



**TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE  
(WOMEN) - 4133**

**(Affiliated to Mahatma Gandhi University, Nalgonda)**

**DEPARTMENT OF MICROBIOLOGY**  
**TEACHING SYNOPSIS**

## SYNOPSIS FOR THE ACADEMIC YEAR 2022-2025

<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: HISTORY OF MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about definition and history of microbiology</li> <li>• Understand contributions of various scientists in microbiology.</li> <li>• Learn &amp; explain importance and applications of microbiology.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Meaning of microbiology.</li> <li>• Some diseases &amp; it's causative agents</li> <li>• Examples of microorganisms</li> <li>• Day to day applications of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Evolution of microbes</li> <li>• Abiogenesis &amp; Biogenesis theory with swan neck experiment.</li> <li>• Immunization – Edward Jenner experiment with vaccinia virus.</li> <li>• Germ theory of diseases- Robert koch's postulates</li> <li>• Antonyvon Leeuwenhoek,Louis Pasteur , Robert koch, Edward Jenner, Winogradsky,Alexander Fleming, Iwanovsky, Beijerinck.</li> <li>• Applications of microbiology and career prospects of microbiology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Chart showing various applications &amp; career prospects in microbiology.</li> <li>• Gave examples of microorganisms &amp; their application.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p>

	*Textbook of microbiology by Prescott.
Student activity planned/ homework given:	* Illustrate various applications of microbiology with examples & explain about scope of microbiology.

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: MICROSCOPY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn &amp; demonstrate microscopy, Principle &amp; types.</li> <li>• To Understand Definition of staining.</li> <li>• To demonstrate process of staining.</li> <li>• To explain types of staining.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of microscopy.</li> <li>• Handling and working of microscope.</li> <li>• Basic morphology of microorganisms.</li> <li>• Examples of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Microscopy definition – Principles- Resolving power, Magnification. Definitions of focal length, numerical aperture, angular aperture.</li> <li>• Types of microscopes- Bright field microscope, principle &amp; applications, Dark field microscope – principle &amp; applications.</li> <li>• Phase contrast &amp; Fluorescence microscope – Principle &amp; applications</li> <li>• Electron microscopy, preparations of specimen, principle &amp; applications &amp; types – Scanning Electron microscope &amp; Transmission electron microscope.</li> <li>• Determination of size of microorganisms- Ocular &amp; stage micrometry.</li> <li>• Staining – stains- auxochrome, chromophore, mordant.</li> </ul>

	<ul style="list-style-type: none"> <li>• stains- acidic, Basic , Neutral examples</li> <li>• Simple staining – Positive Staining (Direct staining), Negative staining ( Indirect staining)</li> <li>• Differential staining – Gram’ s staining – principle , procedure and examples of gram +ve, Gram -ve bacteria.</li> <li>• Acid fast staining – Principle , Procedure &amp; examples of Acid fast &amp; Non acid fast Bacteria.</li> <li>• Special staining – Endospore Staining- principle , Procedure.</li> <li>• Bacterial motility by Hanging drop method.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstrated working of microscope.</li> <li>• Demonstrated size determination of microorganisms.</li> <li>• Demonstration of staining – Simple staining, Gram’s staining, Fungal staining &amp; Hanging drop method.</li> <li>• Observation of microorganisms from various samples collected from our college.</li> </ul>
Teaching aids used:	Black board & Chalk,  PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Draw microscope diagram and explain about various types of microscopes with applications.</li> <li>• Explain differential staining with examples?</li> <li>• Explain endospore staining?</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: Microbiological techniques</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• Know about sterilization.</li> <li>• Understand different types of sterilization &amp; mechanism.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on sterilization</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Sterilization &amp; disinfection techniques- physical methods: Autoclave, Hot air oven, Laminar air flow, Filtration, radiation methods – U.V rays, Gamma rays, Ultrasonic methods.</li> <li>• Chemical methods : *Aldehydes *Alcohols *Phenol *Halogens, *Hypochlorides. * Fumigants.</li> <li>• Phenol – Coefficient</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of autoclave , hot air oven in lab.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<p>*Explain physical methods of sterilization.</p> <p>*Give a note on chemical methods of sterilization.</p> <p>* Write a note on Phenol Coefficient.</p> <p>.</p>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: PURE CULTURE TECHNIQUES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand pure culture concept.</li> <li>• To demonstrate isolation methods of bacteria.</li> <li>• To explain preservation methods of bacteria.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic tools &amp; techniques in microbiology lab</li> <li>• Rules to be followed in microbiology lab.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Isolation of pure cultures <ul style="list-style-type: none"> <li>- Serial dilution process</li> <li>-Spread plate method</li> <li>-Streak plate method</li> <li>-Pour plate method</li> <li>- Single cell isolation method- micromanipulator method.</li> </ul> </li> <li>• Preservation of microbial cultures: <ul style="list-style-type: none"> <li>-Subculturing</li> <li>-overlaying with mineral oils.</li> <li>-Lyophilization.</li> <li>-Cryophilization.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of isolation methods.</li> <li>• Ppt showing preservation methods of microbial cultures.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p>

	*Textbook of microbiology by Prescott.
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain isolation methods of bacteria.</li> <li>• Explain preservation of microbial cultures.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOLOGY OF MICROORGANISM</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand classification of living organism.</li> <li>• To differentiate prokaryotes &amp; eukaryotes.</li> <li>• To explain general characteristics of different bacteria.</li> <li>• Learn Bergey's manual for bacterial classification.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Morphology &amp; general characters of bacteria.</li> <li>• 2 kingdom classification by Linnaeus.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Classification of living organisms: <ul style="list-style-type: none"> <li>• Haeckel</li> <li>• Whittaker</li> <li>• Carl woese system of domain classification <ul style="list-style-type: none"> <li>➤ Place of microorganisms in the living world.</li> <li>➤ Differentiation of prokaryotes &amp; Eukaryotes.</li> <li>➤ Prokaryotes : general characters of bacteria, Archaeobacteria, Rickettsias,</li> </ul> </li> </ul> </li> </ul>

	<p>Mycoplasma, cyanobacteria, Actinomycetes.</p> <p>➤ Classification of bacteria per the second edition of Bergey's manual of systemic Bacteriology.</p>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write differences between prokaryotes &amp; eukaryotes.</li> <li>• Explain Bergey's manual.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: STRUCTURE OF MICROORGANISMS</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand ultra structure of bacterial cell.</li> <li>• To explain general characteristics of viruses.</li> <li>• Learn virus classification.</li> <li>• To explain general characteristics of eukaryotes with examples.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Morphology &amp; general characters of bacteria.</li> <li>• Basic knowledge on eukaryotes.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Ultrastructure of bacterial cell: <ul style="list-style-type: none"> <li>• Cell wall, cell membrane, ribosomes, nucleoid, flagella, capsule, fimbriae, endospore, storage granules.</li> <li>• General characters &amp; classification of viruses.</li> <li>• Morphology &amp; structure of TMV &amp; HIV.</li> <li>• Structure &amp; multiplication of Lambda bacteriophage.</li> <li>• General characteristics of eukaryotic microorganisms: <ul style="list-style-type: none"> <li>➤ Protozoa</li> <li>➤ Microalgae</li> <li>➤ Yeast</li> <li>➤ Molds.</li> </ul> </li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of eukaryotic microorganisms.</li> <li>• Demonstration of ultra structure of bacterial cell.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain ultra structure of bacterial cell</li> <li>• Write about lytic &amp; lysogenic cycles of lambda phage..</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Outline &amp; general characters of carbohydrates. <ul style="list-style-type: none"> <li>▪ Monosaccharides</li> <li>▪ Disaccharides</li> <li>▪ Polysaccharides.</li> </ul> </li> <li>➤ General characteristics of aminoacids &amp; proteins.</li> <li>➤ General characteristics of fatty acids <ul style="list-style-type: none"> <li>• Saturates &amp; unsaturated.</li> </ul> </li> <li>➤ General characteristics of lipids. <ul style="list-style-type: none"> <li>• Sphingolipids</li> <li>• Phospholipids</li> <li>• Sterols.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	Illustrate biomolecules with examples.
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>
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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic structure of some biomolecules &amp; DNA.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Structure of nitrogenous bases , nucleotides &amp; nucleic acids.</li> <li>➤ Hydrogen ion concentration in biological fluids.</li> <li>➤ PH measurement.</li> <li>➤ Types of buffers &amp; their uses in biological reactions.</li> <li>➤ Applications of colorimetry &amp; chromatography ( paper &amp; thin layer )</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Paper chromatography.</li> <li>▪ PH measurement.</li> </ul>

Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write a note on nitrogenous bases.</li> <li>• Write an essay on chromatography with its applications.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: FERMENTED FOODS</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand the concept of fermented foods and illustrate examples of fermented foods.</li> <li>• To know about the health aspects of fermented foods.</li> <li>• To demonstrate processing of fermented vegetables and pickles.</li> <li>• To understand about dairy microbiology and significance of microbes in milk.</li> <li>• To analyse various milk products.</li> <li>• To learn about pre and probiotics.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation an fermented products used in our day today life.</li> <li>• Basics knowledge on milk products.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to fermentation.</li> <li>➤ Fermented foods : Idly, etc.</li> <li>➤ Fermented vegetables : Sauerkraut.</li> <li>➤ Fermented pickles : Dill pickles.</li> <li>➤ Dairy microbiology – Types of microorganisms in milk. Significance of microbes in milk.</li> <li>➤ Microbial milk products – Bulgarian milk, kefir, cheese,yogurt.</li> <li>➤ Microorganisms as food : Prebiotics &amp; probiotics.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of various fermented foods .</li> <li>▪ Observation of various milk products available in market.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*Food microbiology by Frazier,</p> <p>* Food microbiology – Telugu academy.</p> <p>* Food science by V.srilakshmi.</p> <p>* Internet</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observation of various fermented foods .</li> <li>• Observation of various milk products available in market Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand microbial food spoilage.</li> <li>• To know about quality assessment of foods &amp; quality control.</li> <li>• To know about various food preservation methods.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of types of food &amp; food spoilage.</li> <li>• Basic preservation methods of foods we use in our daily life.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microbial spoilage of foods,</li> <li>➤ Microbial food poisoning, risks &amp; hazards.</li> <li>➤ Mycotoxins &amp; their toxicity.</li> <li>➤ Food preservation methods &amp; food safety issues.</li> <li>➤ Food quality: importance &amp; functions of quality control.</li> <li>➤ Methods of quality assessment of foods.</li> <li>➤ Screening &amp; enumeration of spoilage microorganisms.</li> <li>➤ Detection of pathogens in food.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms of different spoiled foods under microscope.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*Food microbiology by Frazier,</p> <p>* Food microbiology – Telugu academy.</p> <p>* Food science by V.srilakshmi.</p> <p>* Internet</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
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Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: AIR &amp; WATER MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms in air &amp; water.</li> <li>• To learn about sanitary quality of water.</li> <li>• To learn about water borne diseases.</li> <li>• To understand sewage treatment process.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of diseases &amp; their transmission.</li> <li>• Basic microbes present in air &amp; water.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microorganisms in air &amp; their importance.</li> <li>➤ Microorganisms &amp; water pollution.</li> <li>➤ Water borne pathogenic microorganisms &amp; their transmission.</li> <li>➤ Sanitary quality of water.</li> <li>➤ Water pollution due to degradation of organic matter.</li> <li>➤ Aerobic &amp; anaerobic sewage treatment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>

Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various microorganisms in different water samples under microscope.</li> <li>• Explain sewage treatment.</li> <li>• List out various diseases transmitted by water &amp; their causative agents.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: SOIL MICROBIOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms soil.</li> <li>• To learn about enumeration of microbes in soil .</li> <li>• To learn about microbes &amp; plant interactions.</li> <li>• To understand biogeochemical cycles.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Examples of microorganisms .</li> <li>• .microbial interactions like symbiosis , antagonism, etc.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Soil properties ( physical, chemical &amp; biological )</li> <li>➤ Soil microorganisms.</li> <li>➤ Methods of enumeration &amp;. activity of microbes in environment/ soil.</li> <li>➤ Microbes &amp; plant interactions- Rhizosphere, Phyllosphere , Mycorrhizae.</li> <li>➤ Introduction to microbial bioremediation.</li> <li>➤ Microbial degradation of organic pollutants.</li> <li>➤ Carbon &amp; Nitrogen cycle.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain about microbial degradation of organic pollutants.</li> <li>• Practice carbon &amp; nitrogen cycles.</li> </ul>

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**TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN**

**DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL BACTERIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To learn about host pathogen interactions.</li> <li>• To acquire knowledge on airborne , food borne water borne and sexually transmitted diseases.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common infections like fever, cold, throat infections, stomach infections.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Normal flora of human body- its significance like production of important vitamins, colicins, protection from pathogens, helps in digestion etc.</li> <li>➤ Host pathogen interactions.</li> <li>➤ Bacterial toxins- exo and endo toxins.</li> <li>➤ Virulence and attenuation.</li> <li>➤ Anti-microbial resistance – MDRS.</li> <li>➤ multiple drug therapy.</li> <li>➤ Air borne diseases-Tuberculosis.</li> <li>➤ Food and water borne diseases- cholera, typhoid.</li> <li>➤ Contact diseases – syphilis, Gonorrhoea Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT

References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on various diseases.</li> </ul>

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<p><b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b></p> <p><b>DEVARAKONDA</b></p>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL VIROLOGY &amp; PARASITOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To acquire knowledge on viral diseases- Transmission.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common viral infections like fever, cold, throat infections, stomach infections.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Food &amp; water borne diseases-Poliomyelitis, Amoebiasis.</li> <li>➤ Insect borne diseases- Malaria, Dengue fever.</li> <li>➤ Zoonotic diseases – Rabies.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Viral diseases – Hepatitis B, HIV, SARS, MERS.</li> <li>➤ Air borne diseases- Influenza. Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by Chand Pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on brief note on diseases.</li> </ul>

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<p>•</p> <p><b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b></p> <p><b>DEVARAKONDA</b></p>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: Introduction to immunology</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology &amp; immunology.</li> <li>• To acquire knowledge on immunity, organs and cells responsible for immunity.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on how immunity helps to fight with diseases.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of immunology- contributions of various scientists in the field of immunology.</li> <li>➤ Immunity- types . Innate &amp; acquired.</li> </ul> <p>Organs of immune system – primary lymphoid organs-thymus, bone marrow. Secondary lymphoid organs – spleen, lymph node, bursa of fabricus.</p> <ul style="list-style-type: none"> <li>➤ Cells of immune system – B &amp; T lymphocytes, Natural killer cells, polymorphonuclear cells.</li> <li>➤ Structure &amp; classification of antigens.</li> <li>➤ Factors affecting antigenicity.</li> <li>➤ Antibodies basic structure, types, properties and functions of immunoglobulins.</li> <li>➤ Humoral and cell mediated immune response.</li> <li>➤ Major histocompatibility complex – class I &amp; II.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Charts showing cells and organs of immune system , antibodies.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> </ul>

	* Immunology by chand pasha- Kalyani publications.
Student activity planned/ homework given:	• .

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: Medical Microbiology &amp; Immunology</b>	<b>Topic: Immunological disorders &amp; AG-AB Interactions.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on immunological disorders .</li> <li>• To know about AG-AB interactions.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of immunity, antigens and antibody types , structure , factors, etc</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Hypersensitivity- types</li> <li>➤ Immediate &amp; delayed</li> <li>➤ Systemic and localized auto immune disorders- causes, symptoms, prevention and treatment.</li> <li>➤ Complement pathways – classical and alternate.</li> <li>➤ Types of AG-AB interactions – precipitation (in gel &amp; in liquid), agglutination, neutralization, complement fixation test.</li> <li>➤ Labelled antibody techniques – ELISA, RIA &amp; IFT.</li> <li>➤ Poly clonal &amp; mono clonal antibodies –</li> <li>➤ Hybridoma technology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures showing AG-AB interactions.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on hybridoma technology.</li> <li>• Essay on auto immune diseases.</li> <li>• Essay on precipitation reactions.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microorganisms and selection</b>

Learning objectives:	<ul style="list-style-type: none"> <li>To acquire knowledge on industrial microbiology, how microbes are used in industries for the welfare of mankind.</li> <li>To analyse industrially produced compounds.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Basic knowledge on fermentation, fermented products used in our daily lives.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to industrial microbiology, microbes of industrial importance- yeast, molds, bacteria, actinomycetes.</li> <li>➤ Screening and selection of industrially important microbes.</li> <li>➤ Steps to maintain seed culture and inoculation strategies for enhanced product yield.</li> <li>➤ Strain improvement strategies.</li> <li>➤ Immobilization methods- adsorption and entrapment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Showing fermented foods.</li> <li>➤ Microscopical observation of yeast, algae, fungi and bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Industrial microbiology – A.H.Patel</li> <li>Industrial microbiology – Casida.</li> <li>* applied microbiology by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>Essay on screening and strain improvement strategies.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>

<b>Subject: Industrial Microbiology</b>	<b>Topic: Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn about Fermentation.</li> <li>• Illustrate examples of fermented products.</li> <li>• To understand the construction of fermenter and parameters required for it.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation, fermented products and microbes involved in the process.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Design of bioreactor, physico -chemical factors used in bioreactors.</li> <li>➤ Limitations of bioreactor, fermentation equipment and its use.</li> <li>➤ Design of fermenter, types of fermenter, anti foam. Agitation, aeration, PH, temperature control ,stages of fermentation process, inoculation media, raw materials used in fermentation media and their processing,</li> <li>➤ Downstream processing.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Construction of bioreactor.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Chart on bioreactor.</li> <li>• Essay on down stream processing</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject : Industrial Microbiology</b>	<b>Topic: Types of Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>To gain knowledge on types of fermentations.</li> <li>To understand the concept of kinetics in fermentations.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Knowledge on fermentation, fermentor is required.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Types of fermentations: Batch, Fed batch, continuous types – chemostat, turbidostatic.</li> <li>➤ Kinetics .</li> <li>➤ Submerged, surface, solid state, dual and multiple fermentations.</li> <li>➤ Advantages and disadvantages of solid substrate and liquid fermentations.</li> <li>➤ Common microbial fermentations- alcohol and lactic acid fermentations.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ video showing types of fermenters.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>Essay on types of fermentation process – advantages and disadvantages.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microbial Products.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial products.</li> <li>• To understand the process of disposal of industrial waste.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge required on fermentation, types.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Industrial products derived from microbes: vitamin B 12, vaccines like recombinant vaccines, production of beverages like beer and wine, biofuels like biogas and methane, enzymes(amylase), antibiotics ( penicillin), amino acids ( glutamic acid ,( organic acid ( citric acid ) etc.</li> <li>➤ Disposal of industrial waste.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>✓ Demonstrating the process of fermented products preparation</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• essay on beer production.</li> <li>• Mention industrially important microbes and their product.</li> </ul>

## SYNOPSIS FOR THE ACADEMIC YEAR 2021-2024

<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: HISTORY OF MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about definition and history of microbiology</li> <li>• Understand contributions of various scientists in microbiology.</li> <li>• Learn &amp; explain importance and applications of microbiology.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Meaning of microbiology.</li> <li>• Some diseases &amp; it's causative agents</li> <li>• Examples of microorganisms</li> <li>• Day to day applications of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Evolution of microbes</li> <li>• Abiogenesis &amp; Biogenesis theory with swan neck experiment.</li> <li>• Immunization – Edward Jenner experiment with vaccinia virus.</li> <li>• Germ theory of diseases- Robert koch's postulates</li> <li>• Antonyvon Leeuwenhoek,Louis Pasteur , Robert koch, Edward Jenner, Winogradsky,Alexander Fleming, Iwanovsky, Beijerinck.</li> <li>• Applications of microbiology and career prospects of microbiology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Chart showing various applications &amp; career prospects in microbiology.</li> <li>• Gave examples of microorganisms &amp; their application.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt

References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<p>*D</p> <p>* Illustrate various applications of microbiology with examples &amp; explain about scope of microbiology.</p>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: MICROSCOPY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn &amp; demonstrate microscopy, Principle &amp; types.</li> <li>• To Understand Definition of staining.</li> <li>• To demonstrate process of staining.</li> <li>• To explain types of staining.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of microscopy.</li> <li>• Handling and working of microscope.</li> <li>• Basic morphology of microorganisms.</li> <li>• Examples of microorganisms.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>• Microscopy definition – Principles- Resolving power, Magnification. Definitions of focal length, numerical aperture, angular aperture.</li> <li>• Types of microscopes- Bright field microscope, principle &amp; applications, Dark field microscope – principle &amp; applications.</li> <li>• Phase contrast &amp; Fluorescence microscope – Principle &amp; applications</li> <li>• Electron microscopy, preparations of specimen, principle &amp; applications &amp; types – Scanning Electron microscope &amp; Transmission electron microscope.</li> <li>• Determination of size of microorganisms- Ocular &amp; stage micrometry.</li> <li>• Staining – stains- auxochrome, chromophore, mordant.</li> <li>• stains- acidic, Basic , Neutral examples</li> <li>• Simple staining – Positive Staining (Direct staining), Negative staining ( Indirect staining)</li> <li>• Differential staining – Gram' s staining – principle , procedure and examples of gram +ve, Gram -ve bacteria.</li> <li>• Acid fast staining – Principle , Procedure &amp; examples of Acid fast &amp; Non acid fast Bacteria.</li> <li>• Special staining – Endospore Staining- principle , Procedure.</li> <li>• Bacterial motility by Hanging drop method.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstrated working of microscope.</li> <li>• Demonstrated size determination of microorganisms.</li> <li>• Demonstration of staining – Simple staining, Gram's staining, Fungal staining &amp; Hanging drop method.</li> <li>• Observation of microorganisms from various samples collected from our college.</li> </ul>
Teaching aids used:	<p>Black board &amp; Chalk,</p> <p>PPT</p>
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Draw microscope diagram and explain about various types of microscopes with applications.</li> <li>• Explain differential staining with examples?</li> <li>• Explain endospore staining?</li> </ul>
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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: Microbiological techniques</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about sterilization.</li> <li>• Understand different types of sterilization &amp; mechanism.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on sterilization</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Sterilization &amp; disinfection techniques- physical methods: Autoclave, Hot air oven, Laminar air flow, Filtration, radiation methods – U.V rays, Gamma rays, Ultrasonic methods.</li> <li>• Chemical methods : *Aldehydes *Alcohols *Phenol *Halogens, *Hypochlorides. * Fumigants.</li> <li>• Phenol – Coefficient</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>Demonstration of autoclave , hot air oven in lab.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<p>*Explain physical methods of sterilization.</p> <p>*Give a note on chemical methods of sterilization.</p> <p>* Write a note on Phenol Coefficient.</p> <p>.</p>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: PURE CULTURE TECHNIQUES</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand pure culture concept.</li> <li>• To demonstrate isolation methods of bacteria.</li> <li>• To explain preservation methods of bacteria.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic tools &amp; techniques in microbiology lab</li> <li>• Rules to be followed in microbiology lab.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Isolation of pure cultures <ul style="list-style-type: none"> <li>- Serial dilution process</li> <li>- Spread plate method</li> <li>- Streak plate method</li> <li>- Pour plate method</li> <li>- Single cell isolation method- micromanipulator method.</li> </ul> </li> <li>• Preservation of microbial cultures: <ul style="list-style-type: none"> <li>- Subculturing</li> <li>- overlaying with mineral oils.</li> <li>- Lyophilization.</li> <li>- Cryophilization.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of isolation methods.</li> <li>• Ppt showing preservation methods of microbial cultures.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain isolation methods of bacteria.</li> <li>• Explain preservation of microbial cultures.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOLOGY OF MICROORGANISM</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand classification of living organism.</li><li>• To differentiate prokaryotes &amp; eukaryotes.</li><li>• To explain general characteristics of different bacteria.</li><li>• Learn Bergey's manual for bacterial classification.</li></ul>

Previous knowledge required:	<ul style="list-style-type: none"> <li>• Morphology &amp; general characters of bacteria.</li> <li>• 2 kingdom classification by Linnaeus.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Classification of living organisms: <ul style="list-style-type: none"> <li>• Haeckel</li> <li>• Whittaker</li> <li>• Carl woese system of domain classification <ul style="list-style-type: none"> <li>➤ Place of microorganisms in the living world.</li> <li>➤ Differentiation of prokaryotes &amp; Eukaryotes.</li> <li>➤ Prokaryotes : general characters of bacteria, Archaeobacteria, Rickettsias, Mycoplasma, cyanobacteria, Actinomycetes.</li> <li>➤ Classification of bacteria per the second edition of Bergey's manual of systemic Bacteriology.</li> </ul> </li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write differences between prokaryotes &amp; eukaryotes.</li> <li>• Explain Bergey's manual.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: STRUCTURE OF MICROORGANISMS</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand ultra structure of bacterial cell.</li> <li>• To explain general characteristics of viruses.</li> <li>• Learn virus classification.</li> <li>• To explain general characteristics of eukaryotes with examples.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Morphology &amp; general characters of bacteria.</li> <li>• Basic knowledge on eukaryotes.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Ultrastructure of bacterial cell: <ul style="list-style-type: none"> <li>• Cell wall, cell membrane, ribosomes, nucleoid, flagella, capsule, fimbriae, endospore, storage granules.</li> <li>• General characters &amp; classification of viruses.</li> <li>• Morphology &amp; structure of TMV &amp; HIV.</li> <li>• Structure &amp; multiplication of Lambda bacteriophage.</li> <li>• General characteristics of eukaryotic microorganisms: <ul style="list-style-type: none"> <li>➤ Protozoa</li> <li>➤ Microalgae</li> <li>➤ Yeast</li> <li>➤ Molds.</li> </ul> </li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote&amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of eukaryotic microorganisms.</li> <li>• Demonstration of ultra structure of bacterial cell.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT

References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain ultra structure of bacterial cell</li> <li>• Write about lytic &amp; lysogenic cycles of lambda phage..</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Outline &amp; general characters of carbohydrates. <ul style="list-style-type: none"> <li>▪ Monosaccharides</li> <li>▪ Disaccharides</li> <li>▪ Polysaccharides.</li> </ul> </li> <li>➤ General characteristics of aminoacids &amp; proteins.</li> <li>➤ General characteristics of fatty acids <ul style="list-style-type: none"> <li>• Saturates &amp; unsaturated.</li> </ul> </li> <li>➤ General characteristics of lipids. <ul style="list-style-type: none"> <li>• Sphingolipids</li> <li>• Phospholipids</li> <li>• Sterols.</li> </ul> </li> </ul>

Illustrations/ Demonstration shown:	Illustrate biomolecules with examples.
Teaching aids used:	Black board & Chalk, PPT
References:	*General microbiology by Dube & Maheshwari. *Introductory Microbiology by R.P.Singh *Textbook of microbiology by pelczar *Textbook of microbiology by Prescott.
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic structure of some biomolecules &amp; DNA.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Structure of nitrogenous bases , nucleotides &amp; nucleic acids.</li> <li>➤ Hydrogen ion concentration in biological fluids.</li> <li>➤ PH measurement.</li> <li>➤ Types of buffers &amp; their uses in biological reactions.</li> <li>➤ Applications of colorimetry &amp; chromatography ( paper &amp; thin layer )</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Paper chromatography.</li> <li>▪ PH measurement.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write a note on nitrogenous bases.</li> <li>• Write an essay on chromatography with its applications.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: FERMENTED FOODS</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To understand the concept of fermented foods and illustrate examples of fermented foods.</li> <li>• To know about the health aspects of fermented foods.</li> <li>• To demonstrate processing of fermented vegetables and pickles.</li> <li>• To understand about dairy microbiology and significance of microbes in milk.</li> <li>• To analyse various milk products.</li> <li>• To learn about pre and probiotics.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation and fermented products used in our day today life.</li> <li>• Basics knowledge on milk products.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to fermentation.</li> <li>➤ Fermented foods : Idly, etc.</li> <li>➤ Fermented vegetables : Sauerkraut.</li> <li>➤ Fermented pickles : Dill pickles.</li> <li>➤ Dairy microbiology – Types of microorganisms in milk. Significance of microbes in milk.</li> <li>➤ Microbial milk products – Bulgarian milk, kefir, cheese, yogurt.</li> <li>➤ Microorganisms as food : Prebiotics &amp; probiotics.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of various fermented foods .</li> <li>▪ Observation of various milk products available in market.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*Food microbiology by Frazier,</p> <p>* Food microbiology – Telugu academy.</p> <p>* Food science by V.srilakshmi.</p> <p>* Internet</p> <p>.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observation of various fermented foods .</li> <li>• Observation of various milk products available in market Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand microbial food spoilage.</li><li>• To know about quality assessment of foods &amp; quality control.</li><li>• To know about various food preservation methods.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Basics of types of food &amp; food spoilage.</li><li>• Basic preservation methods of foods we use in our daily life.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Microbial spoilage of foods,</li><li>➤ Microbial food poisoning, risks &amp; hazards.</li><li>➤ Mycotoxins &amp; their toxicity.</li><li>➤ Food preservation methods &amp; food safety issues.</li><li>➤ Food quality: importance &amp; functions of quality control.</li><li>➤ Methods of quality assessment of foods.</li><li>➤ Screening &amp; enumeration of spoilage microorganisms.</li><li>➤ Detection of pathogens in food.</li></ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"><li>▪ Observation of microorganisms of different spoiled foods under microscope.</li></ul>
Teaching aids used:	Black board & Chalk, PPT

