

DEPARTMENT OF MICROBIOLOGY				CLASS: I B.Sc. Microbiology				
Semester	Course Type	Course Code	Course Title	Credits	Contact Hours/week	CIA	Ext	Total
I	Major Core	20U1RMC1	General Microbiology	3	3	25	75	100

### Course Objectives:

1. To understand history of microbiology towards modern microbiology
2. To understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes
3. To know the pathogenesis and treatment for different microbial diseases
4. To gain knowledge about the structure of bacteria, fungi, algae, protozoa and viruses
5. To know about different classes of antibiotics and their mode of actions, treatment strategies and detection of resistant forms of bacteria from clinical settings.

### Unit-I: History and Scope of Microbiology

Biogenesis and Abiogenesis, Spontaneous generation, Germ theory of diseases, Contribution of Redi, Spallanzani, Needham, Louis Pasteur, Tyndal, Leewenhoek, Joseph Lister, Robert Koch, Edward Jenner, Winogradsky, Flemming, William Beijernick, Emil Christian Hansen, Elie Metchnikoff and Kary Mullis. Scope and applications of Microbiology.

### Unit-II: Microbial Diversity and Extremophiles

Prokaryotes, Eukaryotes and their differences. Archaeobacteria and Eubacteria, Mycoplasma with examples. Acidophiles, Alkalophiles, Neutrophiles, Psychrophiles, Mesophiles, Thermophiles, Aerobes and Anaerobes, Halophiles, Osmophiles, Barophiles with examples and their adaptations.

### Unit-III: Morphology and fine Structure of Bacteria

Bacterial cell size, shape, arrangement – gram positive, negative cell wall, glycocalyx, capsule, flagella, fimbriae, pili, cell membrane, cytoplasm, growth curve. Endospore: structure, formation, stages of sporulation. Ultra structure and significance of *Pseudomonas putida*, and *Bacillus subtilis*.

### Unit-IV: Ultra Structure and Significance of different Microbes

General characteristics of Fungi, Algae, Protozoa and Viruses. Ultra structure and significance of *Saccharomyces* sp. And *Penicillium* sp., *Spirulina*, *Chlamydomonas*, *Amoeba*, *Plasmodium*, HIV and T4 bacteriophage and  $\lambda$  (Lambda) phage.

### Unit-V: Antimicrobial Agents

General characteristics of antimicrobial agents-antiseptics, disinfectants. Antibiotics- mechanism of action of beta lactum and aminoglycosides-. Antiviral, antiparasitic, antifungal agents with examples. Antibiotic sensitivity test-Kirby Bauer test and Minimum Inhibitory Concentration test.

### Books for Study

1. Michael J Pelczar, JR. E.C.S Chan, Noel R. Krieg;(1998). Microbiology, Tata McGraw-Hill publication, New Delhi.
2. Dubey, R.C& Maheshwari, D.K, (1999). A Text book of Microbiology, S. Chand & Company, New Delhi.

### **Books for Reference**

1. Prescott, Harley and Klein's Microbiology (2008), Mac Graw Hill Higher Education, New York.
2. Jacquelyn G.Black, (2008), Microbiology Principles and Explorations, JohnWiley& Sons Ltd, New York.
3. Rajeshwar Reddy, K. (2009). General Microbiology, New Age Publishers, New York.
4. Sharma P, (1986). Algae – Series on diversity of Microbes, Tata McGraw Hill Education Private Limited, New Delhi.
5. Madigan, Martinko, Dunlap, (2010). Brock Biology of Microorganisms; Pearson Publication, New York.

### **Web Resources**

1. <https://www.periobasics.com/basic-microbiology>.
2. <https://www.microbiologynutsandbolts.co.basic-concepts>.
3. <https://www.microbiologyinfo.com/category/basic-microbiology>
4. <https://www.microbiology-overview-youtube.com>
5. <https://www.introduction to microbiology. youtube.com>

### **Pedagogy**

Chalk and talk, PPT, Group discussion, Seminar, Screening of educational videos and quiz

**Course Learning Outcomes (CLO):**

On the completion of the course the student will be able to

	<b>Course Learning Outcome</b>	<b>Knowledge Level</b>
CLO1	Outline the contribution of different scientists in the development of microbiology.	Up to K3
CLO2	Define the basic concept in the field of microbiology	Up to K3
CLO3	Predict the different physiological adaptations during sporulation	Up to K3
CLO4	Interpret the structure & reproduction of bacteria , fungi, algae, protozoa	Up to K2
CLO5	Specify general characters and determine mode of action of various antimicrobial agents	Up to K4

