

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Structured Work Plan for Teaching

(June – 2020 to March . 2021)

Details of Classes to be taught

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. III (Div A + B)	Dr. Vihang V. Patil	Biotechnology	Course Title: Microbial Technology Course Code : U-MIT-608 Course Title: Lab Course XVIII Course Code: U-LAC-612
2	M.Sc. I			Course Title: Microbial Physiology Course Code:P-MIB-335 Course Title: Lab Course X Course Code: P-LAC-339

1. Summary of Lesson Plan

Name of Teacher: Dr. Vihang V Patil

Class

: B.Sc. BT. III (Fifth Semester)

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Microbial Technology	Unit 1 Microbial Growth Microbial -Biotechnology –Historical perspectives - Microbial growth kinetics: Continuous culture, Batch culture, fed Batch culture, -Thermodynamics of Growth -Fermentation concept and types. -Basic nutrition & metabolism. -Novel pathways of microorganisms.	08-07-20 To 28-07-20	02 04 01 01 02 02	Assignments	Assignment 1 : 20/07/2020 Assignment 2 : 10/10/20
		Unit II Down Stream Processing -Removal and Recovery of cell mass (Precipitation, Filtration and Centrifugation).	29-07-20 To	04	Group Discussion	Group Assignment 3 :

	<ul style="list-style-type: none"> -Cell disruption: Physical and Chemical methods. -Purification of Product: Liquid-liquid extraction, Solvent Recovery. -Chromatography: Adsorption, Ion-exchange, HPLC. -Membrane processes: Ultrafiltration and Reverse Osmosis. -Drying and Crystallization. 	24-08-20	02		10/11/2020
	<p>Unit III</p> <p>Fermentation Processes</p> <p>Fermentation processes: Microorganisms involved, Inoculum preparation, Medium used, Fermentation process, Recovery. - Enzyme: Protease, Pectinase.</p> <ul style="list-style-type: none"> -Organic acid: Citric acid. -Antibiotic: Penicillin, Erythromycin. -Vitamin: Vitamin B12, vitamin B 	25-08-20 To 16-10-20	04 04 05 05	Assignment	
	<p>Unit IV</p> <p>Quality Control, Process Economics and GLP</p> <ul style="list-style-type: none"> -Sterility testing. -Pyrogen testing. -Carcinogenicity testing. -Toxicity testing. -Fermentation Economics: Cost Estimates, Process Design ,Capital Cost Estimates, Operating Cost Estimates. -Good Laboratory Practices. 	17-10-20 To 11-11-20	01 01 01 01 03 02	Group Project Assignment	

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Microbial Technology	Production of primary and secondary metabolite (one organic acid and one antibiotic)	22/02/21 To 31/05/21 Batch A, B,C,D	04
2		Biomass production (Baker's yeast and Spirulina)		04
3		Production of beverages (alcohol, wine)		04
4		Immobilization of yeast on calcium alginate		04
5		Estimation of the fermentation products by titration method		04
6		Estimation of fermentative product (Acetic acid from vinegar)		04
7		Production of cheese using different substrate from microorganism		04
8		Isolation & identification of bacteria from different milk & water samples		04
9		Visit to Fermentation Industry		04

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2	M.Sc. I			Course Title: Microbial Physiology Course Code:P-MIB-335 Course Title: Lab Course X Course Code: P-LAC-339

Name of Teacher: Dr. Vihang V Patil

Class : M.Sc. BT. I (First Semester)

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1		<p>Unit 1</p> <p>The Beginning of Microbiology:</p> <ul style="list-style-type: none"> - Discovery of the microbial world by Antony van Leeuwenhoek; Controversy over spontaneous generation, -Role of microorganisms in transformation of organic matter and in the causation of diseases; -Development of pure culture methods; -Enrichment culture methods, -Developments of microbiology in the twentieth century. -Knowing microbial world: Bacteria: Purple and green bacteria, Cyan bacteria, Homoacetogenic bacteria. Acetic acid bacteria, Budding and appendaged bacteria, Spirilla, Spirochetes, Sheathed bacteria, Pseudomonads; Lactic and propionic acid bacteria, Endospore forming rods and cocci, Mycobacterium, Rickettsias, Chlamydia and Mycoplasmas. -Archaea: Halophiles, Methanogens, Thermoplasma, Ferroplasma and Hyperthermophilic archaea,. -Eukarya: Algae, Fungi, Slime moulds 	21-12-20 To 23-01-21	02 02 01 01 06	Seminars	<p>Quiz 1: 23-01-21</p> <p>Quiz 2: 26-02-21</p> <p>Assignment I: 15-02-21</p> <p>Assignment II: 15-03-21</p>

		and Protozoa. -Viruses: Bacterial Plant. Animal and Tumor viruses; -Viroids and Prions.		03 03 01		
		Unit II Methods in Microbiology -Pure culture techniques, -Theory and practice of sterilization, Enrichment culture techniques. -New approaches to bacterial taxonomy classification including Ribotyping; -Ribosomal RNA sequencing; Taxonomy, Nomenclature and Bergey's Manual.	18-01-21 To 15-02-21	01 02 02 03 01	Assignment I	
		Unit III -Microbial Growth The definition of growth, -Mathematical expression of growth, growth curve, measurement of Growth and growth yields; -Synchronous growth: Continuous culture; -Growth as affected by Environmental factors like temperature, acidity, alkalinity, water availability and oxygen; -Culture collection and maintenance of cultures.	16-02-21 To 14-03-21	02 02 01 03 02	Group Discussion	
		Unit IV Overview of Basic Metabolism & Microbial Nutrition: -Metabolic Diversity among Microorganisms Photosynthesis in microorganisms; -Role of Chlorophylls, carotenoids and	15-03-21 To 5-04-21	04	Assignment II	

	phycobilins; Calvin cycle;	04	
	Chemolithotrophy;		
	-Hydrogen - iron - nitrite - oxidizing bacteria;	03	
	-Nitrate and sulfate reduction;	02	
	-Methanogenesis and acetogenesis;	02	
	-Fermentations - diversity, syntrophy	02	

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Microbial Physiology	Preparation of liquid and solid media for growth of microorganisms.	22/02/21 To 31/03/21 Batch A, B	02
2		Isolation and maintenance of organisms by plating, streaking and serial dilution Methods. Slants and stab cultures. Storage of microorganisms.		02
3		Isolation of pure cultures from soil and water.		02
4		Growth: Growth curve.		02
5		Measurement of bacterial population by turbidometry and serial dilution methods.		02
6		Effect of temperature, pH and carbon and nitrogen sources on growth.		02
7		Microscopic examination of bacteria, yeast and molds and study of organisms by Monochrome stain, Negative Stain, Gram stain and staining for spores.		02
8		Assay of antibiotics.		02
9		Analysis of water for portability and determination of MPN.		02
	Biochemical characterization of selected microbes.	02		



Teacher



Head
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Principal

PRINCIPAL
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Structured Work Plan for Teaching

(February 2021 to May 2021)

Details of Classes to be taught

Sr. No.	Class	Name of Asstt. Prof.	Subject	Paper
1	B.Sc. II (Div A + B)	Dr. Vihang V. Patil	Biotechnology	Course Title: Process Biotechnology Course Code : U-PRB-499 Course Title: Lab Course XV Course Code: U-LAC-503

1. Summary of Lesson Plan

Name of Teacher: Dr. Vihang V Patil

Class : B.Sc. BT. III (Fifth Semester)

Sr. No.	Subject	Unit and Chapter to be covered	Date	No. of Lectures	Academic activities to be organized	No. of Test / Assignment with topic and date
1	Process Biotechnology	Unit 1 Introduction to Concepts of Bioprocess engineering: -Definition of Bioprocesses engineering. -Introduction to Simple engineering calculations, Mass & Energy Balances. -Oxygen uptake rate (OUR), KLa, Viscosity & its control. -Design of Fermenters: Construction, Design & Operation, Materials of Constructions, Welding, Surface treatment Components of the fermenters & their specifications	22-02-21 To 10-03-21	02 02 02 06	Assignments	Assignment 1 : 09/03/2021 Assignment 2 : 11/04/21 Group Assignment 3 : 02/05/2021
		Unit II -Air & Media sterilization: Air Sterilization Principles, Mechanisms of capture of particles in Air, Depth &	11-03-21	03		

	<p>Screen Filters, Sizing, Testing & validation of filters for air Sterilization.</p> <p>-Principles of Media Sterilization, Decimal reduction, Design of sterilization, Cycle using kinetics of thermal death of microbes Equipments used in sterilization;</p> <p>-Constituents of media,</p> <p>-Media Optimization their estimation & quantification.</p> <p>-Design of media.</p> <p>-Costing of media</p>	To 31-03-21	02 04 02 01 01 01	Group Discussion
	<p>Unit III</p> <p>-Types of Bioprocesses: Biotransformation (enzyme, whole cell), Batch, Fed-batch, continuous.</p> <p>- Screening: Primary and Secondary Screening, Preservation and Maintenance methods for Microbial culture.</p> <p>-Strain Improvement: Feed back Mechanism, Isolation of mutants which do not produce feedback inhibitors or repressors.</p> <p>-Isolation of mutants which do not recognize presence of inhibitors or repressors. Modification of Permeability.</p>	01-04-21 To 20-04-21	03 02 03 03	Assignment
	<p>Unit IV</p> <p>-Measurement & Control of Bioprocesses Parameters: Cell growth. pH, temperature, Substrate consumption, product formation, Measurement of O₂/CO₂ uptake, evolution.</p>	21-04-21 To 15-05-21	05	Group Project Assignment

		-Specific rates of consumption substrate & formation of product.		02		
		- Strategies for fermentation control.		1		
		-Foam & its control.		1		
		-Computer controlled fermentations.		1		
		-Scale up in Bioprocesses fermentations, Factors used in scale up.		02		

Sr. No.	Subject	Practicals	Date	No. of Practicals
1	Process Biotechnology	Isolation and Screening of Industrially important Microbes-Acid, Antibiotics, Enzymes	22/02/21 To 31/05/21 Batch A, B,C,D	04
2		Strain improvement		04
3		Sterilization Techniques		04
4		Maintenance of pure Culture		04
5		Growth Curve		04
6		Growth kinetics: Effect of pH & Temp		04
7		Media Formulation		04
8		Media Formulation		04
9		Cell and Enzyme immobilization		04

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	<p>methods; -Enrichment culture methods, -Developments of microbiology in the twentieth century. -Knowing microbial world: Bacteria: Purple and green bacteria, Cyan bacteria, Homoacetogenic bacteria. Acetic acid bacteria, Budding and appendaged bacteria, Spirilla, Spirochetes, Sheathed bacteria, Pseudomonads; Lactic and propionic acid bacteria, Endospore forming rods and cocci, Mycobacterium, Rickettsias, Chlamydias and Mycoplasmas. -Archaea: Halophiles, Methanogens, Thermoplasma, Ferroplasma and Hyperthermophilic archaea, -Eukarya: Algae, Fungi, Slime moulds and Protozoa. -Viruses: Bacterial Plant. Animal and Tumor viruses; -Viroids and Prions.</p>		01 01 06 03 03 01		<p>Assignment I: 15-02-21</p> <p>Assignment II: 15-03-21</p>
	<p>Unit II Methods in Microbiology -Pure culture techniques, -Theory and practice of sterilization, Enrichment culture techniques. -New approaches to bacterial taxonomy classification including Ribotyping; -Ribosomal RNA sequencing; Taxonomy, Nomenclature and Bergey's Manual.</p>	18-01-21 To 15-02-21	01 02 02 03 01	Assignment I	

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		Unit IV Overview of Basic Metabolism & Microbial Nutrition: -Metabolic Diversity among Microorganisms Photosynthesis in microorganisms; -Role of Chlorophylls, carotenoids and phycobilins; Calvin cycle; Chemolithotrophy; -Hydrogen - iron - nitrite - oxidizing bacteria; -Nitrate and sulfate reduction; -Methanogenesis and acetogenesis: -Fermentations - diversity, syntrophy	15-03-21 To 5-04-21 04 04 03 02 02 02	Assignment II	

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2		Isolation and maintenance of organisms by plating, streaking and serial dilution Methods. Slants and stab cultures. Storage of microorganisms.		02

3	Isolation of pure cultures from soil and water.	22/02/21 To 31/03/21 Batch A, B	02
4	Growth: Growth curve.		02
5	Measurement of bacterial population by turbidometry and serial dilution methods.		02
6	Effect of temperature, pH and carbon and nitrogen sources on growth.		02
7	Microscopic examination of bacteria, yeast and molds and study of organisms by Monochrome stain, Negative Stain, Gram stain and staining for spores.		02
8	Assay of antibiotics.		02
9	Analysis of water for portability and determination of MPN.		02
	Biochemical characterization of selected microbes.		02



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