References:	<p>*Food microbiology by Frazier,</p> <p>* Food microbiology – Telugu academy.</p> <p>* Food science by V.srilakshmi.</p> <p>* Internet</p> <p>.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand microbial food spoilage.</li> <li>• To know about quality assessment of foods &amp; quality control.</li> <li>• To know about various food preservation methods.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of types of food &amp; food spoilage.</li> <li>• Basic preservation methods of foods we use in our daily life.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microbial spoilage of foods,</li> <li>➤ Microbial food poisoning, risks &amp; hazards.</li> <li>➤ Mycotoxins &amp; their toxicity.</li> <li>➤ Food preservation methods &amp; food safety issues.</li> <li>➤ Food quality: importance &amp; functions of quality control.</li> <li>➤ Methods of quality assessment of foods.</li> <li>➤ Screening &amp; enumeration of spoilage microorganisms.</li> <li>➤ Detection of pathogens in food.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms of different spoiled foods under microscope.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*Food microbiology by Frazier,</li> <li>* Food microbiology – Telugu academy.</li> <li>* Food science by V.srilakshmi.</li> <li>* Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: AIR &amp; WATER MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms in air &amp; water.</li> <li>• To learn about sanitary quality of water.</li> <li>• To learn about water borne diseases.</li> <li>• To understand sewage treatment process.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of diseases &amp; their transmission.</li> <li>• Basic microbes present in air &amp; water.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Microorganisms in air &amp; their importance.</li> <li>➤ Microorganisms &amp; water pollution.</li> <li>➤ Water borne pathogenic microorganisms &amp; their transmission.</li> <li>➤ Sanitary quality of water.</li> <li>➤ Water pollution due to degradation of organic matter.</li> <li>➤ Aerobic &amp; anaerobic sewage treatment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various microorganisms in different water samples under microscope.</li> <li>• Explain sewage treatment.</li> <li>• List out various diseases transmitted by water &amp; their causative agents.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>

<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: SOIL MICROBIOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms soil.</li> <li>• To learn about enumeration of microbes in soil .</li> <li>• To learn about microbes &amp; plant interactions.</li> <li>• To understand biogeochemical cycles.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Examples of microorganisms .</li> <li>• .microbial interactions like symbiosis , antagonism, etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Soil properties ( physical, chemical &amp; biological )</li> <li>➤ Soil microorganisms.</li> <li>➤ Methods of enumeration &amp;. activity of microbes in environment/ soil.</li> <li>➤ Microbes &amp; plant interactions- Rhizosphere, Phyllosphere , Mycorrhizae.</li> <li>➤ Introduction to microbial bioremediation.</li> <li>➤ Microbial degradation of organic pollutants.</li> <li>➤ Carbon &amp; Nitrogen cycle.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain about microbial degradation of organic pollutants.</li> <li>• Practice carbon &amp; nitrogen cycles.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL BACTERIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To know about history of medical microbiology.</li><li>• To learn about host pathogen interactions.</li><li>• To acquire knowledge on airborne , food borne water borne and sexually transmitted diseases.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Basic knowledge on common infections like fever, cold, throat infections, stomach infections.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li><li>➤ Normal flora of human body- its significance like production of important vitamins, colicins, protection from pathogens, helps in digestion etc.</li><li>➤ Host pathogen interactions.</li><li>➤ Bacterial toxins- exo and endo toxins.</li><li>➤ Virulence and attenuation.</li><li>➤ Anti-microbial resistance – MDRS.</li><li>➤ multiple drug therapy.</li><li>➤ Air borne diseases-Tuberculosis.</li><li>➤ Food and water borne diseases- cholera, typhoid.</li><li>➤ Contact diseases – syphilis, Gonorrhoea Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li></ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on various diseases.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL VIROLOGY &amp; PARASITOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To acquire knowledge on viral diseases-Transmission.</li> </ul>

Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common viral infections like fever, cold, throat infections, stomach infections.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Food &amp; water borne diseases-Poliomyelitis, Amoebiasis.</li> <li>➤ Insect borne diseases- Malaria, Dengue fever.</li> <li>➤ Zoonotic diseases – Rabies.</li> <li>➤ Viral diseases – Hepatitis B, HIV, SARS,MERS.</li> <li>➤ Air borne diseases- Influenza. Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on brief note on diseases.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: Introduction to immunology</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology &amp; immunology.</li> <li>• To acquire knowledge on immunity, organs and cells responsible for immunity.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on how immunity helps to fight with diseases.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of immunology- contributions of various scientists in the field of immunology.</li> <li>➤ Immunity- types . Innate &amp; acquired.</li> </ul> <p>Organs of immune system – primary lymphoid organs-thymus, bone marrow. Secondary lymphoid organs – spleen, lymph node, bursa of fabricus.</p> <ul style="list-style-type: none"> <li>➤ Cells of immune system – B &amp; T lymphocytes, Natural killer cells, polymorphonuclear cells.</li> <li>➤ Structure &amp; classification of antigens.</li> <li>➤ Factors affecting antigenicity.</li> <li>➤ Antibodies basic structure, types, properties and functions of immunoglobulins.</li> <li>➤ Humoral and cell mediated immune response.</li> <li>➤ Major histocompatibility complex – class I &amp; II.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Charts showing cells and organs of immune system , antibodies.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• .</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>

<b>Subject: Medical Microbiology &amp; Immunology</b>	<b>Topic: Immunological disorders &amp; AG-AB Interactions.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on immunological disorders .</li> <li>• To know about AG-AB interactions.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of immunity, antigens and antibody types , structure , factors, etc</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Hypersensitivity- types</li> <li>➤ Immediate &amp; delayed</li> <li>➤ Systemic and localized auto immune disorders-causes, symptoms, prevention and treatment.</li> <li>➤ Complement pathways – classical and alternate.</li> <li>➤ Types of AG-AB interactions – precipitation (in gel &amp; in liquid),agglutination, neutralization, complement fixation test.</li> <li>➤ Labelled antibody techniques – ELISA, RIA &amp; IFT.</li> <li>➤ Poly clonal &amp; mono clonal antibodies –</li> <li>➤ Hybridoma technology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures showing AG-AB interactions.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on hybridoma technology.</li> <li>• Essay on auto immune diseases.</li> <li>• Essay on precipitation reactions.</li> </ul>

<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microorganisms and selection</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on industrial microbiology, how microbes are used in industries for the welfare of mankind.</li> <li>• To analyse industrially produced compounds.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on fermentation, fermented products used in our daily lives.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to industrial microbiology, microbes of industrial importance- yeast, molds, bacteria, actinomycetes.</li> <li>➤ Screening and selection of industrially important microbes.</li> <li>➤ Steps to maintain seed culture and inoculation strategies for enhanced product yield.</li> <li>➤ Strain improvement strategies.</li> <li>➤ Immobilization methods- adsorption and entrapment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Showing fermented foods.</li> <li>➤ Microscopical observation of yeast, algae, fungi and bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Industrial microbiology – A.H.Patel</li> <li>Industrial microbiology – Casida.</li> <li>* applied microbiology by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on screening and strain improvement strategies.</li> </ul>

<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn about Fermentation.</li> <li>• Illustrate examples of fermented products.</li> <li>• To understand the construction of fermenter and parameters required for it.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation, fermented products and microbes involved in the process.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Design of bioreactor, physico -chemical factors used in bioreactors.</li> <li>➤ Limitations of bioreactor, fermentation equipment and its use.</li> <li>➤ Design of fermenter, types of fermenter, anti foam. Agitation, aeration, PH, temperature control ,stages of fermentation process, inoculation media, raw materials used in fermentation media and their processing,</li> <li>➤ Downstream processing.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Construction of bioreactor.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Chart on bioreactor.</li> <li>• Essay on down stream processing</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject : Industrial Microbiology</b>	<b>Topic: Types of Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To gain knowledge on types of fermentations.</li> <li>• To understand the concept of kinetics in fermentations.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Knowledge on fermentation, fermentor is required.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Types of fermentations: Batch, Fed batch, continuous types – chemostat, turbidostatic.</li> <li>➤ Kinetics .</li> <li>➤ Submerged, surface, solid state, dual and multiple fermentations.</li> <li>➤ Advantages and disadvantages of solid substrate and liquid fermentations.</li> <li>➤ Common microbial fermentations- alcohol and lactic acid fermentations.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ video showing types of fermenters.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on types of fermentation process – advantages and disadvantages.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microbial Products.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial products.</li> <li>• To understand the process of disposal of industrial waste.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge required on fermentation, types.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Industrial products derived from microbes: vitamin B 12, vaccines like recombinant vaccines, production of beverages like beer and wine, biofuels like biogas and methane, enzymes(amylase), antibiotics ( penicillin), amino acids ( glutamic acid ,( organic acid ( citric acid ) etc.</li> <li>➤ Disposal of industrial waste.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>✓ Demonstrating the process of fermented products preparation</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• essay on beer production.</li> <li>• Mention industrially important microbes and their product.</li> </ul>

## SYNOPSIS FOR THE ACADEMIC YEAR 2020-2023

<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: HISTORY OF MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about definition and history of microbiology</li> <li>• Understand contributions of various scientists in microbiology.</li> <li>• Learn &amp; explain importance and applications of microbiology.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Meaning of microbiology.</li> <li>• Some diseases &amp; it's causative agents</li> <li>• Examples of microorganisms</li> <li>• Day to day applications of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Evolution of microbes</li> <li>• Abiogenesis &amp; Biogenesis theory with swan neck experiment.</li> <li>• Immunization – Edward Jenner experiment with vaccinia virus.</li> <li>• Germ theory of diseases- Robert koch's postulates</li> <li>• Antonyvon Leeuwenhoek,Louis Pasteur , Robert koch, Edward Jenner, Winogradsky,Alexander Fleming, Iwanovsky, Beijerinck.</li> <li>• Applications of microbiology and career prospects of microbiology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Chart showing various applications &amp; career prospects in microbiology.</li> <li>• Gave examples of microorganisms &amp; their application.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p>

	<p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<p>*D</p> <p>* Illustrate various applications of microbiology with examples &amp; explain about scope of microbiology.</p>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: MICROSCOPY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn &amp; demonstrate microscopy, Principle &amp; types.</li> <li>• To Understand Definition of staining.</li> <li>• To demonstrate process of staining.</li> <li>• To explain types of staining.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of microscopy.</li> <li>• Handling and working of microscope.</li> <li>• Basic morphology of microorganisms.</li> <li>• Examples of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Microscopy definition – Principles- Resolving power, Magnification. Definitions of focal length, numerical aperture, angular aperture.</li> <li>• Types of microscopes- Bright field microscope, principle &amp; applications, Dark field microscope – principle &amp; applications.</li> </ul>

	<ul style="list-style-type: none"> <li>• Phase contrast &amp; Fluorescence microscope – Principle &amp; applications</li> <li>• Electron microscopy, preparations of specimen, principle &amp; applications &amp; types – Scanning Electron microscope &amp; Transmission electron microscope.</li> <li>• Determination of size of microorganisms- Ocular &amp; stage micrometry.</li> <li>• Staining – stains- auxochrome, chromophore, mordant.</li> <li>• stains- acidic, Basic , Neutral examples</li> <li>• Simple staining – Positive Staining (Direct staining), Negative staining ( Indirect staining)</li> <li>• Differential staining – Gram' s staining – principle , procedure and examples of gram +ve, Gram -ve bacteria.</li> <li>• Acid fast staining – Principle , Procedure &amp; examples of Acid fast &amp; Non acid fast Bacteria.</li> <li>• Special staining – Endospore Staining- principle , Procedure.</li> <li>• Bacterial motility by Hanging drop method.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstrated working of microscope.</li> <li>• Demonstrated size determination of microorganisms.</li> <li>• Demonstration of staining – Simple staining, Gram's staining, Fungal staining &amp; Hanging drop method.</li> <li>• Observation of microorganisms from various samples collected from our college.</li> </ul>
Teaching aids used:	<p>Black board &amp; Chalk,</p> <p>PPT</p>
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Draw microscope diagram and explain about various types of microscopes with applications.</li> <li>• Explain differential staining with examples?</li> <li>• Explain endospore staining?</li> </ul>

**TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN**

**DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: Microbiological techniques</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about sterilization.</li> <li>• Understand different types of sterilization &amp; mechanism.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on sterilization</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Sterilization &amp; disinfection techniques- physical methods: Autoclave, Hot air oven, Laminar air flow, Filtration, radiation methods – U.V rays, Gamma rays, Ultrasonic methods.</li> <li>• Chemical methods : *Aldehydes *Alcohols *Phenol *Halogens, *Hypochlorides. * Fumigants.</li> <li>• Phenol – Coefficient</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of autoclave , hot air oven in lab.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>

Student activity planned/ homework given:	<p>*Explain physical methods of sterilization.</p> <p>*Give a note on chemical methods of sterilization.</p> <p>* Write a note on Phenol Coefficient.</p> <p>.</p>
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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: PURE CULTURE TECHNIQUES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand pure culture concept.</li> <li>• To demonstrate isolation methods of bacteria.</li> <li>• To explain preservation methods of bacteria.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic tools &amp; techniques in microbiology lab</li> <li>• Rules to be followed in microbiology lab.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>• Isolation of pure cultures <ul style="list-style-type: none"> <li>- Serial dilution process</li> <li>- Spread plate method</li> <li>- Streak plate method</li> <li>- Pour plate method</li> <li>- Single cell isolation method- micromanipulator method.</li> </ul> </li> <li>• Preservation of microbial cultures: <ul style="list-style-type: none"> <li>- Subculturing</li> <li>- overlaying with mineral oils.</li> <li>- Lyophilization.</li> <li>- Cryophilization.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of isolation methods.</li> <li>• Ppt showing preservation methods of microbial cultures.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by Pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain isolation methods of bacteria.</li> <li>• Explain preservation of microbial cultures.</li> </ul>

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**DEVARAKONDA**

<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOLOGY OF MICROORGANISM</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand classification of living organism.</li><li>• To differentiate prokaryotes &amp; eukaryotes.</li><li>• To explain general characteristics of different bacteria.</li><li>• Learn Bergey's manual for bacterial classification.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Morphology &amp; general characters of bacteria.</li><li>• 2 kingdom classification by Linnaeus.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Classification of living organisms:<ul style="list-style-type: none"><li>• Haeckel</li><li>• Whittaker</li><li>• Carl woese system of domain classification<ul style="list-style-type: none"><li>➤ Place of microorganisms in the living world.</li><li>➤ Differentiation of prokaryotes &amp; Eukaryotes.</li></ul></li></ul></li></ul>

	<ul style="list-style-type: none"> <li>➤ Prokaryotes : general characters of bacteria, Archaeobacteria, Rickettsias, Mycoplasma, cyanobacteria, Actinomycetes.</li> <li>➤ Classification of bacteria per the second edition of Bergey's manual of systemic Bacteriology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write differences between prokaryotes &amp; eukaryotes.</li> <li>• Explain Bergey's manual.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>

