SNDT WOMEN'S UNIVERSITY-MUMBAI
ACADEMIC YEAR 2013
B.Sc. Microbiology

Summary B.Sc. Microbiology					
Class	Semester	Paper	Title	Marks	Credit
F.Y.B.Sc.	I	107101	Fundamentals of Microbioloogy	50	2
		107102	Applied Microbiology	50	2
		107201	Practical based on 107101 & 107102	50	2
			Sub Total	150	6
F.Y.B.Sc.	II	207101	Fundamentals of Microbioloogy	50	2
		207102	Applied Microbiology	50	2
		207201	Practical based on 207101 & 207102	50	2
			Sub Total	150	6
			Total	300	12
S.Y.B.Sc.	III	307101	General Microbiology	75	3
		307102	Microbiology	75	3
		307201	Practical based on 307101 & 307102	75	3
			Sub Total	225	9
S.Y.B.Sc.	IV	407101	General Microbiology	75	3
		407102	Microbiology	75	3
		407201	Practical based on 407101 & 407102	75	3
			Sub Total	225	9
			Total	450	18
T.Y.B.Sc.	V	507101	General Microbiology	75	3
		507102	Medical Microbiology	75	3
		507103	Microbial Biochemistry	75	3
		507104	Industrial Microbiology	75	3
		507201	Practical based on 507101 & 507102	75	3
		507202	Practical based on 507103 & 507104	75	3
			Sub Total	450	18
T.Y.B.Sc.	VI	607101	General Microbiology	75	3
		607102	Medical Microbiology	75	3
		607103	Microbial Biochemistry	75	3
		607104	Industrial Microbiology	75	3
		607201	Practical based on 607101 & 607102	75	3
		607202	Practical based on 607103 & 607104	75	3
			Sub Total	450	18

			Total	900	36
			Grand Total	1650	66

PAPER-1
FUNDAMENTALS OF MICROBIOLOGY

SEMESTER –I
NUMBER OF CREDITS: 2
NUMBER OF LECTURES: 30

Objectives:

- **To introduce the subject of Microbiology as one of the fundamental science subject.**
- **To understand the cell structure of prokaryotic cell**
- **To compare prokaryotic cell structure with that of eukaryotic cell.**
- **To understand the nature of growth in prokaryotes.**
- **To understand the principles of nutrition, cultivation and preservation of microorganisms.**

PAPER-2
APPLIED MICROBIOLOGY

SEMESTER –I
NUMBER OF CREDITS: 2
NUMBER OF LECTURES: 30

Objectives:

- **To learn different staining procedures used in the study of morphological and structural aspects of bacteria**
- **To understand the concepts of aseptic techniques in bacterial cultivation and enumeration.**
- **To understand different methods of sterilization and disinfection.**
- **To learn different instruments that assist in the microbiology laboratory.**

PAPER I: FUNDAMENTALS OF MICROBIOLOGY
SEMESTER I

UNIT	TOPIC	NUMBER OF LECTURES
I	**INTRODUCTION TO MICROBIOLOGY:**	**10**
	a) Introduction to diversity in microbial world	01
	b) History and scope of Microbiology	03
	c) Light Microscopy	04
	d) Safety in Microbiology	02
II	**PROKARYOTIC CELL STRUCTURE:**	**10**
	a) Major features of prokaryotic cell structure.	4
	b) Micrometry.	1
	c) Comparison with eucaryotic cell structure.	1
	d) Introduction to Fungi, Algae and Protozoa.	4
III	**NUTRITION AND CULTIVATION OF MICROORGANISMS(bacteria and fungi)**	**10**
	a) Nutritional requirements.	
	i. Macronutrients.	1
	ii. Micronutrients.	1
	iii. Nutritional classification.	2
	iv. cultivation of bacteria and Fungi	2
	b) Principles underlying cultivation and preservation	
	i. Components of media.	2
	ii. Design of the media.	1
	iii. Preservation	1

PRACTICALS
FUNDAMENTALS OF MICROBIOLOGY

PAPER : I
SEMESTER: I

1. Study and care of microscope and use of oil immersion lens.
2. Study of morphology of bacteria using stained slides.
3. Measurement of size of stained bacteria (Micrometry)(use yeast or stained curd whey sample)
4. Study of morphology of fungi using wet mount preparation.
5. Permanent slides of algae and protozoa.
6. Cultivation of microorganisms (bacteria and fungi) in solid and liquid media
7. Study of minimal growth requirements of bacteria.
8. Preservation of cultures by

a. use of soil stock
b. mineral oil overlay
c. stab culture
d. periodic transfer
e. lyophilization(Youtube/video film)

1.
2.
3.
4.
5.
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7.
8.
9. Handling and disposal of used cultures and materials.
10. Assignment on contribution of a scientist.

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PAPER II APPLIED MICROBIOLOGY

SEMESTER :I

UNIT	TOPIC	NUMBER OF LECTURES
I	**BASIC TECHNIQUES IN MICROBIOLOGY** a) Staining techniques i. Dyes and simple staining ii. Differential staining iii. Staining specific structures b) Cultural techniques i. Aseptic techniques ii. Isolation techniques iii. Enumeration techniques ● Surface spread method and pour plate method ● Use of counting chambers ● DMC	**10** **1** **1** **3** **1** **1** **3**
II	**CONTROL OF MICROORGANISMS: STERILIZATION & DISINFECTION** a) Sterilization methods i. Heat –moist and dry heat ii. Filtration iii. Gamma rays iv. UV rays b) Chemical disinfectants	**10** 2 1 1 1 5

	Phenolics, alcohols, Chlorhexidines, Halogens, Quaternary ammonium compounds, Heavy metals, Aldehydes, Peroxygens	
III	**BASIC INSTRUMENTATION IN MICROBIOLOGY –I** Parts, operation and functioning i. Autoclave ii. Hot air iii. Incubator iv. Membrane filters and their types	**10** 4 1 3 2

PRACTICALS
APPLIED MICROBIOLOGY

PAPER :II
SEMESTER: I

1. Monochrome staining
2. Negative staining
3. Gram staining of sputum sample
4. Special staining to demonstrate capsule/ stain cell wall /metachromatic granules/lipids/endospore
5. Aseptic transfer technique of liquid and solid material with and without pipette
   i. Tube to tube
   ii. Tube to plate
   iii. Flask to tube
6. Isolation by streak plate method
7. Enumeration of viable count Surface spread and Pour plate method
8. Enumeration of total count by using Hemocytometer.
9. Study effect of UV radiations on survival of microorganisms.
10. Validation of Autoclave (biological) and Hot air Oven
11. Assignment on Survey of disinfectants / antiseptics (hand wash) available in the market, their mode of action and active ingredient used in it.

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PAPER-1
FUNDAMENTALS OF MICROBIOLOGY

SEMESTER –II
NUMBER OF CREDITS: 2
NUMBER OF LECTURES: 30

Objectives:

- **To understand the chemical basis of cell structure.**
- **To know the important biomolecules of the cell and understand the relation between the function of cell and the biomolecule.**
- **To understand the important characteristics of selected groups of microorganisms, viz. Viruses, Rickettsia and Chlamydia.**

PAPER-2
APPLIED MICROBIOLOGY

SEMESTER –II
NUMBER OF CREDITS: 2
NUMBER OF LECTURES: 30

Objectives:
To understand

- **the importance of microorganisms in air with respect to incidence of infections, and realize the need for air sanitation.**
- **To understand the role of microorganisms in the preparation of some fermented foods, beverages and waste utilization.**
- **To understand the effect of environment on survival and growth of bacteria**

PAPER I: FUNDAMENTALS OF MICROBIOLOGY
SEMESTER : II

UNIT	TOPIC	NUMBER OF LECTURES
I	**CHEMICAL BASIS OF LIFE-I**	**10**
	a) Water: Structure and interactions	**2**
	b) Study of carbohydrates. i. Types of sugars-Monosaccharide-aldoses, ketoses, classification and isomerism in carbohydrates, anomers and enantiomers of sugars.. ii. Glycoside bonds-α,1-4; β,1-6 etc. iii. Disaccharides with examples, polysaccharides-linear, branched, heterpolysaccharides and homopoysaccharides with examples. iv. Chemical properties of carbohydrates	**8**
II	**CHEMICAL BASIS OF LIFE-II**	**10**
	a) Study of amino acids and proteins. i) Concept of zwitterions. ii) Classification of amino acids and proteins. iii) Chemical properties of amino acids and proteins.	4
	b) Study of nucleic acids. i) Structural building blocks of nucleic acids. ii) Types of nucleic acids. iii) Chemical properties of nucleic acids.	3
	c) Study of lipids. i) Structural building blocks of lipids-glycerol, fatty acids, ii) Types of lipids- simple lipids, complex lipids and steroids- definition and examples. iii) Chemical properties of lipids.	3
III	**STUDY OF SELECTED GROUPS OF MICROORGANISMS.**	**10**
	a) Study of viruses. i) General characteristics of animal, plant and bacterial viruses. ii) Cultivation of viruses.	**7**

	iii) Life cycle of λ phage. b) Study of Rickettsia and Chlamydia-cytological and physiological features	3

PRACTICALS
FUNDAMENTALS OF MICROBIOLOGY

PAPER : I
SEMESTER: II

1. Qualitative tests for carbohydrates-Benedict's, Molisch's.
2. Qualitative test for proteins- Biuret test
3. Qualitative test for amino acids- Ninhydrin reaction
4. Qualitative test for RNA-Orcinol test, for DNA- Diphenyl amine reaction.
5. Measurement and adjustment of pH of media using pH paper.
6. Demontration of bacteriophage plaque assay.
7. Demonstration of viral haemaggltination in microtitre plate.
8. Cultivation of animal viruses- Assignment

PAPER II APPLIED MICROBIOLOGY

SEMESTER :II

UNIT	TOPIC	NUMBER OF LECTURES
I	**MICROBIOLOGY OF AIR**	**10**
	i. components of air, factors influencing survival of microbes in air involved	3
	ii. transmission of microbes through air, study of air quality,	4
	iii. control of microorganisms in air, and standards	3
II	**BIOTECHNOLOGY IN OUR LIFE**	**10**
	a) Role of microorganisms in the production and spoilage of curd, cheese, wine, probiotic ice-creams	6
	b) Microorganisms as SCP- characteristics and types	2
	c) Importance of microorganisms in compositing	2
III	**EFFECT OF ENVIRONMENT ON BACTERIA AND HOST PARASITE RELATIONSHIP**	**10**
	a) Effect of Environment on Bacteria	5
	i. pH	
	ii. temperature	
	iii. Desiccation	
	iv. Hydrostatic pressure	
	v. Osmotic pressure	
	b) Human Microbe interactions	
	i. Normal flora of the human body	4
	ii. Relationship between microbes and human host	1

PRACTICALS
APPLIED MICROBIOLOGY

PAPER :II
SEMESTER: II

1. Study of air flora by sedimentation plate technique.
2. Group experiment on composting of kitchen/fruit waste and study its use as a fertilizer.
3. Making of wine using a seasonal fruit.
4. Study normal and abnormal fermentation of milk.
5. Isolate normal flora from sputum, skin and stool using emphirical and selective medium
6. Study effect of pH, temperature, and osmotic pressure on growth of bacteria.

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References:

1. Microbiology. 5th edition by Prescott, Harley and Klein. MacGraw Hill. New York. 2002.
2. Microbiology an introduction. 9th edition Low price edition by G.J.Tortora, B.R.Funke and C.Case.2007.
3.