOLOGY
REGULATIONS

1. CONDITION FOR ADMISSION

A candidate who has passed a Bachelor degree in Science with Biotechnology / Botany / Zoology / Biology / Microbiology / Microbial Gene technology / Bioinstrumentation / Bioinformatics / Biochemistry / Chemistry / Agriculture / Marine Biology / Home Science / Farm Science / Nutrition and Dietetics / Integrated Biology / Plant Science / Animal Science / Fisheries Science / Aquaculture / Mathematics with Physics, Chemistry as Ancillary / Medical Lab Technology / MBBS / BDS / B. Pharm / BSMS of this University or any of the above degree of any other University accepted by syndicates as equivalent thereto, subject to such conditions as may prescribed therefore shall be permitted to appear and qualify for the M. Sc., Biotechnology Degree Examination of this University after a course of study of two academic years.

2. DURATION OF THE COURSE

The course for the degree of Master of Biotechnology shall consist of two academic years.

3. COURSE OF STUDY

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>PAPER</th>
<th>TITLE OF THE PAPER</th>
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<tbody>
<tr>
<td>1</td>
<td>Paper I</td>
<td>Cell Biology</td>
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<td>2</td>
<td>Paper II</td>
<td>Biomolecules</td>
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<tr>
<td>3</td>
<td>Paper III</td>
<td>Microbial Physiology and Genetics</td>
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<td>4</td>
<td>Paper IV</td>
<td>Molecular Biology</td>
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<td>5</td>
<td>Paper V</td>
<td>Plant Biotechnology</td>
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<td>6</td>
<td>Paper VI</td>
<td>Animal Biotechnology</td>
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<td>7</td>
<td>Paper VII</td>
<td>Research Methodology in Biotechnology</td>
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<tr>
<td>8</td>
<td>Practical 1</td>
<td>Lab in Cell Biology, Biomolecules, Microbial Physiology &amp; Genetics and Molecular Biology</td>
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<tr>
<td>9</td>
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<tr>
<td>10</td>
<td>Paper VIII</td>
<td>Genetic Engineering</td>
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<td>12</td>
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<td>13</td>
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<td>Bioprocess Engineering and Technology</td>
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<td>14</td>
<td>Paper XII</td>
<td>Environmental Biotechnology</td>
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<td>15</td>
<td>Paper XIII</td>
<td>Food and Pharmaceutical Biotechnology</td>
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<td>16</td>
<td>Paper XIV</td>
<td>Bioinformatics, IPR and Bioethics</td>
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<td>17</td>
<td>Practical 3</td>
<td>Lab in Genetic Engineering and Immunology &amp; Immunotechnology,</td>
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<td>19</td>
<td>Project</td>
<td>Dissertation / Project Work &amp; Viva – Voce [Project report (150) + Viva - Voce (50)]</td>
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4. EXAMINATIONS

The theory examination shall be three hours duration to each paper at the end of year. The candidate failing in any subject(s) will be permitted to appear for each failed subject(s) in the subsequent examinations.

The practical examinations for PG course should be conducted at the end of the year. At the end of the II year Viva-Voce will be conducted and on basics of the Dissertation /Project work submitted by the student. One internal and one external examiner will conduct the Viva voce jointly.
## 5. SCHEME OF EXAMINATIONS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>PAPER</th>
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<td>Project</td>
<td>Dissertation / Project Work &amp; Viva – Voce [Project report (150) + Viva - Voce (50)]</td>
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</table>

**Grand Total Marks** 2000
6. PATTERN OF QUESTION PAPER

**Model Question Paper Pattern: THEORY**

Time: 3 Hours.  
Max. Marks: 100

**SECTION – A**

Answer all the questions:  
5 X 5 = 25 Marks  
(2 questions from each unit with internal choice)

**SECTION – B**

Answer all the questions:  
5 X 15 = 75 Marks  
(2 questions from each unit with internal choice)

**Model Question Paper Pattern: PRACTICAL**

Time: 6 Hours.  
Max. Marks: 100

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<tr>
<td>Viva Voce</td>
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Total 100 Marks

7. NORMS FOR EXAMINERS

Internal examiner - for evaluation of the theory paper faculty only from the offering M. Sc., Biotechnology course, Periyar University for internal examiner ship should be consider; preferably faculty with minimum of 3 years teaching experience. Examiner panel submitted by the Board of studies to be followed
8. DISSERTATION:

No. of copies / distribution of dissertation:

The students should prepare three copies of dissertation and submit the same for the evaluation by Examiners. After evaluation one copy is to be retained in the college library and one copy is to be submitted to the University (Register) and the student can hold one copy.

