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**Note:** For attendance of a student in every theory and practical class, the teachers are supposed to keep records ultimately in the following format which will be included in the semester mark-sheets.

<table>
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<tr>
<th>Attendance</th>
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<tr>
<td>&gt; 70 &amp; &lt; 85</td>
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<td>&gt; 60 &amp; &lt; 70</td>
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<td>&lt; 60</td>
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Chairman (BOS) | Member (BOS) | Member (BOS)
DEPARTMENT OF BIOTECHNOLOGY SYLLABUS

<table>
<thead>
<tr>
<th>Name of the Subject</th>
<th>Genomics</th>
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<tr>
<td>Semester</td>
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<td>Lecture Periods/Week</td>
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<tr>
<td></td>
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<td>Credits L+P</td>
<td>4</td>
</tr>
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</table>

Unit 1: Introduction
Features of prokaryotic, eukaryotic & organellar genomes, Genome sizes- C value paradox, Gene counting, Structural, Functional genomics. DNA sequencing: Principles of DNA sequencing, Automated DNA sequencing, Shotgun sequencing- contig assembly.

Unit 2: Analysis of sequence data
Analysis & Annotation- ORF, Exon- Intron boundaries, Other features of nucleic acid sequencing, Protein motifs & domains, Databanks, Sequence comparisons. Nature of genetic variation- SNP, Methods to study variation- RFLP, PCR, based methods, Genome- wide comparitions.

Unit 3: Comparative Genomics
Human Genome Project, Phylogenetic Trees, Arabidopsis genome and other genome projects, Synteny, Genome evolution.

Unit 4: Analysis of Gene Expression
Functional Genomics- Analysis transcription- Northern blot, RNase protection assay, RT-PCR, Primer extension analysis, SI- nuclease protection assay, Comparing transcriptomes-subtractive hybridization, different display, SAGE, Reporter genes.

Unit 5: Application
Gene in health and disease, Genomic disorders and molecular medicines, pharmacogenomics, Gene banks, Legal status of gene bank.

Text/ Reference Books
5. Various research and review journals like nature Biotechnology, Current option, Trends and Annual Reviews.
DEPARTMENT OF BIOTECHNOLOGY SYLLABUS

<table>
<thead>
<tr>
<th>Name of the Subject</th>
<th>Microbial Technology</th>
<th>Subject Code</th>
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<td>Practical Periods/Week</td>
<td>03</td>
<td>Credits L+P</td>
<td>4+2</td>
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</table>

Unit 1: Introduction
Introduction to Microbial Technology; Basic idea on fermentation process; Submerged, Stationary, Solid and Semisolid with their merits and demerits. Media for industrial fermentation.

Unit 2: Basic Requirements

Unit 3: Microbial Production

Unit 4: Microbial Product Modification processes
Isolation of Industrially important micro-organisms. Preservation of industrial important microorganism. Improvement of microorganism. The Improvement of industrial strains by modifying properties other than the yield of product.

Unit 5: Industrial and Medicinal Applications
Application of enzymes in industrially analytical purpose and medical therapy. Biodegradation of cellulose and lignin. Production of Biodiesel and Rapeseed methyl esters. Microbial metabolic products; Primary metabolites and Secondary metabolites.

Text Books:


Reference Books:

1. Biotechnology by Dr. U. Satyanarayana
National Institute of Technology, Raipur (C.G.)

2. Industrial Microbiology by A. H. Patel.
Unit 1: Introduction
Solids, Characteristics of solid particles, types of standard screen series. Screening and other separation methods: screen analysis, estimation of particle size, surface area and particle population based on screen analysis, Storage and conveying of solids, ideal and actual screens, principles of elutriation, flotation, jigging, cyclone separator, hydroclones, electrostatics and magnetic separation processes.

Unit 2: Size Reduction
Size reduction and enlargements, crushers, grinders, ultrafine grinders, energy and power requirements in comminution, Crushing laws and work index, Open-circuit and closed circuit operation.

Unit 3:- Mixing and Agitation
Axial and radial flow impellers, prevention of vortex and swirling, Liquid-Liquid, Liquid-Solid, Solid-solid mixing operations and equipments, power consumption in agitated vessels mixing index.

Unit 4: Separation Techniques

Unit 5: Conveyors
Conveyors, Belt conveyor, bucket elevator, flight conveyor, apron conveyor, screw conveyor, pneumatic conveying.