<b>Subject: General Microbiology -I I</b>	<b>Topic: STRUCTURE OF MICROORGANISMS</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand ultra structure of bacterial cell.</li> <li>• To explain general characteristics of viruses.</li> <li>• Learn virus classification.</li> <li>• To explain general characteristics of eukaryotes with examples.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Morphology &amp; general characters of bacteria.</li> <li>• Basic knowledge on eukaryotes.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Ultrastructure of bacterial cell: <ul style="list-style-type: none"> <li>• Cell wall, cell membrane, ribosomes, nucleoid, flagella, capsule, fimbriae, endospore, storage granules.</li> <li>• General characters &amp; classification of viruses.</li> <li>• Morphology &amp; structure of TMV &amp; HIV.</li> <li>• Structure &amp; multiplication of Lambda bacteriophage.</li> <li>• General characteristics of eukaryotic microorganisms: <ul style="list-style-type: none"> <li>➤ Protozoa</li> <li>➤ Microalgae</li> <li>➤ Yeast</li> <li>➤ Molds.</li> </ul> </li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote&amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of eukaryotic microorganisms.</li> <li>• Demonstration of ultra structure of bacterial cell.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain ultra structure of bacterial cell</li> <li>• Write about lytic &amp; lysogenic cycles of lambda phage..</li> </ul>
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<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b> <b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Outline &amp; general characters of carbohydrates. <ul style="list-style-type: none"> <li>▪ Monosaccharides</li> <li>▪ Disaccharides</li> <li>▪ Polysaccharides.</li> </ul> </li> <li>➤ General characteristics of aminoacids &amp; proteins.</li> <li>➤ General characteristics of fatty acids <ul style="list-style-type: none"> <li>• Saturates &amp; unsaturated.</li> </ul> </li> <li>➤ General characteristics of lipids. <ul style="list-style-type: none"> <li>• Sphingolipids</li> <li>• Phospholipids</li> <li>• Sterols.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	Illustrate biomolecules with examples.
Teaching aids used:	Black board & Chalk, PPT

References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic structure of some biomolecules &amp; DNA.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Structure of nitrogenous bases , nucleotides &amp; nucleic acids.</li> <li>➤ Hydrogen ion concentration in biological fluids.</li> <li>➤ PH measurement.</li> <li>➤ Types of buffers &amp; their uses in biological reactions.</li> <li>➤ Applications of colorimetry &amp; chromatography ( paper &amp; thin layer )</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Paper chromatography.</li> <li>▪ PH measurement.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write a note on nitrogenous bases.</li> <li>• Write an essay on chromatography with its applications.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: FERMENTED FOODS</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand the concept of fermented foods and illustrate examples of fermented foods.</li> <li>• To know about the health aspects of fermented foods.</li> <li>• To demonstrate processing of fermented vegetables and pickles.</li> <li>• To understand about dairy microbiology and significance of microbes in milk.</li> <li>• To analyse various milk products.</li> <li>• To learn about pre and probiotics.</li> </ul>

Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation and fermented products used in our day today life.</li> <li>• Basics knowledge on milk products.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to fermentation.</li> <li>➤ Fermented foods : Idly, etc.</li> <li>➤ Fermented vegetables : Sauerkraut.</li> <li>➤ Fermented pickles : Dill pickles.</li> <li>➤ Dairy microbiology – Types of microorganisms in milk. Significance of microbes in milk.</li> <li>➤ Microbial milk products – Bulgarian milk, kefir, cheese, yogurt.</li> <li>➤ Microorganisms as food : Prebiotics &amp; probiotics.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of various fermented foods .</li> <li>▪ Observation of various milk products available in market.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*Food microbiology by Frazier,</li> <li>* Food microbiology – Telugu academy.</li> <li>* Food science by V.srilakshmi.</li> <li>* Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observation of various fermented foods .</li> <li>• Observation of various milk products available in market Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand microbial food spoilage.</li> <li>• To know about quality assessment of foods &amp; quality control.</li> <li>• To know about various food preservation methods.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of types of food &amp; food spoilage.</li> <li>• Basic preservation methods of foods we use in our daily life.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microbial spoilage of foods,</li> <li>➤ Microbial food poisoning, risks &amp; hazards.</li> <li>➤ Mycotoxins &amp; their toxicity.</li> <li>➤ Food preservation methods &amp; food safety issues.</li> <li>➤ Food quality: importance &amp; functions of quality control.</li> <li>➤ Methods of quality assessment of foods.</li> <li>➤ Screening &amp; enumeration of spoilage microorganisms.</li> <li>➤ Detection of pathogens in food.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms of different spoiled foods under microscope.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*Food microbiology by Frazier,</li> <li>* Food microbiology – Telugu academy.</li> <li>* Food science by V.srilakshmi.</li> <li>* Internet</li> </ul>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>
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<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand microbial food spoilage.</li> <li>• To know about quality assessment of foods &amp; quality control.</li> <li>• To know about various food preservation methods.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of types of food &amp; food spoilage.</li> <li>• Basic preservation methods of foods we use in our daily life.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microbial spoilage of foods,</li> <li>➤ Microbial food poisoning, risks &amp; hazards.</li> <li>➤ Mycotoxins &amp; their toxicity.</li> <li>➤ Food preservation methods &amp; food safety issues.</li> <li>➤ Food quality: importance &amp; functions of quality control.</li> <li>➤ Methods of quality assessment of foods.</li> <li>➤ Screening &amp; enumeration of spoilage microorganisms.</li> <li>➤ Detection of pathogens in food.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms of different spoiled foods under microscope.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT

References:	<ul style="list-style-type: none"> <li>*Food microbiology by Frazier,</li> <li>* Food microbiology – Telugu academy.</li> <li>* Food science by V.srilakshmi.</li> <li>* Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: AIR &amp; WATER MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms in air &amp; water.</li> <li>• To learn about sanitary quality of water.</li> <li>• To learn about water borne diseases.</li> <li>• To understand sewage treatment process.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of diseases &amp; their transmission.</li> <li>• Basic microbes present in air &amp; water.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microorganisms in air &amp; their importance.</li> <li>➤ Microorganisms &amp; water pollution.</li> <li>➤ Water borne pathogenic microorganisms &amp; their transmission.</li> <li>➤ Sanitary quality of water.</li> <li>➤ Water pollution due to degradation of organic matter.</li> <li>➤ Aerobic &amp; anaerobic sewage treatment.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various microorganisms in different water samples under microscope.</li> <li>• Explain sewage treatment.</li> <li>• List out various diseases transmitted by water &amp; their causative agents.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: SOIL MICROBIOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms soil.</li> <li>• To learn about enumeration of microbes in soil .</li> <li>• To learn about microbes &amp; plant interactions.</li> <li>• To understand biogeochemical cycles.</li> </ul>

Previous knowledge required:	<ul style="list-style-type: none"> <li>• Examples of microorganisms .</li> <li>• .microbial interactions like symbiosis , antagonism, etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Soil properties ( physical, chemical &amp; biological )</li> <li>➤ Soil microorganisms.</li> <li>➤ Methods of enumeration &amp;. activity of microbes in environment/ soil.</li> <li>➤ Microbes &amp; plant interactions- Rhizosphere, Phyllosphere , Mycorrhizae.</li> <li>➤ Introduction to microbial bioremediation.</li> <li>➤ Microbial degradation of organic pollutants.</li> <li>➤ Carbon &amp; Nitrogen cycle.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain about microbial degradation of organic pollutants.</li> <li>• Practice carbon &amp; nitrogen cycles.</li> </ul>

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**TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN**

**DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL BACTERIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To learn about host pathogen interactions.</li> <li>• To acquire knowledge on airborne , food borne water borne and sexually transmitted diseases.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common infections like fever, cold, throat infections, stomach infections.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Normal flora of human body- its significance like production of important vitamins, colicins, protection from pathogens, helps in digestion etc.</li> <li>➤ Host pathogen interactions.</li> <li>➤ Bacterial toxins- exo and endo toxins.</li> <li>➤ Virulence and attenuation.</li> <li>➤ Anti-microbial resistance – MDRS.</li> <li>➤ multiple drug therapy.</li> <li>➤ Air borne diseases-Tuberculosis.</li> <li>➤ Food and water borne diseases- cholera, typhoid.</li> <li>➤ Contact diseases – syphilis, Gonorrhoea Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT

References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on various diseases.</li> </ul>

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<p><b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b></p> <p><b>DEVARAKONDA</b></p>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL VIROLOGY &amp; PARASITOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To acquire knowledge on viral diseases- Transmission.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common viral infections like fever, cold, throat infections, stomach infections.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Food &amp; water borne diseases-Poliomyelitis, Amoebiasis.</li> <li>➤ Insect borne diseases- Malaria, Dengue fever.</li> <li>➤ Zoonotic diseases – Rabies.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Viral diseases – Hepatitis B, HIV, SARS, MERS.</li> <li>➤ Air borne diseases- Influenza. Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by Chand Pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on brief note on diseases.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: Introduction to immunology</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology &amp; immunology.</li> <li>• To acquire knowledge on immunity, organs and cells responsible for immunity.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on how immunity helps to fight with diseases.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of immunology- contributions of various scientists in the field of immunology.</li> <li>➤ Immunity- types . Innate &amp; acquired.</li> </ul> <p>Organs of immune system – primary lymphoid organs-thymus, bone marrow. Secondary lymphoid organs – spleen, lymph node, bursa of fabricus.</p> <ul style="list-style-type: none"> <li>➤ Cells of immune system – B &amp; T lymphocytes, Natural killer cells, polymorphonuclear cells.</li> <li>➤ Structure &amp; classification of antigens.</li> <li>➤ Factors affecting antigenicity.</li> <li>➤ Antibodies basic structure, types, properties and functions of immunoglobulins.</li> <li>➤ Humoral and cell mediated immune response.</li> <li>➤ Major histocompatibility complex – class I &amp; II.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Charts showing cells and organs of immune system , antibodies.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> </ul>

	* Immunology by chand pasha- Kalyani publications.
Student activity planned/ homework given:	• .

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: Medical Microbiology &amp; Immunology</b>	<b>Topic: Immunological disorders &amp; AG-AB Interactions.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on immunological disorders .</li> <li>• To know about AG-AB interactions.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of immunity, antigens and antibody types , structure , factors, etc</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Hypersensitivity- types</li> <li>➤ Immediate &amp; delayed</li> <li>➤ Systemic and localized auto immune disorders- causes, symptoms, prevention and treatment.</li> <li>➤ Complement pathways – classical and alternate.</li> <li>➤ Types of AG-AB interactions – precipitation (in gel &amp; in liquid), agglutination, neutralization, complement fixation test.</li> <li>➤ Labelled antibody techniques – ELISA, RIA &amp; IFT.</li> <li>➤ Poly clonal &amp; mono clonal antibodies –</li> <li>➤ Hybridoma technology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures showing AG-AB interactions.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on hybridoma technology.</li> <li>• Essay on auto immune diseases.</li> <li>• Essay on precipitation reactions.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microorganisms and selection</b>

Learning objectives:	<ul style="list-style-type: none"> <li>To acquire knowledge on industrial microbiology, how microbes are used in industries for the welfare of mankind.</li> <li>To analyse industrially produced compounds.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Basic knowledge on fermentation, fermented products used in our daily lives.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to industrial microbiology, microbes of industrial importance- yeast, molds, bacteria, actinomycetes.</li> <li>➤ Screening and selection of industrially important microbes.</li> <li>➤ Steps to maintain seed culture and inoculation strategies for enhanced product yield.</li> <li>➤ Strain improvement strategies.</li> <li>➤ Immobilization methods- adsorption and entrapment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Showing fermented foods.</li> <li>➤ Microscopical observation of yeast, algae, fungi and bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Industrial microbiology – A.H.Patel</li> <li>Industrial microbiology – Casida.</li> <li>* applied microbiology by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>Essay on screening and strain improvement strategies.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>

<b>Subject: Industrial Microbiology</b>	<b>Topic: Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn about Fermentation.</li> <li>• Illustrate examples of fermented products.</li> <li>• To understand the construction of fermenter and parameters required for it.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation, fermented products and microbes involved in the process.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Design of bioreactor, physico -chemical factors used in bioreactors.</li> <li>➤ Limitations of bioreactor, fermentation equipment and its use.</li> <li>➤ Design of fermenter, types of fermenter, anti foam. Agitation, aeration, PH, temperature control ,stages of fermentation process, inoculation media, raw materials used in fermentation media and their processing,</li> <li>➤ Downstream processing.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Construction of bioreactor.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Chart on bioreactor.</li> <li>• Essay on down stream processing</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject : Industrial Microbiology</b>	<b>Topic: Types of Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>To gain knowledge on types of fermentations.</li> <li>To understand the concept of kinetics in fermentations.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Knowledge on fermentation, fermentor is required.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Types of fermentations: Batch, Fed batch, continuous types – chemostat, turbidostatic.</li> <li>➤ Kinetics .</li> <li>➤ Submerged, surface, solid state, dual and multiple fermentations.</li> <li>➤ Advantages and disadvantages of solid substrate and liquid fermentations.</li> <li>➤ Common microbial fermentations- alcohol and lactic acid fermentations.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ video showing types of fermenters.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>Essay on types of fermentation process – advantages and disadvantages.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microbial Products.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial products.</li> <li>• To understand the process of disposal of industrial waste.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge required on fermentation, types.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Industrial products derived from microbes: vitamin B 12, vaccines like recombinant vaccines, production of beverages like beer and wine, biofuels like biogas and methane, enzymes(amylase), antibiotics ( penicillin), amino acids ( glutamic acid ,( organic acid ( citric acid ) etc.</li> <li>➤ Disposal of industrial waste.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>✓ Demonstrating the process of fermented products preparation</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• essay on beer production.</li> <li>• Mention industrially important microbes and their product.</li> </ul>

## SYNOPSIS FOR THE ACADEMIC YEAR 2019-2022

<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: HISTORY OF MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about definition and history of microbiology</li> <li>• Understand contributions of various scientists in microbiology.</li> <li>• Learn &amp; explain importance and applications of microbiology.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Meaning of microbiology.</li> <li>• Some diseases &amp; it's causative agents</li> <li>• Examples of microorganisms</li> <li>• Day to day applications of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Evolution of microbes</li> <li>• Abiogenesis &amp; Biogenesis theory with swan neck experiment.</li> <li>• Immunization – Edward Jenner experiment with vaccinia virus.</li> <li>• Germ theory of diseases- Robert koch's postulate</li> <li>• Antonyvon Leeuwenhoek,Louis Pasteur , Robert koch, Edward Jenner, Winogradsky,Alexander Fleming, Iwanovsky, Beijerinck.</li> <li>• Applications of microbiology and career prospects of microbiology.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Chart showing various applications &amp; career prospects in microbiology.</li> <li>• Gave examples of microorganisms &amp; their application.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>* Illustrate various applications of microbiology with examples &amp; explain about scope of microbiology.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: MICROSCOPY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn &amp; demonstrate microscopy, Principle &amp; types.</li> <li>• To Understand Definition of staining.</li> <li>• To demonstrate process of staining.</li> </ul>

	<ul style="list-style-type: none"> <li>To explain types of staining.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Basics of microscopy.</li> <li>Handling and working of microscope.</li> <li>Basic morphology of microorganisms.</li> <li>Examples of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>Microscopy definition – Principles- Resolving power, Magnification. Definitions of focal length, numerical aperture, angular aperture.</li> <li>Types of microscopes- Bright field microscope, principle &amp; applications, Dark field microscope – principle &amp; applications.</li> <li>Phase contrast &amp; Fluorescence microscope – Principle &amp; applications</li> <li>Electron microscopy, preparations of specimen, principle &amp; applications &amp; types – Scanning Electron microscope &amp; Transmission electron microscope.</li> <li>Determination of size of microorganisms- Ocular &amp; stage micrometry.</li> <li>Staining – stains- auxochrome, chromophore, mordant.</li> <li>stains- acidic, Basic , Neutral examples</li> <li>Simple staining – Positive Staining (Direct staining), Negative staining ( Indirect staining)</li> <li>Differential staining – Gram’ s staining – principle , procedure and examples of gram +ve, Gram -ve bacteria.</li> <li>Acid fast staining – Principle , Procedure &amp; examples of Acid fast &amp; Non acid fast Bacteria.</li> <li>Special staining – Endospore Staining- principle , Procedure.</li> <li>Bacterial motility by Hanging drop method.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>Demonstrated working of microscope.</li> <li>Demonstrated size determination of microorganisms.</li> <li>Demonstration of staining – Simple staining, Gram’s staining, Fungal staining &amp; Hanging drop method.</li> </ul>

	<ul style="list-style-type: none"> <li>• Observation of microorganisms from various samples collected from our college.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Draw microscope diagram and explain about various types of microscopes with applications.</li> <li>• Explain differential staining with examples?</li> <li>• Explain endospore staining?</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>

<b>Subject: General Microbiology - I</b>	<b>Topic: Microbiological techniques</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about sterilization.</li> <li>• Understand different types of sterilization &amp; mechanism.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on sterilization</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Sterilization &amp; disinfection techniques- physical methods: Autoclave, Hot air oven Laminar air flow, Filtration, radiation methods – U.V rays, Gamma rays, Ultrasonic methods.</li> <li>• Chemical methods : *Aldehydes *Alcohols *Phenol *Halogens, *Hypochlorides. * Fumigants.</li> <li>• Phenol – Coefficient</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of autoclave , hot air oven in lab.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	*Explain physical methods of sterilization.

	<p>*Give a note on chemical methods of sterilization.</p> <p>* Write a note on Phenol Coefficient.</p> <p>.</p>
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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: PURE CULTURE TECHNIQUES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand pure culture concept.</li> <li>• To demonstrate isolation methods of bacteria.</li> <li>• To explain preservation methods of bacteria.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic tools &amp; techniques in microbiology lab</li> <li>• Rules to be followed in microbiology lab.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>• Isolation of pure cultures <ul style="list-style-type: none"> <li>- Serial dilution process</li> <li>- Spread plate method</li> <li>- Streak plate method</li> <li>- Pour plate method</li> <li>- Single cell isolation method- micromanipulator method.</li> </ul> </li> <li>• Preservation of microbial cultures: <ul style="list-style-type: none"> <li>- Subculturing</li> <li>- overlaying with mineral oils.</li> <li>- Lyophilization.</li> <li>- Cryophilization.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of isolation methods.</li> <li>• Ppt showing preservation methods of microbial cultures.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by Pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain isolation methods of bacteria.</li> <li>• Explain preservation of microbial cultures.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOLOGY OF MICROORGANISM</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand classification of living organism.</li><li>• To differentiate prokaryotes &amp; eukaryotes.</li><li>• To explain general characteristics of different bacteria.</li><li>• Learn Bergey's manual for bacterial classification.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Morphology &amp; general characters of bacteria.</li><li>• 2 kingdom classification by Linnaeus.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Classification of living organisms:<ul style="list-style-type: none"><li>• Haeckel</li><li>• Whittaker</li><li>• Carl woese system of domain classification<ul style="list-style-type: none"><li>➤ Place of microorganisms in the living world.</li><li>➤ Differentiation of prokaryotes &amp; Eukaryotes.</li><li>➤ Prokaryotes : general characters of bacteria, Archaeobacteria,Rickettsias, Mycoplasma, cyanobacteria,Actinomycetes.</li></ul></li></ul></li></ul>

	<ul style="list-style-type: none"> <li>➤ Classification of bacteria per the second edition of Bergey's manual of systemic Bacteriology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write differences between prokaryotes &amp; eukaryotes.</li> <li>• Explain Bergey's manual.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: STRUCTURE OF MICROORGANISMS</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand ultra structure of bacterial cell.</li><li>• To explain general characteristics of viruses.</li><li>• Learn virus classification.</li><li>• To explain general characteristics of eukaryotes with examples.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Morphology &amp; general characters of bacteria.</li><li>• Basic knowledge on eukaryotes.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Ultrastructure of bacterial cell:<ul style="list-style-type: none"><li>• Cell wall, cell membrane, ribosomes, nucleoid, flagella, capsule, fimbriae, endospore, storage granules.</li><li>• General characters &amp; classification of viruses.</li><li>• Morphology &amp; structure of TMV &amp; HIV.</li><li>• Structure &amp; multiplication of Lambda bacteriophage.</li><li>• General characteristics of eukaryotic microorganisms:<ul style="list-style-type: none"><li>➤ Protozoa</li><li>➤ Microalgae</li><li>➤ Yeast</li><li>➤ Molds.</li></ul></li></ul></li></ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"><li>• Demonstration of prokaryote &amp; Eukaryote charts.</li><li>• Ppt showing morphology of different types of eukaryotic microorganisms.</li><li>• Demonstration of ultra structure of bacterial cell.</li></ul>

Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain ultra structure of bacterial cell</li> <li>• Write about lytic &amp; lysogenic cycles of lambda phage..</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Outline &amp; general characters of carbohydrates. <ul style="list-style-type: none"> <li>▪ Monosaccharides</li> <li>▪ Disaccharides</li> <li>▪ Polysaccharides.</li> </ul> </li> <li>➤ General characteristics of aminoacids &amp; proteins.</li> <li>➤ General characteristics of fatty acids <ul style="list-style-type: none"> <li>• Saturates &amp; unsaturated.</li> </ul> </li> <li>➤ General characteristics of lipids. <ul style="list-style-type: none"> <li>• Sphingolipids</li> <li>• Phospholipids</li> <li>• Sterols.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<p>Illustrate biomolecules with examples.</p>
Teaching aids used:	<p>Black board &amp; Chalk, PPT</p>
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand different biomolecules.</li><li>• To classify biomolecules with examples.</li><li>• To understand importance of biomolecules .</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Outline &amp; general characters of carbohydrates.<ul style="list-style-type: none"><li>▪ Monosaccharides</li><li>▪ Disaccharides</li><li>▪ Polysaccharides.</li></ul></li><li>➤ General characteristics of aminoacids &amp; proteins.</li><li>➤ General characteristics of fatty acids<ul style="list-style-type: none"><li>• Saturates &amp; unsaturated.</li></ul></li><li>➤ General characteristics of lipids.<ul style="list-style-type: none"><li>• Sphingolipids</li><li>• Phospholipids</li><li>• Sterols.</li></ul></li></ul>

Illustrations/ Demonstration shown:	Illustrate biomolecules with examples.
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: MICROBIAL PHYSIOLOGY &amp; ENZYMOLOGY</b>	<b>Topic: MICROBIAL METABOLISM</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about microbial metabolism.</li> <li>• Understand different processes in microbial metabolism.</li> <li>• Explain nutritional group of microorganisms.</li> </ul>

	<ul style="list-style-type: none"> <li>• Illustrate bacterial media with examples.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Meaning of anabolism, catabolism</li> <li>• Enzymes responsible for digestion &amp; respiration.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Definition of respiration- <ul style="list-style-type: none"> <li>* Glycolysis</li> <li>* kreb's cycle.</li> <li>* HMP pathway</li> <li>* ED pathway</li> <li>* Anaplerotic reaction</li> <li>*Electron transport chain</li> <li>* oxidative phosphorylation</li> </ul> </li> </ul>
Illustrations / Demonstration shown:	<ul style="list-style-type: none"> <li>• Charts shown on various cycles.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>*Discuss in detail about glycolysis.</li> <li>*Explain uptake of nutrients.</li> <li>* Practise TCA cycle, ED pathway, HMP pathway.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: MICROBIAL PHYSIOLOGY &amp; ENZYMOLOGY</b>	<b>Topic: Microbial Nutrition</b>
Learning objectives:	<ul style="list-style-type: none"><li>• Know about microbial nutrition, understand nutritional requirement.</li><li>• Understand uptake of nutrients by cell.</li><li>• Demonstrate nutritional groups of microorganisms.</li></ul>
knowledge required:	<ul style="list-style-type: none"><li>• Basic knowledge on nutrition and important nutrients required for life.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>• Microbial Nutrition- nutritional requirement, uptake of nutrients by cell – uniport, symport, antiport, group translocation.</li><li>• Nutritional groups of microorganisms – autotrophs, heterotrophs, mixotrophs.</li><li>• Components and types of bacterial growth media- simple and complex media.</li><li>•</li></ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"><li>• Demonstration of microbial nutrition and nutritional group of microorganisms.</li></ul>
Teaching aids used:	Black board & Chalk, ppt
References:	*General microbiology by Dube & Maheshwari. *Introductory Microbiology by R.P. Singh *Textbook of microbiology by pelczar *Textbook of microbiology by Prescott.

Student activity planned/ homework given:	<p>*Explain uptake of nutrients by microbial cell.</p> <p>*Give a note on nutritional types of microorganisms.</p>
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<p align="center"><b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b></p>	
<p align="center"><b>DEVARAKONDA</b></p>	
Name of the Faculty: S.Bhavana laxmi	Department: Microbiology
Course/Group: MB.Z.C	Semester: I
Subject: MICROBIAL PHYSIOLOGY & ENZYMOLOGY	Topic: BIOMOLECULES
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic structure of some biomolecules &amp; DNA.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Structure of nitrogenous bases , nucleotides &amp; nucleic acids.</li> <li>➤ Hydrogen ion concentration in biological fluids.</li> <li>➤ PH measurement.</li> <li>➤ Types of buffers &amp; their uses in biological reactions.</li> <li>➤ Applications of colorimetry &amp; chromatography ( paper &amp; thin layer )</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Paper chromatography.</li> <li>▪ PH measurement.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write a note on nitrogenous bases.</li> <li>• Write an essay on chromatography with its applications.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: MICROBIAL PHYSIOLOGY &amp; ENZYMOLOGY</b>	<b>Topic: ENZYMES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different Enzymes</li> <li>• To classify enzymes and understand nomenclature with examples.</li> <li>• To understand importance of enzymes .</li> <li>• To analyse enzyme kinetics.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on the enzymes used in our day today life.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Introduction of enzymes.</li> <li>➤ Nomenclature</li> <li>➤ Classification with examples.</li> <li>➤ Enzyme action.</li> <li>➤ Enzyme kinetics- Michaelis menten constant.</li> <li>➤ Theories of enzyme action –</li> <li>➤ Fischer theory – lock &amp; key hypothesis.</li> <li>➤ Koshland – induced fit theory.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Video shown on enzyme action.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write about nomenclature and classification of enzymes.</li> <li>• Collect the names of various enzymes and their roles.</li> </ul>

**TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN**

**DEVARAKONDA**

**Name of the Faculty: S.Bhavana laxmi**

**Department: Microbiology**

<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand microbial food spoilage.</li> <li>• To know about quality assessment of foods &amp; quality control.</li> <li>• To know about various food preservation methods.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of types of food &amp; food spoilage.</li> <li>• Basic preservation methods of foods we use in our daily life.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microbial spoilage of foods,</li> <li>➤ Microbial food poisoning, risks &amp; hazards.</li> <li>➤ Mycotoxins &amp; their toxicity.</li> <li>➤ Food preservation methods &amp; food safety issues.</li> <li>➤ Food quality: importance &amp; functions of quality control.</li> <li>➤ Methods of quality assessment of foods.</li> <li>➤ Screening &amp; enumeration of spoilage microorganisms.</li> <li>➤ Detection of pathogens in food.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms of different spoiled foods under microscope.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*Food microbiology by Frazier,</li> <li>* Food microbiology – Telugu academy.</li> <li>* Food science by V.srilakshmi.</li> <li>* Internet</li> </ul>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>
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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand microbial food spoilage.</li> <li>• To know about quality assessment of foods &amp; quality control.</li> <li>• To know about various food preservation methods.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of types of food &amp; food spoilage.</li> <li>• Basic preservation methods of foods we use in our daily life.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Microbial spoilage of foods,</li> <li>➤ Microbial food poisoning, risks &amp; hazards.</li> <li>➤ Mycotoxins &amp; their toxicity.</li> <li>➤ Food preservation methods &amp; food safety issues.</li> <li>➤ Food quality: importance &amp; functions of quality control.</li> <li>➤ Methods of quality assessment of foods.</li> <li>➤ Screening &amp; enumeration of spoiled microorganisms.</li> <li>➤ Detection of pathogens in food.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms of different spoiled foods under microscope.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*Food microbiology by Frazier,</li> <li>* Food microbiology – Telugu academy.</li> <li>* Food science by V.srilakshmi.</li> <li>* Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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**TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN****DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: MICROBIAL FOOD SPOILAGE</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand microbial food spoilage.</li><li>• To know about quality assessment of foods &amp; quality control.</li><li>• To know about various food preservation methods.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Basics of types of food &amp; food spoilage.</li><li>• Basic preservation methods of foods we use in our daily life.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Microbial spoilage of foods,</li><li>➤ Microbial food poisoning, risks &amp; hazards.</li><li>➤ Mycotoxins &amp; their toxicity.</li><li>➤ Food preservation methods &amp; food safety issues.</li><li>➤ Food quality: importance &amp; functions of quality control.</li><li>➤ Methods of quality assessment of foods.</li><li>➤ Screening &amp; enumeration of spoilage microorganisms.</li><li>➤ Detection of pathogens in food.</li></ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"><li>▪ Observation of microorganisms of different spoiled foods under microscope.</li></ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"><li>*Food microbiology by Frazier,</li><li>* Food microbiology – Telugu academy.</li><li>* Food science by V.srilakshmi.</li><li>* Internet</li></ul>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various spoiled foods under microscope.</li> <li>• Explain food preservation methods.</li> </ul>

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<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: AIR &amp; WATER MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms in air &amp; water.</li> <li>• To learn about sanitary quality of water.</li> <li>• To learn about water borne diseases.</li> <li>• To understand sewage treatment process.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of diseases &amp; their transmission.</li> <li>• Basic microbes present in air &amp; water.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Microorganisms in air &amp; their importance.</li> <li>➤ Microorganisms &amp; water pollution.</li> <li>➤ Water borne pathogenic microorganisms &amp; their transmission.</li> <li>➤ Sanitary quality of water.</li> <li>➤ Water pollution due to degradation of organic matter.</li> <li>➤ Aerobic &amp; anaerobic sewage treatment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various microorganisms in different water samples under microscope.</li> <li>• Explain sewage treatment.</li> <li>• List out various diseases transmitted by water &amp; their causative agents.</li> </ul>

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**TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN**

**DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: FOOD &amp; ENVIRONMENTAL MICROBIOLOGY</b>	<b>Topic: SOIL MICROBIOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms soil.</li> <li>• To learn about enumeration of microbes in soil .</li> <li>• To learn about microbes &amp; plant interactions.</li> <li>• To understand biogeochemical cycles.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Examples of microorganisms .</li> <li>• .microbial interactions like symbiosis , antagonism, etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Soil properties ( physical, chemical &amp; biological )</li> <li>➤ Soil microorganisms.</li> <li>➤ Methods of enumeration &amp;. activity of microbes in environment/ soil.</li> <li>➤ Microbes &amp; plant interactions- Rhizosphere, Phyllosphere , Mycorrhizae.</li> <li>➤ Introduction to microbial bioremediation.</li> <li>➤ Microbial degradation of organic pollutants.</li> <li>➤ Carbon &amp; Nitrogen cycle.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain about microbial degradation of organic pollutants.</li> <li>• Practice carbon &amp; nitrogen cycles.</li> </ul>
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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL BACTERIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To learn about host pathogen interactions.</li> <li>• To acquire knowledge on airborne , food borne water borne and sexually transmitted diseases.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common infections like fever, cold, throat infections, stomach infections.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Normal flora of human body- its significance like production of important vitamins, colicins, protection from pathogens, helps in digestion etc.</li> <li>➤ Host pathogen interactions.</li> <li>➤ Bacterial toxins- exo and endo toxins.</li> <li>➤ Virulence and attenuation.</li> <li>➤ Anti-microbial resistance – MDRS.</li> <li>➤ multiple drug therapy.</li> <li>➤ Air borne diseases-Tuberculosis.</li> <li>➤ Food and water borne diseases- cholera, typhoid.</li> <li>➤ Contact diseases – syphilis, Gonorrhoea Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on various diseases.</li> </ul>

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**DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: MEDICAL VIROLOGY &amp; PARASITOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To know about history of medical microbiology.</li> <li>• To acquire knowledge on viral diseases- Transmission.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Basic knowledge on common viral infections like fever, cold, throat infections, stomach infections.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li><li>➤ Food &amp; water borne diseases- Poliomyelitis, Amoebiasis.</li><li>➤ Insect borne diseases- Malaria, Dengue fever.</li><li>➤ Zoonotic diseases – Rabies.</li><li>➤ Viral diseases – Hepatitis B, HIV, SARS,MERS.</li><li>➤ Air borne diseases- Influenza. Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li></ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on brief note on diseases.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: MEDICAL MICROBIOLOGY &amp; IMMUNOLOGY</b>	<b>Topic: Introduction to immunology</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology &amp; immunology.</li> </ul>

	<ul style="list-style-type: none"> <li>• To acquire knowledge on immunity, organs and cells responsible for immunity.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on how immunity helps to fight with diseases.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of immunology- contributions of various scientists in the field of immunology.</li> <li>➤ Immunity- types . Innate &amp; acquired.</li> </ul> <p>Organs of immune system – primary lymphoid organs-thymus, bone marrow. Secondary lymphoid organs – spleen, lymph node, bursa of fabricus.</p> <ul style="list-style-type: none"> <li>➤ Cells of immune system – B &amp; T lymphocytes, Natural killer cells, polymorphonuclear cells.</li> <li>➤ Structure &amp; classification of antigens.</li> <li>➤ Factors affecting antigenicity.</li> <li>➤ Antibodies basic structure, types, properties and functions of immunoglobulins.</li> <li>➤ Humoral and cell mediated immune response.</li> <li>➤ Major histocompatibility complex – class I &amp; II.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Charts showing cells and organs of immune system , antibodies.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT

References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• .</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: Medical Microbiology &amp; Immunology</b>	<b>Topic: Immunological disorders &amp; AG-AB Interactions.</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on immunological disorders .</li> <li>• To know about AG-AB interactions.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of immunity, antigens and antibody types , structure , factors, etc</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Hypersensitivity- types</li> <li>➤ Immediate &amp; delayed</li> <li>➤ Systemic and localized auto immune disorders- causes, symptoms, prevention and treatment.</li> <li>➤ Complement pathways – classical and alternate.</li> <li>➤ Types of AG-AB interactions – precipitation (in gel &amp; in liquid),agglutination, neutralization, complement fixation test.</li> <li>➤ Labelled antibody techniques – ELISA, RIA &amp; IFT.</li> <li>➤ Poly clonal &amp; mono clonal antibodies –</li> <li>➤ Hybridoma technology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures showing AG-AB interactions.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on hybridoma technology.</li> <li>• Essay on auto immune diseases.</li> <li>• Essay on precipitation reactions.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Microbial Genetics.</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To acquire knowledge on microbial genetics.</li><li>• To understand the structure and functions of genetic material.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Basic concept gene, its function.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Fundamentals of genetics- Mendelian laws</li><li>➤ Law of segregation - mono hybrid cross.</li><li>➤ Law of independent assortment – dihybrid cross.</li><li>➤ Alleles, crossing over, linkage.</li><li>➤ DNA as genetic material – Griffith experiment, Avery, Macloed &amp; Maccarty experiment on transformation principle, Hershey and chase experiment.</li><li>➤ RNA as genetic material.</li><li>➤ Structure of DNA- Watson &amp; Crick model of double helical structure of DNA.</li><li>➤ Extra chromosomal elements- Plasmids &amp; transposons – types and functions.</li><li>➤ Replication of DNA, semi conservative model. Enzymes involved in replication process.</li></ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"><li>➤ Charts showing DNA replication.</li><li>➤ Demonstration of DNA Double helical model.</li></ul>

Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Practice DNA model preparation.</li> <li>• Essay on DNA replication.</li> <li>• Essay on Watson &amp; crick DNA model</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Mutations &amp; Genetic recombination.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial genetics.</li> <li>• To understand the structure and functions of genetic material.</li> <li>• To learn about genetic recombination and mutations</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept gene, its structure &amp; function.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Mutations – sudden heritable change in DNA.</li> <li>➤ Spontaneous &amp; induced, base pair changes, frame shift, deletions,</li> <li>➤ inversion, tandem duplication, insertion, etc.</li> <li>➤ various physical &amp; chemical mutagens.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Outline of DNA damage and repair mechanism.</li> <li>➤ Gene transfer among bacteria –</li> <li>➤ Transformation, conjugation, transduction.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Charts showing DNA mutations.</li> <li>➤ Charts showing gene transfer mechanisms.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on DNA damage and repair mechanism.</li> <li>• Charts preparation on gene transfer methods.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Gene Expression</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial genetics.</li> <li>• To gain knowledge on gene expression.</li> </ul>

	<ul style="list-style-type: none"> <li>To know about types of RNA &amp; OPERON concept.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Basic concept gene, its structure &amp; function.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Concept of gene – muton, recon, cistron.</li> <li>➤ One gene-one enzyme, one gene - one polypeptide, one gene - one product hypothesis.</li> <li>➤ Types of RNA and their functions. (M,T, R)</li> <li>➤ Transcription in prokaryotes.</li> <li>➤ Genetic code.</li> <li>➤ Structure of ribosomes.</li> <li>➤ Translation- protein synthesis.</li> <li>➤ Types of genes- structural, constitutive, regulatory.</li> <li>➤ OPERON concept, regulation of gene expression in bacteria.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Video showing transcription and translation.</li> <li>➤ Demonstration LAC OPERON.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on transcription and translation.</li> <li>• Chart preparation on LAC OPERON.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Recombinant DNA Technology.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on RDNA technology.</li> <li>• To understand gene cloning methods.</li> <li>• To learn the concept of genomic libraries.</li> <li>• To gain knowledge on applications of genetic engineering.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept gene, its structure &amp; function.</li> <li>• Knowledge required on replication and enzymes involved in replication.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Basic principles of genetic engineering- restriction endonucleases, DNA polymerases, ligases.</li> <li>➤ vectors.</li> <li>➤ Outline of gene cloning methods- Genomic and CDNA libraries.</li> <li>➤ Applications of genetic engineering in industry, agriculture and medicine.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Video showing preparing RDNA.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on gene cloning.</li> <li>• Various examples of cloned species and their applications in our day to day lives.</li> </ul>
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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microorganisms and selection</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on industrial microbiology, how microbes are used in industries for the welfare of mankind.</li> <li>• To analyse industrially produced compounds.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on fermentation, fermented products used in our daily lives.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to industrial microbiology, microbes of industrial importance- yeast, molds, bacteria, actinomycetes.</li> <li>➤ Screening and selection of industrially important microbes.</li> <li>➤ Steps to maintain seed culture and inoculation strategies for enhanced product yield.</li> <li>➤ Strain improvement strategies.</li> <li>➤ Immobilization methods- adsorption and entrapment.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Showing fermented foods.</li> <li>➤ Microscopical observation of yeast, algae, fungi and bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Industrial microbiology – A.H.Patel</li> <li>Industrial microbiology – Casida.</li> <li>* applied microbiology by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on screening and strain improvement strategies.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn about Fermentation.</li> <li>• Illustrate examples of fermented products.</li> <li>• To understand the construction of fermenter and parameters required for it.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation, fermented products and microbes involved in the process.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Design of bioreactor, physico -chemical factors used in bioreactors.</li> <li>➤ Limitations of bioreactor, fermentation equipment and its use.</li> <li>➤ Design of fermenter, types of fermenter, anti foam. Agitation, aeration, PH, temperature control ,stages of fermentation process, inoculation media, raw materials used in fermentation media and their processing,</li> <li>➤ Downstream processing.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Construction of bioreactor.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Chart on bioreactor.</li> <li>• Essay on down stream processing</li> </ul>

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<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b>	
<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject : Industrial Microbiology</b>	<b>Topic: Types of Fermentation.</b>

Learning objectives:	<ul style="list-style-type: none"> <li>• To gain knowledge on types of fermentations.</li> <li>• To understand the concept of kinetics in fermentations.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Knowledge on fermentation, fermentor is required.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Types of fermentations: Batch, Fed batch, continuous types – chemostat, turbidostatic.</li> <li>➤ Kinetics .</li> <li>➤ Submerged, surface, solid state, dual and multiple fermentations.</li> <li>➤ Advantages and disadvantages of solid substrate and liquid fermentations.</li> <li>➤ Common microbial fermentations- alcohol and lactic acid fermentations.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ video showing types of fermenters.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• essay on types of fermentation process – advantages and disadvantages.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microbial Products.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial products.</li> <li>• To understand the process of disposal of industrial waste.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge required on fermentation, types.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Industrial products derived from microbes: vitamin B 12, vaccines like recombinant vaccines, production of beverages like beer and wine, biofuels like biogas and methane, enzymes(amylase), antibiotics ( penicillin), amino acids ( glutamic acid ,( organic acid ( citric acid ) etc.</li> <li>➤ Disposal of industrial waste.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>✓ Demonstrating the process of fermented products preparation</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• essay on beer production.</li> <li>• Mention industrially important microbes and their product.</li> </ul>

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## SYNOPSIS FOR THE ACADEMIC YEAR 2018-2021

TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN	
DEVARAKONDA	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: HISTORY OF MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"><li>• Know about definition and history of microbiology</li><li>• Understand contributions of various scientists in microbiology.</li><li>• Learn &amp; explain importance and applications of microbiology.</li></ul>
knowledge required:	<ul style="list-style-type: none"><li>• Meaning of microbiology.</li><li>• Some diseases &amp; it's causative agents</li><li>• Examples of microorganisms</li><li>• Day to day applications of microorganisms.</li></ul>

Synopsis:	<ul style="list-style-type: none"> <li>• Evolution of microbes</li> <li>• Abiogenesis &amp; Biogenesis theory with swan neck experiment.</li> <li>• Immunization – Edward Jenner experiment with vaccinia virus.</li> <li>• Germ theory of diseases- Robert Koch's postulates</li> <li>• Antony von Leeuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Winogradsky, Alexander Fleming, Iwanovsky, Beijerinck.</li> <li>• Applications of microbiology and career prospects of microbiology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Chart showing various applications &amp; career prospects in microbiology.</li> <li>• Gave examples of microorganisms &amp; their application.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by Pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	* Illustrate various applications of microbiology with examples & explain about scope of microbiology.

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>

<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: MICROSCOPY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn &amp; demonstrate microscopy, Principle &amp; types.</li> <li>• To Understand Definition of staining.</li> <li>• To demonstrate process of staining.</li> <li>• To explain types of staining.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of microscopy.</li> <li>• Handling and working of microscope.</li> <li>• Basic morphology of microorganisms.</li> <li>• Examples of microorganisms.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Microscopy definition – Principles- Resolving power, Magnification. Definitions of focal length, numerical aperture, angular aperture.</li> <li>• Types of microscopes- Bright field microscope, principle &amp; applications, Dark field microscope – principle &amp; applications.</li> <li>• Phase contrast &amp; Fluorescence microscope – Principle &amp; applications</li> <li>• Electron microscopy, preparations of specimen, principle &amp; applications &amp; types – Scanning Electron microscope &amp; Transmission electron microscope.</li> <li>• Determination of size of microorganisms- Ocular &amp; stage micrometry.</li> <li>• Staining – stains- auxochrome, chromophore, mordant.</li> <li>• stains- acidic, Basic , Neutral examples</li> <li>• Simple staining – Positive Staining (Direct staining), Negative staining ( Indirect staining)</li> <li>• Differential staining – Gram’ s staining – principle , procedure and examples of gram +ve, Gram -ve bacteria.</li> <li>• Acid fast staining – Principle , Procedure &amp; examples of Acid fast &amp; Non acid fast Bacteria.</li> <li>• Special staining – Endospore Staining- principle , Procedure.</li> <li>• Bacterial motility by Hanging drop method.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstrated working of microscope.</li> <li>• Demonstrated size determination of microorganisms.</li> <li>• Demonstration of staining – Simple staining, Gram’s staining, Fungal staining &amp; Hanging drop method.</li> <li>• Observation of microorganisms from various samples collected from our college.</li> </ul>

Teaching aids used:	Black board & Chalk, PPT
References:	*General microbiology by Dube & Maheshwari. *Introductory Microbiology by R.P.Singh *Textbook of microbiology by pelczar *Textbook of microbiology by Prescott.
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Draw microscope diagram and explain about various types of microscopes with applications.</li> <li>• Explain differential staining with examples?</li> <li>• Explain endospore staining?</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: Microbiological techniques</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about sterilization.</li> <li>• Understand different types of sterilization &amp; mechanism.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on sterilization</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>• Sterilization &amp; disinfection techniques- physical methods: Autoclave, Hot air oven, Laminar air flow, Filtration, radiation methods – U.V rays, Gamma rays, Ultrasonic methods.</li> <li>• Chemical methods : <ul style="list-style-type: none"> <li>*Aldehydes</li> <li>*Alcohols</li> <li>*Phenol</li> <li>*Halogens,</li> <li>*Hypochlorides.</li> <li>* Fumigants.</li> </ul> </li> <li>• Phenol – Coefficient</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of autoclave , hot air oven in lab.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<p>*Explain physical methods of sterilization.</p> <p>*Give a note on chemical methods of sterilization.</p> <p>* Write a note on Phenol Coefficient.</p> <p>.</p>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology - I</b>	<b>Topic: PURE CULTURE TECHNIQUES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand pure culture concept.</li> <li>• To demonstrate isolation methods of bacteria.</li> <li>• To explain preservation methods of bacteria.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic tools &amp; techniques in microbiology lab</li> <li>• Rules to be followed in microbiology lab.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Isolation of pure cultures <ul style="list-style-type: none"> <li>- Serial dilution process</li> <li>-Spread plate method</li> <li>-Streak plate method</li> <li>-Pour plate method</li> <li>- Single cell isolation method- micromanipulator method.</li> </ul> </li> <li>• Preservation of microbial cultures: <ul style="list-style-type: none"> <li>-Subculturing</li> <li>-overlaying with mineral oils.</li> <li>-Lyophilization.</li> <li>-Cryophilization.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of isolation methods.</li> <li>• Ppt showing preservation methods of microbial cultures.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT

References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain isolation methods of bacteria.</li> <li>• Explain preservation of microbial cultures.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOLOGY OF MICROORGANISM</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand classification of living organism.</li> <li>• To differentiate prokaryotes &amp; eukaryotes.</li> <li>• To explain general characteristics of different bacteria.</li> <li>• Learn Bergey's manual for bacterial classification.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Morphology &amp; general characters of bacteria.</li> <li>• 2 kingdom classification by Linnaeus.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Classification of living organisms: <ul style="list-style-type: none"> <li>• Haeckel</li> <li>• Whittaker</li> <li>• Carl woese system of domain classification <ul style="list-style-type: none"> <li>➤ Place of microorganisms in the living world.</li> <li>➤ Differentiation of prokaryotes &amp; Eukaryotes.</li> <li>➤ Prokaryotes : general characters of bacteria, Archaeobacteria, Rickettsias, Mycoplasma, cyanobacteria, Actinomycetes.</li> <li>➤ Classification of bacteria per the second edition of Bergey's manual of systemic Bacteriology.</li> </ul> </li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote&amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write differences between prokaryotes &amp; eukaryotes.</li> <li>• Explain Bergey's manual.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: General Microbiology -II</b>	<b>Topic: STRUCTURE OF MICROORGANISMS</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand ultra structure of bacterial cell.</li> <li>• To explain general characteristics of viruses.</li> <li>• Learn virus classification.</li> <li>• To explain general characteristics of eukaryotes with examples.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Morphology &amp; general characters of bacteria.</li> <li>• Basic knowledge on eukaryotes.</li> </ul>
Synopsis:	<p style="text-align: right;">➤ Ultrastructure of bacterial cell:</p> <ul style="list-style-type: none"> <li>• Cell wall, cell membrane, ribosomes, nucleoid, flagella, capsule, fimbriae, endospore, storage granules.</li> <li>• General characters &amp; classification of viruses.</li> <li>• Morphology &amp; structure of TMV &amp; HIV.</li> <li>• Structure &amp; multiplication of Lambda bacteriophage.</li> <li>• General characteristics of eukaryotic microorganisms: <ul style="list-style-type: none"> <li>➤ Protozoa</li> <li>➤ Microalgae</li> <li>➤ Yeast</li> <li>➤ Molds.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>• Ppt showing morphology of different types of eukaryotic microorganisms.</li> <li>• Demonstration of ultra structure of bacterial cell.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p>

	<p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain ultra structure of bacterial cell</li> <li>• Write about lytic &amp; lysogenic cycles of lambda phage..</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Outline &amp; general characters of carbohydrates. <ul style="list-style-type: none"> <li>▪ Monosaccharides</li> <li>▪ Disaccharides</li> <li>▪ Polysaccharides.</li> </ul> </li> <li>➤ General characteristics of aminoacids &amp; proteins.</li> <li>➤ General characteristics of fatty acids <ul style="list-style-type: none"> <li>• Saturates &amp; unsaturated.</li> </ul> </li> <li>➤ General characteristics of lipids.</li> </ul>

	<ul style="list-style-type: none"> <li>• Spingolipids</li> <li>• Phospholipids</li> <li>• Sterols.</li> </ul>
Illustrations/ Demonstration shown:	Illustrate biomolecules with examples.
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>

<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Outline &amp; general characters of carbohydrates. <ul style="list-style-type: none"> <li>▪ Monosaccharides</li> <li>▪ Disaccharides</li> <li>▪ Polysaccharides.</li> </ul> </li> <li>➤ General characteristics of aminoacids &amp; proteins.</li> <li>➤ General characteristics of fatty acids <ul style="list-style-type: none"> <li>• Saturates &amp; unsaturated.</li> </ul> </li> <li>➤ General characteristics of lipids. <ul style="list-style-type: none"> <li>• Sphingolipids</li> <li>• Phospholipids</li> <li>• Sterols.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	Illustrate biomolecules with examples.
Teaching aids used:	Black board & Chalk, PPT
References:	<p>*General microbiology by Dube &amp; Maheshwari.</p> <p>*Introductory Microbiology by R.P.Singh</p> <p>*Textbook of microbiology by pelczar</p> <p>*Textbook of microbiology by Prescott.</p>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOLOGY OF MICROORGANISM</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand classification of living organism.</li><li>• To differentiate prokaryotes &amp; eukaryotes.</li><li>• To explain general characteristics of different bacteria.</li><li>• Learn Bergey's manual for bacterial classification.</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Morphology &amp; general characters of bacteria.</li><li>• 2 kingdom classification by Linnaeus.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Classification of living organisms:<ul style="list-style-type: none"><li>• Haeckel</li><li>• Whittaker</li><li>• Carl woese system of domain classification<ul style="list-style-type: none"><li>➤ Place of microorganisms in the living world.</li><li>➤ Differentiation of prokaryotes &amp; Eukaryotes.</li><li>➤ Prokaryotes : general characters of bacteria, Archaeobacteria, Rickettsias, Mycoplasma, cyanobacteria, Actinomycetes.</li><li>➤ Classification of bacteria per the second edition of Bergey's manual of systemic Bacteriology.</li></ul></li></ul></li></ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>Ppt showing morphology of different types of bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>Write differences between prokaryotes &amp; eukaryotes.</li> <li>Explain Bergey's manual.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: I</b>
<b>Subject: General Microbiology -II</b>	<b>Topic: STRUCTURE OF MICROORGANISMS</b>
Learning objectives:	<ul style="list-style-type: none"> <li>To Understand ultra structure of bacterial cell.</li> <li>To explain general characteristics of viruses.</li> <li>Learn virus classification.</li> </ul>

	<ul style="list-style-type: none"> <li>To explain general characteristics of eukaryotes with examples.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Morphology &amp; general characters of bacteria.</li> <li>Basic knowledge on eukaryotes.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Ultrastructure of bacterial cell: <ul style="list-style-type: none"> <li>Cell wall, cell membrane, ribosomes, nucleoid, flagella, capsule, fimbriae, endospore, storage granules.</li> </ul> </li> <li>General characters &amp; classification of viruses.</li> <li>Morphology &amp; structure of TMV &amp; HIV.</li> <li>Structure &amp; multiplication of Lambda bacteriophage.</li> <li>General characteristics of eukaryotic microorganisms: <ul style="list-style-type: none"> <li>➤ Protozoa</li> <li>➤ Microalgae</li> <li>➤ Yeast</li> <li>➤ Molds.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>Demonstration of prokaryote &amp; Eukaryote charts.</li> <li>Ppt showing morphology of different types of eukaryotic microorganisms.</li> <li>Demonstration of ultra structure of bacterial cell.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>Explain ultra structure of bacterial cell</li> <li>Write about lytic &amp; lysogenic cycles of lambda phage..</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"><li>• To Understand different biomolecules.</li><li>• To classify biomolecules with examples.</li><li>• To understand importance of biomolecules .</li></ul>
Previous knowledge required:	<ul style="list-style-type: none"><li>• Nutrition &amp; sources of carbohydrates, proteins, lipids etc.</li></ul>
Synopsis:	<ul style="list-style-type: none"><li>➤ Outline &amp; general characters of carbohydrates.<ul style="list-style-type: none"><li>▪ Monosaccharides</li><li>▪ Disaccharides</li><li>▪ Polysaccharides.</li></ul></li><li>➤ General characteristics of aminoacids &amp; proteins.</li><li>➤ General characteristics of fatty acids<ul style="list-style-type: none"><li>• Saturates &amp; unsaturated.</li></ul></li><li>➤ General characteristics of lipids.<ul style="list-style-type: none"><li>• Sphingolipids</li><li>• Phospholipids</li><li>• Sterols.</li></ul></li></ul>
Illustrations/ Demonstration shown:	Illustrate biomolecules with examples.

Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• explain carbohydrates general characteristics &amp; classification.</li> <li>• Write about general characteristics of proteins.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: II</b>
<b>Subject: General Microbiology -I I</b>	<b>Topic: BIOMOLECULES</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To Understand different biomolecules.</li> <li>• To classify biomolecules with examples.</li> <li>• To understand importance of biomolecules .</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic structure of some biomolecules &amp; DNA.</li> </ul>
	<ul style="list-style-type: none"> <li>➤ Structure of nitrogenous bases , nucleotides &amp; nucleic acids.</li> <li>➤ Hydrogen ion concentration in biological fluids.</li> <li>➤ PH measurement.</li> <li>➤ Types of buffers &amp; their uses in biological reactions.</li> </ul>

	<ul style="list-style-type: none"> <li>➤ Applications of colorimetry &amp; chromatography ( paper &amp; thin layer )</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Paper chromatography.</li> <li>▪ PH measurement.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write a note on nitrogenous bases.</li> <li>• Write an essay on chromatography with its applications.</li> </ul>

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**DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: MICROBIAL PHYSIOLOGY &amp; ENZYMOLOGY</b>	<b>Topic: Microbial growth</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about different phases of bacterial growth.</li> <li>• Understand different types of bacterial growth.</li> <li>• Understand different methods of measuring microbial growth.</li> <li>• Understand growth kinetics.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on bacterial reproduction &amp; generation time.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>• Microbial growth- <ul style="list-style-type: none"> <li>*Batch culture: <ul style="list-style-type: none"> <li>➤ Lag phase</li> <li>➤ Log phase</li> <li>➤ Stationary phase</li> <li>➤ Death phase</li> </ul> </li> <li>*Continuous culture</li> <li>* Biphasic growth</li> <li>* Synchronous growth</li> </ul> </li> </ul> <p style="text-align: center;">Factors influencing microbial growth</p> <ul style="list-style-type: none"> <li>• Methods for measuring microbial growth -- Direct microscopic count <ul style="list-style-type: none"> <li>- Viable count</li> <li>- Turbidometry</li> <li>- Biomass</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Demonstration of generation time &amp; growth kinetics.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> </ul>

	*Textbook of microbiology by Prescott.
Student activity planned/ homework given:	*Explain bacterial growth curve in batch culture. *Give a note on methods for measuring microbial growth.

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: III</b>
<b>Subject: MICROBIAL PHYSIOLOGY AND ENZYMOLOGY</b>	<b>Topic: MICROBIAL METABOLISM</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Know about microbial metabolism.</li> <li>• Understand different processes in microbial metabolism.</li> <li>• Explain nutritional group of microorganisms.</li> <li>• Illustrate bacterial media with examples.</li> </ul>
knowledge required:	<ul style="list-style-type: none"> <li>• Meaning of anabolism, catabolism</li> <li>• Enzymes responsible for digestion &amp; respiration.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>• Definition of respiration- <ul style="list-style-type: none"> <li>* Glycolysis</li> <li>* kreb's cycle.</li> <li>* HMP pathway</li> <li>* ED pathway</li> <li>* Anaplerotic reaction</li> <li>*Electron transport chain</li> <li>* oxidative phosphorylation</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>• Charts shown on various cycles.</li> </ul>
Teaching aids used:	Black board & Chalk, ppt
References:	<ul style="list-style-type: none"> <li>*General microbiology by Dube &amp; Maheshwari.</li> <li>*Introductory Microbiology by R.P.Singh</li> <li>*Textbook of microbiology by pelczar</li> <li>*Textbook of microbiology by Prescott.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>*Discuss in detail about glycolysis.</li> <li>*Explain uptake of nutrients.</li> <li>* Practise TCA cycle, ED pathway, HMP pathway.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Microbial Genetics.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial genetics.</li> <li>• To understand the structure and functions of genetic material.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept gene, its function.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Fundamentals of genetics- Mendelian laws</li> <li>➤ Law of segregation - mono hybrid cross.</li> <li>➤ Law of independent assortment – dihybrid cross.</li> <li>➤ Alleles, crossing over, linkage.</li> <li>➤ DNA as genetic material – Griffith experiment, Avery, Macloed &amp; Maccarty experiment on transformation principle, Hershey and chase experiment.</li> <li>➤ RNA as genetic material.</li> <li>➤ Structure of DNA- Watson &amp; Crick model of double helical structure of DNA.</li> <li>➤ Extra chromosomal elements- Plasmids &amp; transposons – types and functions.</li> <li>➤ Replication of DNA, semi conservative model. Enzymes involved in replication process.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Charts showing DNA replication.</li> <li>➤ Demonstration of DNA Double helical model.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> </ul>

	* Microbial genetics by Chand pasha.
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Practice DNA model preparation.</li> <li>• Essay on DNA replication.</li> <li>• Essay on Watson &amp; crick DNA model</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Mutations &amp; Genetic recombination.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial genetics.</li> <li>• To understand the structure and functions of genetic material.</li> <li>• To learn about genetic recombination and mutations</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept gene, its structure &amp; function.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Mutations – sudden heritable change in DNA.</li> <li>➤ Spontaneous &amp; induced, base pair changes, frame shift, deletions,</li> <li>➤ inversion, tandem duplication, insertion, etc.</li> <li>➤ various physical &amp; chemical mutagens.</li> <li>➤ Outline of DNA damage and repair mechanism.</li> <li>➤ Gene transfer among bacteria –</li> <li>➤ Transformation, conjugation, transduction.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Charts showing DNA mutations.</li> <li>➤ Charts showing gene transfer mechanisms.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on DNA damage and repair mechanism.</li> <li>• Charts preparation on gene transfer methods.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>
<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Gene Expression</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on microbial genetics.</li> <li>• To gain knowledge on gene expression.</li> <li>• To know about types of RNA &amp; OPERON concept.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept gene, its structure &amp; function.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Concept of gene – muton, recon, cistron.</li> <li>➤ One gene-one enzyme, one gene - one polypeptide, one gene - one product hypothesis.</li> <li>➤ Types of RNA and their functions. (M, T, R)</li> <li>➤ Transcription in prokaryotes.</li> <li>➤ Genetic code.</li> <li>➤ Structure of ribosomes.</li> <li>➤ Translation- protein synthesis.</li> <li>➤ Types of genes- structural, constitutive, regulatory.</li> <li>➤ OPERON concept, regulation of gene expression in bacteria.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Video showing transcription and translation.</li> <li>➤ Demonstration LAC OPERON.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on transcription and translation.</li> <li>• Chart preparation on LAC OPERON.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: IV</b>