Format to be followed:

The formats / certificate for dissertation to be submitted by the students are given below.

Format for the preparation of project work:

(a) Title page
(b) Bona fide certificate
(c) Acknowledgement
(d) Table of contents

<table>
<thead>
<tr>
<th>Chapter No:</th>
<th>TITLE</th>
<th>Page no.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
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<tr>
<td>2</td>
<td>Review of Literature</td>
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<td>3</td>
<td>Materials and Methods</td>
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<td>4</td>
<td>Results</td>
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<td>5</td>
<td>Discussion</td>
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<tr>
<td>6</td>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>References / Bibliography</td>
<td></td>
</tr>
</tbody>
</table>
Format of the Title Page:

TITLE OF THE DISSERTATION

Dissertation submitted in part fulfillment of the requirement for the Degree of Master of Science in Biotechnology to Periyar Institute of Distance Education (PRIDE), Periyar University, Salem-636011.

By

Student Name
Register Number
Endroll Number

Under the guidance of

_________________________ with official Address

Name of the Study Centre with Code

Periyar Institute of Distance Education (PRIDE), Periyar University, Salem-636011

Year
Format of the Certificate:

CERTIFICATE

This is to certify that the dissertation entitled ........................................ ........................ submitted in part fulfillment of the requirement of the degree of MASTER OF SCIENCE IN BIOTECHNOLOGY to Periyar Institute of Distance Education (PRIDE), Periyar University, Salem is a record of bonafide research work carried out by................................. under my supervision and guidance and that no part of the dissertation has been submitted for the award of any degree, diploma, fellowship or other similar titles or prizes and that the work has not been published in part of full in any scientific or popular journals or magazines.

Signature of the Candidate ................................. Signature of the Guide

Study Centre - Coordinator ................................. Director

Examiner 1 : ................................. Examiner 2 :
9. PASSING MINIMUM

The candidate shall be declared to have passed the examination if the candidate secures not less than 50 marks in the University examination in each theory paper.

For the Practical paper, a minimum of 50 marks out of 100 marks in the University examination and the record notebook taken together. There is no passing minimum for record notebook. However submission of a record notebook is a must.

For the project work and viva-voce the candidate should secure 50% of the marks for pass. The candidate should compulsorily attend viva-voce examination to secure pass in that paper.

Candidate who does not obtain the required minimum marks for a pass in a paper/project report shall be required to appear and pass the same at a subsequent appearance.

10. CLASSIFICATION OF SUCCESSFUL CANDIDATES

Candidates who secure not less than 60% of the aggregate marks in the whole examination shall be declared to have passed the examination in First Class.

All other successful candidates shall be declared to have passed in the Second Class.

Candidates who obtain 75% of the marks in the aggregate shall be deemed to have passed the examination in First Class with Distinction provided they pass all the examination in First Class with Distinction provided they pass all the examinations prescribed for the course at the first appearance.

Candidates who pass all the examinations prescribed for the course in the first instance and within a period of two academic years from the year of admission to the course only are eligible for University Ranking.
11. MAXIMUM DURATION FOR THE COMPLETION OF THE PG PROGRAMME

The maximum duration for completion of the PG Programme shall not exceed 4 years.

12. COMMENCEMENT OF THE REGULATION

These regulations shall take effect from the academic year 2007-08, i.e., for students who are to be admitted to the first year of the course during the academic year 2007-08 and thereafter.

13. TRANSITORY PROVISION

Candidates who were admitted to the PG course of study before 2007-2008 shall be permitted to appear for the examinations under those regulations for a period of three years i.e., up to and inclusive of the examination of April/May 2010. Thereafter, they will be permitted to appear for the examination only under the regulations.
1st – YEAR

PAPER - I: CELL BIOLOGY

UNIT - I

Cell Diversity: Cell size shape, cell theory, structure and function of cell organelles in prokaryotic & eukaryotic cells. The cell cycle and programmed cell death: Cell cycle, molecular events in plants and animals. The mechanics of cell division. Cell motility.