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

**Mapping of Course Learning Outcome with Programme Specific Outcome:**

	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PSO6</b>	<b>PSO7</b>
CLO1	2	1	2	1	3	1	2
CLO2	1	1	1	2	2	1	1
CLO3	1	2	1	1	3	1	1
CLO4	2	2	1	1	2	3	1
CLO5	1	1	2	3	2	1	2

Advance application–3; Intermediate level –2; Basic level –1

**Mapping of Course Outcome with Programme Outcome:**

	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CLO1	1	1	1	1	1
CLO2	2	1	1	1	1
CLO3	2	2	1	1	1
CLO4	2	2	1	2	2
CLO5	3	2	2	2	2

Advance application–3; Intermediate level –2; Basic level –1

**Learning Outcome Based Education & Assessment (LOBE)**  
**Blue Print**  
**Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)**

S. No.	CLOs	K-Level	Section A		Section B		Section C (Either / or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level		
1.	CLO 1	Up to K 3	2	K1 & K2	1	K1	2 (K1&K1)	1(K2)
2.	CLO 2	Up to K 3	2	K1 & K2	1	K1	2 (K2&K2)	1(K3)
3.	CLO 3	Up to K 3	2	K1 & K2	1	K2	2 (K3&K3)	1(K3)
4.	CLO 4	Up to K 2	2	K1 & K2	1	K2	2 (K2&K2)	1(K2)
5.	CLO 5	Up to K 4	2	K1 & K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each Question			1		2		5	10
Total Marks for each Section			10		10		25	30

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

**Distribution of Section-wise Marks with K Levels**

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Section D (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	5	4	10	-	<b>19</b>	15.83	<b>58%</b>
K2	5	6	20	20	<b>51</b>	42.5	
K3	-	-	10	20	<b>30</b>	25	<b>25%</b>
K4	-	-	10	10	<b>20</b>	16.67	<b>17%</b>
Total Marks	10	10	50	50	<b>120</b>	100.00	<b>100%</b>

## LESSON PLAN

Units	Description	Staff	Hours	Mode
<b>I History and Scope of Microbiology</b>	a) Biogenesis and Abiogenesis, Spontaneous generation		1	Chalk and Talk
	b) Germ theory of diseases, Contribution of Redi, Spallanzani, Needham		2	
	c) Louis Pasteur, Tyndal, Leewenhoek, Joseph Lister		2	
	d) Robert Koch, Edward Jenner, Winogradsky, Flemming		2	
	e) William Beijernick, Emil Christian Hansen, Elie Metchnikoff and Kary Mullis. Scope and application of Microbiology.		2	
<b>II Microbial Diversity and Extremophiles</b>	a) Prokaryotes, Eukaryotes and their differences		2	Chalk and Talk
	b) Archaeobacteria and Eubacteria, Mycoplasma with examples		2	
	c) Acidophiles, Alkalophiles, Neutrophiles, Psychrophiles, Mesophiles, Thermophiles		2	
	d) Aerobes and Anaerobes		1	
	e) Halophiles, Osmophiles, Barophiles with examples and their adaptations		2	
<b>III Morphology and fine Structure of Bacteria</b>	a) Bacterial cell size, shape, arrangement		2	Chalk and Talk & PPT
	b) Gram positive, negative cell wall, glycocalyx, capsule		2	
	c) Flagella, fimbriae, pili, cell membrane, cytoplasm.		2	
	d) Growth curve, Endospore: structure, formation, stages of sporulation		2	
	e) Ultra structure and significance of <i>Pseudomonas putida</i> , and <i>Bacillus subtilis</i> .		1	
<b>IV Ultra Structure and Significance of different Microbes</b>	a) General characteristics of Fungi, Algae, Protozoa and Viruses		2	PPT & Chalk and Talk
	b) Ultra structure and significance of <i>Saccharomyces</i> sp. and <i>Penicillium</i> sp.		2	
	c) <i>Spirulina</i> , <i>Chlamydomonas</i> , <i>Amoeba</i>		3	
	d) <i>Plasmodium</i> , HIV, T4 bacteriophage, and $\lambda$		2	
<b>V Antimicrobial Agents</b>	a) General characteristics of antimicrobial agents- antiseptics, disinfectants.		2	PPT
	b) Antibiotics- mechanism of action of beta lactum and aminoglycosides		3	
	c) Antiviral, antiparasitic, antifungal agents with examples		3	
	d) Antibiotic sensitivity test- Kirby Bauer test and Minimum Inhibitory Concentration test.		1	
<b>Total</b>			<b>45 Hours</b>	

Course designers

1. Mrs. K. Rajeswari