<b>Subject: Molecular Biology &amp; Microbial Genetics</b>	<b>Topic: Recombinant DNA Technology.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on RDNA technology.</li> <li>• To understand gene cloning methods.</li> <li>• To learn the concept of genomic libraries.</li> <li>• To gain knowledge on applications of genetic engineering.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept gene, its structure &amp; function.</li> <li>• Knowledge required on replication and enzymes involved in replication.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Basic principles of genetic engineering- restriction endonucleases, DNA polymerases, ligases.</li> <li>➤ vectors.</li> <li>➤ Outline of gene cloning methods- Genomic and CDNA libraries.</li> <li>➤ Applications of genetic engineering in industry, agriculture and medicine.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Video showing preparing RDNA.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on gene cloning.</li> <li>• Various examples of cloned species and their applications in our day to day lives.</li> </ul>

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**DEVARAKONDA**

<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Applied Microbiology</b>	<b>Topic: Microbes in agriculture</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about soil &amp; understand its properties.</li> <li>• To learn about rhizosphere and phyllosphere.</li> <li>• To understand about plant growth promoting microorganisms and biofertilizers.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on biofertilizers.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Physical , chemical &amp; biological properties of soil.</li> <li>➤ Rhizosphere, rhizoplane, phyllosphere, phylloplane.</li> <li>➤ Phizobacteria, plant growth promoting rhizobacteria- Actinoplanes, Agrobacterium, Alkaligenes, Arthrobacter, Bacillus, Cellulomonas, pseudomonas, rhizobium, etc.</li> <li>➤ Biofertilizers – PGPM, Rhizobium, azospirillum, Frankia, Cyanobacteria, Phosphate solubilizing microorganisms, Mycorrhizae.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Soil profile diagram.</li> <li>▪ Diagrams of various microorganisms.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<p>* soil microbiology by Subba Rao.</p> <p>* Telugu academy textbook.</p>

	* Applied microbiology by Chand Pasha- Kalyani publications.
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write about rhizosphere effect.</li> <li>• Write an essay on mycorrhizae.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Applied Microbiology</b>	<b>Topic: Plant diseases &amp; biocontrol</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about plant diseases.</li> <li>• To analyse the symptoms of various plant diseases.</li> <li>• To learn about biological control of plant diseases.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on biofertilizers.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ The concept of disease in plants.</li> <li>➤ Plant disease symptoms.</li> <li>➤ Groundnut leaf rust.</li> <li>➤ Angular leaf spot of cotton.</li> <li>➤ Tomato leaf curl.</li> <li>➤ Principles of plant disease control.</li> <li>➤ Biological control of plant diseases. <ul style="list-style-type: none"> <li>• Bacillus thuringensis</li> <li>• Nuclear polyhedrosis virus.</li> <li>• Trichoderma.</li> </ul> </li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Commercial production of biopesticides.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* soil microbiology by Subba Rao.</li> <li>* Telugu academy textbook.</li> <li>* Applied microbiology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write about rhizosphere effect.</li> <li>• Write an essay on mycorrhizae.</li> </ul>

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<p>•</p> <p><b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b></p> <p><b>DEVARAKONDA</b></p>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Applied Microbiology</b>	<b>Topic: Microbial ecology</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about biogeochemical cycles.</li> <li>• To understand about microbial interactions.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on nitrogen fixation.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ The concept of disease in plants.</li> <li>➤ Plant disease symptoms.</li> <li>➤ Groundnut leaf rust.</li> <li>➤ Angular leaf spot of cotton.</li> <li>➤ Tomato leaf curl.</li> <li>➤ Principles of plant disease control.</li> <li>➤ Biological control of plant diseases. <ul style="list-style-type: none"> <li>• Bacillus thuringensis</li> <li>• Nuclear polyhedrosis virus.</li> <li>• Trichoderma.</li> </ul> </li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Commercial production of biopesticides.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* soil microbiology by Subba Rao.</li> <li>* Telugu academy textbook.</li> <li>* Applied microbiology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Write about rhizosphere effect.</li> <li>• Write an essay on mycorrhizae.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: IMMUNOLOGY</b>	<b>Topic: Introduction to immunology</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology &amp; immunology.</li> <li>• To acquire knowledge on immunity, organs and cells responsible for immunity.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on how immunity helps to fight with diseases.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of immunology- contributions of various scientists in the field of immunology.</li> <li>➤ Immunity- types . Innate &amp; acquired.</li> </ul> <p>Organs of immune system – primary lymphoid organs-thymus, bone marrow. Secondary lymphoid organs – spleen, lymph node, bursa of fabricus.</p> <ul style="list-style-type: none"> <li>➤ Cells of immune system – B &amp; T lymphocytes, Natural killer cells, polymorphonuclear cells.</li> <li>➤ Structure &amp; classification of antigens.</li> <li>➤ Factors affecting antigenicity.</li> <li>➤ Antibodies basic structure, types, properties and functions of immunoglobulins.</li> <li>➤ Humoral and cell mediated immune response.</li> <li>➤ Major histocompatibility complex – class I &amp; II.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Charts showing cells and organs of immune system , antibodies.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• .Write an essay on immune organs.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Applied Microbiology</b>	<b>Topic: AIR &amp; WATER MICROBIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms in air &amp; water.</li> <li>• To learn about sanitary quality of water.</li> <li>• To learn about water borne diseases.</li> <li>• To understand sewage treatment process.</li> </ul>

Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basics of diseases &amp; their transmission.</li> <li>• Basic microbes present in air &amp; water.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Microorganisms in air &amp; their importance.</li> <li>➤ Microorganisms &amp; water pollution.</li> <li>➤ Water borne pathogenic microorganisms &amp; their transmission.</li> <li>➤ Sanitary quality of water.</li> <li>➤ Water pollution due to degradation of organic matter.</li> <li>➤ Aerobic &amp; anaerobic sewage treatment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Observing various microorganisms in different water samples under microscope.</li> <li>• Explain sewage treatment.</li> <li>• List out various diseases transmitted by water &amp; their causative agents.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Applied Microbiology</b>	<b>Topic: SOIL MICROBIOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To understand about microorganisms soil.</li> <li>• To learn about enumeration of microbes in soil .</li> <li>• To learn about microbes &amp; plant interactions.</li> <li>• To understand biogeochemical cycles.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Examples of microorganisms .</li> <li>• .microbial interactions like symbiosis , antagonism, etc.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Soil properties ( physical, chemical &amp; biological )</li> <li>➤ Soil microorganisms.</li> <li>➤ Methods of enumeration &amp;. activity of microbes in environment/ soil.</li> <li>➤ Microbes &amp; plant interactions- Rhizosphere, Phyllosphere , Mycorrhizae.</li> <li>➤ Introduction to microbial bioremediation.</li> <li>➤ Microbial degradation of organic pollutants.</li> <li>➤ Carbon &amp; Nitrogen cycle.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Observation of microorganisms in different water samples.</li> <li>▪ Demonstration of sewage treatment</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>• Telugu academy – III year textbook.</li> <li>• Applied microbiology by Chand .</li> <li>• Applied microbiology by R.P.Singh.</li> <li>• A textbook of Microbiology by Dube &amp; Maheshwari.</li> <li>• Internet</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Explain about microbial degradation of organic pollutants.</li> <li>• Practice carbon &amp; nitrogen cycles.</li> </ul>

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<b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: V</b>
<b>Subject: Immunology</b>	<b>Topic: Immunological disorders &amp; AG-AB Interactions.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on immunological disorders .</li> <li>• To know about AG-AB interactions.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of immunity, antigens and antibody types , structure , factors, etc</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Hypersensitivity- types</li> <li>➤ Immediate &amp; delayed</li> <li>➤ Systemic and localized auto immune disorders-causes, symptoms, prevention and treatment.</li> <li>➤ Complement pathways – classical and alternate.</li> <li>➤ Types of AG-AB interactions – precipitation (in gel &amp; in liquid),agglutination, neutralization, complement fixation test.</li> <li>➤ Labelled antibody techniques – ELISA, RIA &amp; IFT.</li> <li>➤ Poly clonal &amp; mono clonal antibodies –</li> <li>➤ Hybridoma technology.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures showing AG-AB interactions.</li> </ul>

Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on hybridoma technology.</li> <li>• Essay on auto immune diseases.</li> <li>• Essay on precipitation reactions.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microorganisms and selection</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To acquire knowledge on industrial microbiology, how microbes are used in industries for the welfare of mankind.</li> <li>• To analyse industrially produced compounds.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on fermentation, fermented products used in our daily lives.</li> </ul>

Synopsis:	<ul style="list-style-type: none"> <li>➤ Introduction to industrial microbiology, microbes of industrial importance- yeast, molds, bacteria, actinomycetes.</li> <li>➤ Screening and selection of industrially important microbes.</li> <li>➤ Steps to maintain seed culture and inoculation strategies for enhanced product yield.</li> <li>➤ Strain improvement strategies.</li> <li>➤ Immobilization methods- adsorption and entrapment.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Showing fermented foods.</li> <li>➤ Microscopical observation of yeast, algae, fungi and bacteria.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Industrial microbiology – A.H.Patel</li> <li>Industrial microbiology – Casida.</li> <li>* applied microbiology by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Essay on screening and strain improvement strategies.</li> </ul>

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<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Fermentation.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• Learn about Fermentation.</li> <li>• Illustrate examples of fermented products.</li> <li>• To understand the construction of fermenter and parameters required for it.</li> </ul>

Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic concept of fermentation, fermented products and microbes involved in the process.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Design of bioreactor, physico -chemical factors used in bioreactors.</li> <li>➤ Limitations of bioreactor, fermentation equipment and its use.</li> <li>➤ Design of fermenter, types of fermenter, anti foam. Agitation, aeration, PH, temperature control ,stages of fermentation process, inoculation media, raw materials used in fermentation media and their processing,</li> <li>➤ Downstream processing.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ Construction of bioreactor.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Chart on bioreactor.</li> <li>• Essay on down stream processing</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject : Industrial Microbiology</b>	<b>Topic: Types of Fermentation.</b>

Learning objectives:	<ul style="list-style-type: none"> <li>To gain knowledge on types of fermentations.</li> <li>To understand the concept of kinetics in fermentations.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Knowledge on fermentation, fermentor is required.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Types of fermentations: Batch, Fed batch, continuous types – chemostat, turbidostatic.</li> <li>➤ Kinetics .</li> <li>➤ Submerged, surface, solid state, dual and multiple fermentations.</li> <li>➤ Advantages and disadvantages of solid substrate and liquid fermentations.</li> <li>➤ Common microbial fermentations- alcohol and lactic acid fermentations.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>➤ video showing types of fermenters.</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>essay on types of fermentation process – advantages and disadvantages.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: Industrial Microbiology</b>	<b>Topic: Microbial Products.</b>

Learning objectives:	<ul style="list-style-type: none"> <li>To acquire knowledge on microbial products.</li> <li>To understand the process of disposal of industrial waste.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>Basic knowledge required on fermentation, types.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ Industrial products derived from microbes: vitamin B 12, vaccines like recombinant vaccines, production of beverages like beer and wine, biofuels like biogas and methane, enzymes(amylase), antibiotics ( penicillin), amino acids ( glutamic acid ,( organic acid ( citric acid ) etc.</li> <li>➤ Disposal of industrial waste.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>✓ Demonstrating the process of fermented products preparation</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Telugu academy text book of microbiology</li> <li>* Microbial genetics by B.D.Singh.</li> <li>* Microbial genetics by Chand pasha.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>essay on beer production.</li> <li>Mention industrially important microbes and their product.</li> </ul>

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<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: IMMUNOLOGY</b>	<b>Topic: MEDICAL BACTERIOLOGY</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To learn about host pathogen interactions.</li> <li>• To acquire knowledge on airborne , food borne water borne and sexually transmitted diseases.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common infections like fever, cold, throat infections, stomach infections.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Normal flora of human body- its significance like production of important vitamins, colicins, protection from pathogens, helps in digestion etc.</li> <li>➤ Host pathogen interactions.</li> <li>➤ Bacterial toxins- exo and endo toxins.</li> <li>➤ Virulence and attenuation.</li> <li>➤ Anti-microbial resistance – MDRS.</li> <li>➤ multiple drug therapy.</li> <li>➤ Air borne diseases-Tuberculosis.</li> <li>➤ Food and water borne diseases- cholera, typhoid.</li> <li>➤ Contact diseases – syphilis, Gonorrhoea Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>
Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>

Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on various diseases.</li> </ul>
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Sign of the faculty

Principal's sign

<b>TELANGANA TRIBAL WELFARE RESIDENTIAL DEGREE COLLEGE FOR WOMEN</b> <b>DEVARAKONDA</b>	
<b>Name of the Faculty: S.Bhavana laxmi</b>	<b>Department: Microbiology</b>
<b>Course/Group: MB.Z.C</b>	<b>Semester: VI</b>
<b>Subject: MEDICAL MICROBIOLOGY</b>	<b>Topic: MEDICAL VIROLOGY &amp; PARASITOLOGY.</b>
Learning objectives:	<ul style="list-style-type: none"> <li>• To know about history of medical microbiology.</li> <li>• To acquire knowledge on viral diseases-Transmission.</li> </ul>
Previous knowledge required:	<ul style="list-style-type: none"> <li>• Basic knowledge on common viral infections like fever, cold, throat infections, stomach infections.</li> </ul>
Synopsis:	<ul style="list-style-type: none"> <li>➤ History of medical microbiology – Koch postulates, immunization, contributions of various scientists in the field of medical microbiology.</li> <li>➤ Food &amp; water borne diseases-Poliomyelitis, Amoebiasis.</li> <li>➤ Insect borne diseases- Malaria, Dengue fever.</li> <li>➤ Zoonotic diseases – Rabies.</li> <li>➤ Viral diseases – Hepatitis B, HIV, SARS,MERS.</li> <li>➤ Air borne diseases- Influenza. Cause, pathogenicity, symptoms, prevention, treatment of above diseases is being studied.</li> </ul>

Illustrations/ Demonstration shown:	<ul style="list-style-type: none"> <li>▪ Pictures depicting various symptoms of diseases and causative organisms are shown.</li> <li>▪ Charts showing description of various diseases</li> </ul>
Teaching aids used:	Black board & Chalk, PPT
References:	<ul style="list-style-type: none"> <li>* Microbiology by Ananthanarayan.</li> <li>* Telugu academy textbook.</li> <li>* Immunology by chand pasha- Kalyani publications.</li> </ul>
Student activity planned/ homework given:	<ul style="list-style-type: none"> <li>• Assignment on brief note on diseases.</li> </ul>

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