UNIT - II

The cytoskeleton: The self assembly and dynamic structure of cytoskeletal filaments, How cells regulate their cytoskeletal filaments; molecular moters, the cytoskeleton and cell behavior. Microtubule motors and movements. Cell-cell interactions: Cell Adhesion proteins, tight and gap junctions, plant cell adhesion and plasmodesmata.

UNIT - III


UNIT - IV


UNIT - V

Cellular basis of differentiation and development-mitosis, gametogenesis and fertilization Development in Drosophila and Arabiopsis; PM5 spatial and temporary regulation of gene expression.
SUGGESTED READINGS

7. The cell – Cooper et al.,
8. The World of Cell –
PAPER - II : BIOMOLECULES

UNIT -I
Amino acids and peptides- classification, chemical reactions and physical properties. Proteins-classification, heirarchy in structure, Ramachandran map. Protein sequencing, Glyco and lipoproteins-structure and function.

UNIT -II
Sugars-Classification and reactions, Polysaccharides-types, structural features, methods for compositional analysis.

UNIT –III
Lipids-Classification, structure and functions, glycerol phospholopids, sphignolopids, cholesterol and its biosynthesis. Polynucleotides: biosynthesis of purines and pyrimidines, de novo and salvage pathway.

UNIT –IV

UNIT – V
Hormones : - Definition, classification of hormones, Biological functions and disorders of pancreatic hormone (Insulin), thyroid hormone (thyroxin), pituitary hormone (GH, ADH) and Adrenal medullary hormones (adrenaline, Nor adrenaline).

SUGGESTED READINGS
5. Laboratory Techniques in Biochemistry and Molecular Biology,Work and work.
6. Tools of Biochemistry by T.G. cooper.
PAPER –III : MICROBIAL PHYSIOLOGY AND GENETICS

UNIT –I

History and Development of Microbiology. Microbial evolution, systematic and taxonomy-Evolution of earth and earliest life forms; primitive organisms and their metabolic strategies and molecular coding.

UNIT –II

Methods in Microbiology: Pure culture technique; Microbial Growth-The definition of growth, growth cure, Synchronous growth, Continuous, Batch and Fed Batch Culture; Growth as affected by environmental factors like temperature, acidity, alkalinity, water availability and oxygen; Culture collection maintenance and preservation.

UNIT – III

Physiology and Metabolic Diversity among Microorganisms- Nutritional classification of microorganisms- chemoautotrophs, chemoheterotrophs and photosynthetic microorganisms. Photosynthesis in microorganisms; Role of Chlorophylls, Carotenoids and phycobilins; Light and Dark Reaction; Role of anoxic decomposition; Nitrogen metabolism; Nitrogen fixation; Hydrocarbon transformation.

UNIT – IV

Host Parasite Relationships-Normal microflora of skin, oral cavity, gastrointestinal tract; entry of pathogens into the host; colonization and factors predisposing to infections; types of toxins(Exotoxin, Endotoxin and Enteotoxin)and their structure; mode of actions; virulence and pathogenesis. Antibiotics from prokaryotes; Antifungal antibiotics; Mode of action; Resistance to antibiotics.

UNIT – V

Gene Mutation and Mutagenesis-Mutagens-Radiation and chemical; Types of mutation and their repair mechanism; Ames test for mutagenesis; Methods of genetic analysis. Bacterial Genetic System-Recombination-Transformation, Conjugation, Transduction, Plasmids and Transposons.
SUGGESTED READINGS

7. Microbiology: Fundamentals and Applications, S.S. Purohit, Published by Agrobios India.
PAPER – IV : MOLECULAR BIOLOGY

UNIT –I
Introduction to Molecular Biology and Genetic. DNA Replication. Prokaryotic and eukaryotic DNA replication, Mechanics of DNA replication, Enzymes and accessory proteins involved in DNA replication. DNA Repair and Recombination.

UNIT -II
Transcription-Prokaryotic transcription, Eukaryotic transcription, RNA polymerase, General and specific transcription factors, Regulatory elements and mechanisms of transcription regulation, Transcriptional and post-transcriptional gene silencing.

UNIT –III
Translation-Prokaryotic and eukaryotic translation, the translation machinery, Mechanisms of initiation, elongation and termination, Regulation of translation, co-and post-translational modifications of proteins. Protein Localization.

UNIT – IV
Onco-genes and Tumor Suppressor Genes-Viral and cellular onco-genes, tumor suppressor genes from humans, Structure, function and mechanism of action of pRB and p53 tumor suppressor proteins.

UNIT –V
Molecular Mapping of Genome-Genetic and physical maps, physical mapping and map-based cloning, choice of mapping population, simple sequence repeat loci, Southern and fluorescence in situ hybridization in genome analysis: RELP, RAPD and AFLP analysis, Molecular marker linked to diseased resistance genes, Application of RFLP in forensic, diseases prognosis, genetic counselling, and Pedigree, varietal etc.

SUGGESTED READINGS

6. Genomes,T.S.Brown
PAPER - V : PLANT BIOTECHNOLOGY

UNIT – I
Introductory history – laboratory organization, sterilization techniques, nutrition of plant cells, types of media, solid and liquid tissue and organ culture. Initiation and maintenance of callus and suspension culture; single cell clones. Organogenesis; somatic embryogenesis; Shoot-tip culture: rapid clonal propagation and production of virus-free plants.

UNIT - II
Anther, pollen and ovary culture for production of haploid plants and homozygous lines. Cryopreservation, synthetic seed. Plant Transformation Technology: basis of tumor formation, hairy root, features of Ti and Ri plasmid, mechanisms of DNA transfer, role of virulence genes and promoters. Genetic markers, use of reporter genes, reporter gene with introns.

UNIT – III
Application of Transgenic plants and plant Transformation for productivity and performance herbicide resistance, Bt genes, Non-Bt like protease inhibitors, alpha amylase inhibitor, virus resistance, coat protein mediated, abiotic stress, post-harvest losses, long shelf life of fruits and flowers, male sterile lines.

UNIT – IV

UNIT – V

SUGGESTED READINGS
PAPER – VI : ANIMAL BIOTECHNOLOGY

UNIT – I

Structure and organization of animal cell, cell physiology. Equipments and materials for animal cell culture technology. Primary and established cell line cultures.

UNIT -II

Introduction to the balance salt solutions and simple growth medium. Brief discussion on the chemical, physical and metabolic functions of different constituents of culture medium. Role of carbon dioxide. Role of serum and supplements.

UNIT –III

Serum & protein free defined media and their application. measurement of viability and cytotoxicity. Biology and characterization of cultured cells, measuring parameters of growth.

UNIT –IV

Basic techniques of mammalian cell culture in vitro; disaggregation of tissue and primary culture; maintenance of cell culture; cell separation. Scaling-up of animal cell culture. Cell cloning. Application of animal cell culture.

UNIT – V


SUGGESTED READINGS

UNIT – I
Spectroscopy : Laws of absorption General principles, instrumentation and applications of UV-visible spectrophotometry, fluorimetry, flame photometry and atomic absorption spectrophotometry. Brief account of NMR, ESR and mass spectrometry in biology.

UNIT – II
Chromatography : Basic principles. Paper and thin layer chromatography. Gas liquid chromatography, ion-exchange chromatography. Molecular sieve and affinity chromatography. HPLC.

UNIT - III

UNIT – IV

UNIT – V

SUGGESTED READINGS
2. Physical Biochemistry: Application to biochemistry and Molecular Biology. Friefelder
PRACTICAL –I : LAB IN CELL BIOLOGY, BIOMOLECULES, MICROBIAL PHYSIOLOGY & GENETICS AND MOLECULAR BIOLOGY

CELL BIOLOGY

1. Principles of Microscopy and Optics.
2. Microtomy
3. Cell Size Determination
4. Staining (simple and Gram)
5. Mitosis and Meiosis

BIOMOLECULES

1. Reactions of amino acids, sugars and lipids.
2. Isolation, purity determination and quantization of cholesterol, DNA and RNA
3. Quantitation of Proteins and Sugars.

MICROBIAL PHYSIOLOGY

1. Preparation of liquid and solid media for growth of microorganisms.
2. Isolation and maintenance of organisms by plating, streaking and serial dilution methods, slants and stab cultures.
3. Isolation of pure cultures from soil and water.
4. Growth; Growth curve, Measurement of bacterial population by turbidometry and serial dilution methods
5. Microscopic examination of bacteria, yeast and molds and study of organisms by Gram stain, Acid fast stain and staining for spores.

MOLECULAR BIOLOGY

1. Isolation of genomic DNA.
2. Isolation of plasmid RNA.
3. Isolation of antibiotic resistance mutants
4. RFLP

PRACTICAL II : LAB IN PLANT AND ANIMAL BIOTECHNOLOGY

PLANT BIOTECHNOLOGY

1. Preparation of media.
2. Surface sterilization
3. Organ culture.
4. Callus propagation, transfer of plants to soil.
5. Protoplast isolation and culture.
6. Anther culture
7. Green house - Demonstration
ANIMAL BIOTECHNOLOGY

1. Preparation of tissue culture medium
2. Preparation of single cell suspension from spleen and thymus.
3. Cell counting and cell viability.
4. Cryopreservation and thawing.
6. Role of serum in cell culture.
7. preparation chick embryo fibroplast culture (monolayer)

2nd YEAR

PAPER –VIII : GENETIC ENGINEERING

UNIT –I

UNIT – II

UNIT – III

UNIT – IV
Expression Strategies for Heterologous Genes-Vector engineering and codon optimization, host engineering, in vitro transcription and translation, expression in bacteria, expression in yeast, expression in insects and insect cells, expression in mammalian cells, expression in plants. Processing of Recombinant proteins-Purification and refolding, characterization of recombinant proteins, stabilization of proteins.
UNIT – V

T-DNA and Transposon Tagging - Role of gene tagging in gene analysis, T-DNA and Transposon tagging. Identification and isolation of genes through T-DNA or transposon. Transgenic and Gene Knockout Technologies.

SUGGESTED READINGS

10. Molecular Biotechnology - Glick.
UNIT – I

History and scope of Immunology – Types of Immunity. Anatomy of lymphoid organs; primary and secondary lymphoid organs. Immunoglobulin structure, function and synthesis; memory cells,

UNIT – II

Major histocompatibility complex-cells of the immune system, haematopoiesis and differentiation, lymphocyte trafficking, B-lymphocytes, T-lymphocytes, macrophages, dendritic cells, langerhan cells, natural killer cells and lymphokine activated killer cells, eosinophils and neutrophils.

UNIT – III

Regulation of immune response-antigen processing and presentation, generation of humoral and cell mediated immune responses; activation of B and T-lymphocytes, cytokines, and their role in immune regulation. T-cell regulation, MHC restriction.

UNIT – IV

Cell mediated cytotoxicity: Mechanism of T-cell - Antibody dependent cell mediated cytotoxicity, macrophage mediated cytotoxicity, Hypersensitivity, Autoimmunity, transplantation, Tumor immunology, AIDS and other Immunodeficiencies.

UNIT – V

Antigen – Isolation, purification and characterization of various antigen and haptens from pathogens. Production of antibodies, purification of antibodies. Antigen – antibody reaction, Hybridoma and monoclonal antibody production; Immuno-diagnosis and applications of monoclonal antibodies in biomedical research; human monoclonal antibodies.

SUGGESTED READINGS

2. Fundamentals of Immunology, William Paul.
3. Immunology, By Roitt and others.
5. Immunology by Abbas.
6. Microbiology by Pelczar, Chan and Krieg, TMH.
UNIT – I

Enzyme classification and nomenclature of enzymes according to IUB. Intracellular localization of enzymes, homogenization techniques, isolation and fractionation of enzymes by precipitation, gel filtration, chromatography and ultra centrifugation technique.

UNIT – II


UNIT – III


UNIT – IV

Enzyme inhibitors - kinetics of competitive, non-competitive and uncompetitive inhibitors. AllostERIC interaction mechanism of enzyme catalysis, includes acid base catalysis, Covalent, metal ion, electrostatic proximity and orientation effect. Immobilisation of enzyme – Methods.

UNIT – V


SUGGESTED READINGS

1. Biological chemistry by H.R. Mahier and E. Cordes (1986)
2. Enzymes by Dizon and Webb.
UNIT – I

Introduction to bioprocess engineering; Isolation and screening of industrially important microbes. Primary & Secondary detection & assay of fermentation products. Improvement of the strains for increased yield and other desirable characteristics. Advantages of bioprocess over chemical process.

UNIT – II


UNIT – III


UNIT – IV


UNIT – V

Bioprocess control and monitoring of variable such as temperature, agitation, pressure, pH. On line measurement. On / Off control. Elementary idea of Canning & Packing, Sterilization & Pasteurization and preservation of food products.

SUGGESTED READINGS

5. Industrial Biotechnology by Casida.
UNIT - I

Environmental Pollution: Types of pollution, Methods for measurement of pollution; Methodology of environmental management – The problem solving approach and its limitations. Air pollution and its control through biotechnology.

UNIT - II


UNIT – III


UNIT – IV

Microbiology of degradation of Xenobiotics in environment: Ecological considerations, decay behaviour & degradative plasmids; Hydrocarbons, substituted hydrocarbons, oil pollution, surfactants, pesticides. Bioremediation of contaminated soils and wasteland.

UNIT – V

Solid wastes: Sources and management (Composting, vermiculture and methane production). Global environmental problems: Ozone depletion, UV-B, Green house effect and acid rain, their impact and biotechnological approaches for management.

SUGGESTED READINGS

PAPER – XIII : FOOD AND PHARMACEUTICAL BIOTECHNOLOGY

UNIT – I

Dairy Products: Cheese – principles of cheese making, general methods, cheddar cheese, swise cheese, surface ripened cheese, cheese spoilage and public health – Stphylococcal, salmonellosis, E.coli, Butalism, Aflatoxin and amine production

UNIT – II

Fermented Foods: Soy sauce, Miso, tempeh, ontiom, hamantto, sufu, Natto, idli, Ang-kak fermented fish products. Saucer krant, pickles, fermentation of olives, fermented sausages. Production of bread, organic acids, acetic acid, lactic acid and citric acid, amino acids glutamic acid.

UNIT –III
Production of food flavourants and pigments. Production of distilled beverage, alcohol, wine, brandy and beer. Single cell protein and Baker’s yeast. Food industry enzymes.

UNIT – IV

UNIT – V

SUGGESTED READINGS

UNIT – I  
**Bioinformatics**: Use of databases in biology sequence databases, structural databases, Sequence Analysis – protein and nucleic acids, Structural comparisons, genome projects.

UNIT – II

Information theory and biology: Entropy, Shannon’s formula, divergences from equiprobability and independence, Markov chains, ergodic processes, redundancy, application to DNA and protein sequences.

UNIT – III

Microarray data analysis: Microarray data analysis methods, tools and resources and sequence sampling and SAGE (serial analysis of gene expression). Proteomic data analysis – Analyzing data from 2D-PAGE gels and analyzing protein mass spectrometry data. Bioinformatics in pharmaceutical industry: Drug discovery and pharmainformatics resources

UNIT - IV


UNIT - V


SUGGESTED READINGS

4. Recombinant DNA safety guidelines, Department of Biotechnology, Ministry of Science & Technology, Government of India
PRACTICAL III : LAB IN GENETIC ENGINEERING AND IMMUNOLOGY AND IMMUNOTECHNOLOGY

GENETIC ENGINEERING

1. Bacterial culture and antibiotic selection media. Preparation of competent cells.
2. Isolation of Lambda phage DNA.
3. Quantitation of nucleic acids.
4. Restriction Digestion
5. Ligation
6. Transformation using bacterial culture

IMMUNOLOGY AND IMMUNOTECHNOLOGY

1. Blood grouping
2. Blood Cell Analysis
3. Lympocyte subset identification and enumeration
4. Preparation of Antigen- Protocol of Immunization
5. Immunodiffusion and Radial Immuno-diffusion tests
6. Antigen-Antibody reaction – Precipitation & Agglutination reaction tests

PRACTICAL IV : LAB IN ENZYMOLGY AND ENZYME TECHNOLOGY AND BIOPROCESS ENGINEERING AND TECHNOLOGY

ENZYMOLGY AND ENZYME TECHNOLOGY

1. Isolation of Extra cellular Enzymes.
2. Isolation of Intra Cellular Enzymes.
3. Assay of Enzyme (Protease) activity
4. Enzyme Immobilization.

BIOPROCESS ENGINEERING AND TECHNOLOGY

1. Isolation of industrially important microorganisms for microbial processes.
2. Determination of thermal death point (TDP) and thermal death time (TDT) of microorganism for design of a sterilizer.
3. Comparative studies of Ethanol production using different substrates.
5. Microbial production of antibiotics (Penicillin).
7. Use of alginate for cell immobilization.