SARDAR PATEL UNIVERSITY
Syllabus Structure B.Sc. Semester: II
With Effect From: June – 2023
B.Sc. Microbiology

Course Code	US2MAMIC01	Title of the Course	Fundamentals of Microbiology
Total Credits of the Course	4	Hours per Week	4

Course Objectives:	To make the students familiar with: • Major characteristics of microorganisms. • Introduction to concepts of biochemistry for a microbiologist • Basic knowledge of bio molecules and enzymes • The nutritional requirements and physical parameters needed for the Cultivation of bacteria. • Knowledge of culture media and nutritional classification of bacteria

Course Content		
Unit	Description	Weightage* %
1.	**Introduction to bio molecules and enzymes** a) **Introduction to Biomolecules**: i) Carbohydrates ii) Lipids iii) Proteins iv) Nucleic acids b) **Introduction to Enzymes:** i) Characteristics, chemical and physical properties of enzymes ii) Nomenclature and classes of enzymes iii) The nature and mechanism of enzyme action iv) Conditions affecting enzyme action.	
2.	**The Characterization, Classification, and Identification of Microorganisms** a) Major Characteristics of Microorganisms: Morphological Characteristics, Chemical Characteristics, Cultural Characteristics , Metabolic Characteristics, Antigenic Characteristics , Genetic Characteristics, Pathogenicity, Ecological Characteristics b) Microbial Classification, Nomenclature, and Identification: Classification, Nomenclature, Identification .	

3.	**Cultivation of Bacteria**: a) Nutritional Requirements, b) Nutritional Types of Bacteria: Phototrophs , Chemotrophs , Autotrophs and Heterotrophs and Obligate Parasites c) Bacteriological Media, Types of Media, Preparation of Media. d) Physical Conditions Required for Growth : Temperature, Gaseous Requirements, Acidity or Alkalinity (pH) , Miscellaneous Physical Requirements , Choice of Media and Conditions of Incubation	
4.	**Pure culture techniques:** a) Pure culture, mixed culture (Natural Microbial Populations). b) Selective methods to obtain pure cultures: Chemical, Physical, and Biological Methods c). Isolation methods of pure culture: Aseptic technique , Streak plate , Spread plate and Pour plate techniques d) Cultural characteristics: Colony characteristics, Characteristics of broth cultures , e). Maintenance and preservation of pure cultures f) Culture collection centres	

Suggested References:	
Sr. No.	References:
1.	Microbiology - Michael J. Pelczar JR.; E.C.S.Chan; Noel R. Krieg. Fifth edition
2.	Principles of Microbiology, Ronald m. Atlas, 2nd Edition.
3.	Elementary Microbiology Vol : I – Dr. H.A. Modi .

SARDAR PATEL UNIVERSITY
Syllabus Structure B.Sc. Semester: II
With Effect From: June – 2023
B.Sc. Microbiology

Course Code	US2MAMIC02	Title of the Course	Practicals: Based on Fundamentals of Microbiology
Total Credits of the Course	04	Hours per Week	08

Course Objectives:	To demonstrate: • Understanding of various laboratory equipments and use of pH meter. • Preparation of nutritional media • The use of requirements and various conditions for cultivation and isolation of bacteria as an applied aspect. • An understanding.

Course Content		
No.	**Practicals Based on :Fundamentals of Microbiology**	Weight age* (%)
	SECTION-1	
1.	Demonstration of adjustment of pH of media by use of pH strips and pH meter.	
2	Preparation of buffer: Phosphate buffer	
3.	Disposal of Laboratory waste and media	
4.	Qualitative analysis of Carbohydrates.	
5.	Qualitative analysis of Proteins	
6	Preparation of routine media: Nutrient broth and Nutrient agar	

	SECTION-2	
7.	Study of differential and selective media: EMB and Macconkey's Agar.	
8	Study of enzyme production by bacteria like amylase, caseinase, gelatinase on media containing their specific substrate.	
9	Demonstration: Measurement of microscopic objects using stage and ocular micrometer.	
10	Isolation, cultivation and preservation of bacteria in pure culture by: (i) Streak plate (ii) Spread plate method.	
11	Study of Various growth types of bacteria by inoculating liquid medium N-broth	
12	Study of pigment production by bacteria	
13	Cultivation of anaerobic bacteria.	

Teaching-Learning Methodology	• By briefing them with the theoretical aspects as well as providing them with the protocol (Aim, Requirements and Procedure) of the experiment to be performed using chalk and duster as well as power point presentation. • Students are trained for microscope observations and its handling. • Demonstrations of the practical are also carried out and care is taken for aseptic handling and skill development for microbiological work in the laboratory. • Possibility of various results and their interpretation is also discussed.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
	During practical examination; student should have a certified journal duly signed by head of department and the teacher in charge at the time of examination.	

Course Outcomes: Having completed this course, the learner will be able to:	
1.	Use common laboratory equipments.
2.	Become proficient at safety procedures and microbial handling techniques.
3.	Acquire requisite laboratory skills in media preparations.
4.	Comprehend the basic fundamental knowledge of how microorganisms grow on growth media
5.	Learns various biochemical properties of bio molecules.

Suggested References:	
Sr. No.	References
1.	Experimental Microbiology - RakeshJ.Patel&Kiran R. Patel, Volume I
2.	Practical Microbiology- Dr. R.C. Dubey and Dr. D.K. Maheshwari (Revised edition), S. Chand publication
3.	Microbiology : A Practical Approach – Dr Bhavesh Patel and Dr NandiniPhanse

On-line resources to be used if available as reference material

SARDAR PATEL UNIVERSITY
With Effect From: June – 2023
B.Sc. Microbiology Sem. 2
(Minor subject)

Course Code	US02MIMIC01	Title of the Course	Fundamentals of Microbiology
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	To make the students familiar with: • Introduction to concepts of biochemistry for a microbiologist • Basic knowledge of bio molecules and enzymes • The nutritional requirements and physical parameters needed for the Cultivation of bacteria. • Knowledge of culture media and nutritional classification of bacteria

Course Content		
Unit	Description	Weightage* %
1.	**Introduction to bio molecules and enzymes** a) Introduction to Biomolecules: i) Carbohydrates ii) Lipids iii) Proteins iv) Nucleic acids b) Introduction to Enzymes: i) Characteristics, chemical and physical properties of enzymes ii) Nomenclature and classes of enzymes iii) The nature and mechanism of enzyme action iv) Conditions affecting enzyme action.	33%
2.	**Cultivation of Bacteria**: a) Nutritional Requirements, b) Nutritional Types of Bacteria: Phototrophs , Chemotrophs , Autotrophs and Heterotrophs and Obligate Parasites c) Bacteriological Media, Types of Media, Preparation of Media. d) Physical Conditions Required for Growth : Temperature, Gaseous Requirements, Acidity or Alkalinity (pH) , Miscellaneous Physical Requirements , Choice of Media and Conditions of Incubation	

SARDAR PATEL UNIVERSITY
With Effect From: June – 2023
B.Sc. Microbiology Sem. 2
(Minor subject)

Course Code	US02MIMIC02	Title of the Course	Practicals: Based on US02MIMIC01
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	To demonstrate: • Understanding of various laboratory equipments and use of pH meter. • Preparation of nutritional media • The use of requirements and various conditions for cultivation and isolation of bacteria as an applied aspect. • An understanding.

Course Content		
No.	**Practicals Based on US02 CMICXX :Fundamentals of Microbiology I**	Weight age* (%)
1.	Preparation of media – Nutrient broth and Nutrient agar	100 %
2.	Demonstration of adjustment of pH of media by use of pH strips and pH meter.	
3	Preparation of buffer: Phosphate buffer	
3.	Disposal of Laboratory waste and media	
4.	Qualitative analysis of Carbohydrates.	
5.	Qualitative analysis of Proteins	
6	study of differential and selective media : EMB and Macconkey' Agar,	
7	Study of enzyme production by bacteria like amylase, caseinase, gelatinase on media containing their specific substrate.	

Teaching-Learning Methodology	• By briefing them with the theoretical aspects as well as providing them with the protocol (Aim, Requirements and Procedure) of the experiment to be performed using chalk and duster as well as power point presentation. • Students are trained for microscope observations and its handling. • Demonstrations of the practical are also carried out and care is taken for aseptic handling and skill development for microbiological work in the laboratory.

	• Possibility of various results and their interpretation is also discussed.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
	During practical examination; student should have a certified journal duly signed by head of department and the teacher in charge at the time of examination.	

Course Outcomes: Having completed this course, the learner will be able to:	
1.	Use common laboratory equipments.
2.	Become proficient at safety procedures and microbial handling techniques.
3.	Acquire requisite laboratory skills in media preparations.
4.	Comprehend the basic fundamental knowledge of how microorganisms grow on growth media
5.	Learns various biochemical properties of bio molecules.

Suggested References:	
Sr. No.	References
1.	Experimental Microbiology - RakeshJ.Patel&Kiran R. Patel, Volume I
2.	Practical Microbiology- Dr. R.C. Dubey and Dr. D.K. Maheshwari (Revised edition), S. Chand publication
3.	Microbiology : A Practical Approach – Dr Bhavesh Patel and Dr NandiniPhanse

On-line resources to be used if available as reference material

SARDAR PATEL UNIVERSITY
With Effect From: June – 2023
B.Sc. Microbiology Sem. 2
(Interdisciplinary subject)

Course Code	US02IDMIC01	Title of the Course	Fundamentals of Microbiology
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	To make the students familiar with: • The nutritional requirements and physical parameters needed for the Cultivation of bacteria. • Knowledge of culture media and nutritional classification of bacteria • Various habitats of microorganisms

Course Content		
Unit	Description	Weightage* %
1.	**Cultivation of Bacteria**: a) Nutritional Requirements, b) Nutritional Types of Bacteria: Phototrophs , Chemotrophs , Autotrophs and Heterotrophs and Obligate Parasites c) Bacteriological Media, Types of Media, Preparation of Media.	50
2.	**Microorganisms and their Habitats:** a) Structure and function of ecosystems Terrestrial Environment: b) Soil profile and soil microflora c) Aquatic Environment: Microflora of fresh water and marine habitats d) Atmosphere: Aeromicroflora and dispersal of microbes e) Extremophiles: Microbes thriving at high & low temperatures, pH, Osmotic pressure and salinity.	50

SARDAR PATEL UNIVERSITY
With Effect From: June – 2023
B.Sc. Microbiology Sem. 2
(Interdisciplinary subject)

Course Code	US02IDMIC02	Title of the Course	Practicals
Total Credits of the Course	02	Hours per Week	04

Course Objectives:	To demonstrate: • Understanding of various laboratory equipments and use of pH meter. • Preparation of nutritional media • An understanding of soil, water and air microbial flora

Course Content		
No.	**Practicals**	Weight age* (%)
1.	Preparation of media – Nutrient broth and Nutrient agar	100 %
2.	Demonstration of adjustment of pH of media by use of pH strips and pH meter.	
3	Preparation of buffer: Phosphate buffer	
3.	Disposal of Laboratory waste and media	
4.	Study of air microbial flora	
5.	Study of water microbial flora	
6	Study of soil microbial flora	

Teaching-Learning Methodology	• By briefing them with the theoretical aspects as well as providing them with the protocol (Aim, Requirements and Procedure) of the experiment to be performed using chalk and duster as well as power point presentation. • Students are trained for microscope observations and its handling. • Demonstrations of the practical are also carried out and care is taken for aseptic handling and skill development for microbiological work in the laboratory. • Possibility of various results and their interpretation is also discussed.

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weight age
	During practical examination; student should have a certified journal duly signed by head of department and the teacher in charge at the time of examination.	

Course Outcomes: Having completed this course, the learner will be able to:	
1.	Use common laboratory equipments.
2.	Become proficient at safety procedures and microbial handling techniques.
3.	Acquire requisite laboratory skills in media preparations.
4.	Comprehend the basic fundamental knowledge of how microorganisms grow on growth media
5.	Learns various biochemical properties of bio molecules.

Suggested References:	
Sr. No.	References
1.	Experimental Microbiology - RakeshJ.Patel&Kiran R. Patel, Volume I
2.	Practical Microbiology- Dr. R.C. Dubey and Dr. D.K. Maheshwari (Revised edition), S. Chand publication
On-line resources to be used if available as reference material	