Name of text books:
1. Unit operations of Chemical engineering by W.L. McCabe
2. Unit operations I by Hiramath Kulkarni
3. Unit operations I by K. A. Gavhane
DEPARTMENT OF BIOTECHNOLOGY SYLLABUS

<table>
<thead>
<tr>
<th>Name of the Subject</th>
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<td>Lecture Periods/Week</td>
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<td>Practical Periods/Week</td>
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</table>

**Unit 1- Food Industry:** Introduction to food industry, food storage, food processing, consumer food processing, dairy products, fruits and vegetable products, poultry and meat product

**Unit 2- Biotechnology:** Genetic engineering, Introduction to biotechnology, Pharmaceutical industries, Agriculture application, petroleum products and role of biotechnology in field of pollution control

**Unit 3- Pharmaceutical Industry & Polymer Industry:** Growth of industry, Economy of industry, methods of production of penicillin Polymerization: Chemistry of polymerization Engineering properties of polymers. Technology: Plastic, rubber, polymer oils, fibers

**Unit 4- Paper & Pulp Industry:** Paper and Pulp industry, Agents, principles, equipments, technology

**Unit 5- Oil & Wax Industry, Soap & Detergent Industry:** Technology of oil, fats and waxes, soap and detergents industries

**Name of Text Books:**
1. Groggings, Unit Processes in Organic Synthesis

**Name of Reference Books:**
1. Dryden, Outlines of Chemical Technology.
DEPARTMENT OF BIOTECHNOLOGY SYLLABUS

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<th>Name of the Subject</th>
<th>Cancer Biology</th>
<th>Subject Code</th>
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<tr>
<td>Credits</td>
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Unit 1: Introduction

Introduction to Cancer Biology, phenotypic characteristic of cancer cell. Cell cycle and proliferation- cyclins, cdk’s and detection of tumour cell growth. Cell cycle checkpoints.

Unit 2: Oncogenesis


Unit 3: Apoptosis

Apoptosis and cancer– overview of cell death process, apoptosis signaling pathways, abnormalities and detection. Types of cancer.

Unit 4: Metastasis

Tumour progression and metastasis– steps of metastasis, associated genes and organ specificity.

Unit 5: Diagnosis and Therapy


Name of Text Books:


Name of Reference Books:

DEPARTMENT OF BIOTECHNOLOGY SYLLABUS

<table>
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<th>Molecular Pathogenesis</th>
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**Unit 1 - General clinical laboratory techniques and procedures:** Volumetric analysis, balancing and weighing, concept of solute and solvent, units of measurement. Specimen collection and processing from blood, urine, spinal fluid, saliva and synovial fluid. Sample preservation and transportation.

**Unit 2 - Clinical Enzymology:** Principle of diagnostic enzymology, liver, cardiac and skeleton enzymes, digestive enzymes, etc.

**Unit 3 - General Function Test:** Liver function test, cardiac function test, renal function test, thyroid function test. Reproductive endocrine function test.

**Unit 4 - Immunodiagnostic:** Immuno assay classification and commercial technologies. DNA based diagnostic – PCR, RFLP, ASSCP, Micro array, and FISH. Cell based diagnostic- Antibody markers, CD markers and bioassays.

**Unit 5 - Biosensors:** Concept and applications, non invasive biosensors in clinical analysis. Introduction to biochips and their applications in modern science.

**Name of Text Books:**

2. Essentials of Diagnostic Microbiology . Lisa Anne shimeld.

**Name of Reference Books:**

1. Diagnostic Microbiology Balley & Scott’s.
2. The Science of laboratory Diagnosis, Crocker Burnelt
List of Experiments:

1. Microbial strain improvement and preservation techniques.
2. Amino acid production and purification.
3. Alcohol production.
4. Citric acid production.
5. Antibiotic production and screening.
7. Amylase production and analysis.
8. Screening and selection of auxotropic mutants.

List of Equipments/Machine Required:

1. Autoclave
2. Hot Air Oven
3. Laminar Air Flow
4. Microscope
5. Water Bath
6. Colony Counter
7. Digital Balance
8. Rotating Incubator
9. BOD Incubator
10. Distillation Unit

Text Books:

2. Industrial Microbiology by A.H. Patel
3. Experimental Microbiology, Plant Pathology and Biotechnology by K. R. Aneja
Subject: Unit Operation Lab
Subject Code: BT20722BT
End Semester Exam Marks : 20

List of Experiments :

1. To determine the size distribution of a sample of particulate solid by sieve analysis and to evaluate the average particle diameter.
2. To determine the size distribution of the product of laboratory rod mill.
3. To determine the size distribution of the product of laboratory ball mill.
4. To evaluate the overall effectiveness of given screen.
5. To determine the power required in size reduction and to evaluate the Rittinger’s Constant in respect of Laboratory Rod Mill.
6. To determine the degree of mixing of a given binary solid system in Tumbler Mixer.
7. To determine the size distribution in a mass of fine solids by the method of decantation.
8. To study the settling characteristics of the given slurry.
9. To determine the power required for crushing in Roll Crusher.
10. Study of separation of two liquids in laboratory Centrifuge.
11. Study of Filter Press.
12. To determine the power required in size reduction and to evaluate the Rittinger’s Constant in respect of Ball Mill.

List of Equipments/Machine Required:
1. Sieve Shaker
2. Rod mill
3. Ball mill.
4. Tumbler Mixer
5. Roll Crusher
6. Filter Press
7. Centrifuge

Recommended Books: