

Part-A: Introduction			
Program: <i>Certificate Course</i>		Class: B. Sc. Part - I	Year: 2022 Session: 2022-2023
1	Course Code	MICRO -1T	
2	Course Title	Microbial World and Microbial Techniques	
3	Course Type	Core Course	
4	Pre-requisite (if, any)	As per Government norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able - ➤ <i>to understand the nature, occurrence and diversity of Microorganisms in the environment</i> ➤ <i>to learn basic techniques microbial culture, identification and handling.</i> ➤ <i>to become familiar with the eminent microbiologists, historical background and scope of microbiology.</i>	
6	Credit Value	04	
7	Total Marks	Max.Marks:50	Min Passing Marks: 17

PART B: Content of the Course

Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	Topics (Course contents)	No. of Periods/ Hours
I	Development of microbiology as a discipline: Fundamental, History & Developments Introduction to various fields of Microbiology; Contributions of eminent scientists i.e. Antony von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming, Martinus W. Beijerinck, Sergei N. Winogradsky, Selman A. Waksman, Paul Ehrlich, Elie Metchnikoff, Edward Jenner, Hans Christian Gram.	12 Periods / 08 Hours
II	Systems of classification: Binomial Nomenclature, Haeckel's three kingdom concept, Whittaker's five kingdom classification and Carl Woese's three domain classification system. Concept of prokaryotic and eukaryotic microorganisms.	12 Periods / 08 Hours
III	Diversity of Microbial World: General features structure, reproduction and economic importance of major groups of microorganisms i.e. Virus, Bacteria, Fungi, Algae, Yeast, Protozoa, Cyanobacteria, Chlamydia, Actinomycetes, Mycoplasma.	12 Periods / 08 Hours
IV	Basic Microbial Techniques: Introduction to Microscopy (Bright Field, Dark Field, Phase Contrast Fluorescent Microscope and Electron Microscope) Staining Techniques (Gram staining, negative staining, acid fast staining) and Sterilization techniques (Physical and Chemical).	12 Periods / 08 Hours

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V	Pure Culture and Staining Techniques: Culture media and theirs types (Natural, Synthetic, Complex Media-Differential, Enriched, Enrichment, Selective Media) Pure culture isolation Technique: (Streak plate, Waskman serial dilution and plating methods) Maintenance and Preservation of pure culture.	12 Periods / 08 Hours
Keywords <i>Microbial Diversity, Microbial world. Microbes, Microbial techniques, Microbial culture</i>		
PART – C		
Learning Resources: Text Books, Reference Books and Others		
Suggested Readings:		
Text Books Recommended		
<ol style="list-style-type: none">1. General Microbiology; Vol I & II, Powar C.B. and Daginawala H.I., Himalay Pub. House, Bombay.2. A Text Book of Microbiology; Dubey & Maheshwari.3. Microbiology: An Introduction; Tortora, G. J, Funke B. R. and Case C. L.4. Practical Microbiology; Dubey and Maheshwari.5. Experiments in Microbiology: Plant Pathology and Biotechnology; K. R. Aneja.6. A Text Book of Microbiology; R. P. Singh.7. Prescott's Microbiology. Wiley JM, Sherwood LM and Woolverton CJ8. Microbiology. 5th edition. Pelczar MJ, Chan ECS and Krieg NR.9. General Microbiology. 5th edition. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR.		
Online Resources –		
<ul style="list-style-type: none">➤ e-Resources / e-books and e-learning portals➤ Use of following sites		
<ol style="list-style-type: none">1. https://nptel.ac.in/courses/1021030152. https://onlinecourses.swayam2.ac.in/cec19_bt11/preview3. https://www.britannica.com		

Dr. Anil Kumar

Part-A: Introduction			
Program: <i>Certificate Course</i>		Class: B. Sc. Part - I	Year: 2022 Session: 2022-2023
1	Course Code	MICRO - 2T	
2	Course Title	Bacteriology, Virology & Proto-zoology	
3	Course Type	Core Course	
4	Pre-requisite (if, any)	As per Government norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to - ➤ <i>understand ecological distribution of microorganism and their significance for society</i> ➤ <i>aware with the essential and current knowledge of bacteria, virus and protozoa</i> ➤ <i>become familiar with beneficial & harmful behavior of Viruses, Bacteria, Protozoan and other microbes</i>	
6	Credit Value	04	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17

PART B: Content of the Course		
Total No. of Teaching Periods – 60 / Hours - 40		
Unit	Topics (Course contents)	No. of Period / Hours
I	Morphology and Ultra structure of Bacteria: Cell size, shape and arrangements. Composition, structure and function of cell membrane and cell wall of gram-positive, gram-negative and archaea bacteria, capsule, flagella, pili, ribosomes, inclusions, nucleoid, plasmids. Structure and stages of spore formation.	12 / 08
II	Ecological significance and economic importance Archaea: methanogens, thermophiles and halophiles. Eubacteria: Gram negative(non-proteobacteria– <i>Deinococcus, Spirochetes</i> . Alpha proteobacteria–, <i>Rhizobium, Agrobacterium</i> . Gamma proteo-bacteria– <i>Escherichia, Pseudomonas</i>). Gram positive low G+C; <i>Bacillus, Clostridium, Staphylococcus</i> . High G+C: <i>Streptomyces, Frankia</i> .	12 / 08
III	Morphology and ultrastructure of viruses; General Introduction, morphology and ultra- structure of viruses, capsid and their arrangements, types of envelopes and their composition. Viral genome; their types and structure, viral related forms-virions, viroids, virusoids, and prions.	12 / 08

IV	Classification and multiplication of viruses; Classification of Bacterial Plant and animal viruses. Salient features and life cycle of viruses: Bacteriophages (T4 & Lambda), Plant (TMV & CMV), Animal (Adenovirus, Pox virus & retrovirus).	12 / 08
V	Basic Introduction to protozoa; occurrence and classification of protozoa. Structure, reproduction, life cycle and diseases caused by important protozoans- <i>Entamoeba</i> , <i>Giardia</i> , <i>Leishmania</i> , <i>Trypanosoma</i> and <i>Plasmodium</i> .	12 / 08
Keywords <i>Bacteria, Virus, Protozoan,</i>		
PART – C		
Learning Resources: Text Books, Reference Books and Others		
Suggested Readings:		
<i>Text Books Recommended -</i>		
<ol style="list-style-type: none"> 1. General Microbiology; Vol I & II, Powar C.B. and Dagainawala H.I., Himalay Pub. House, Bombay. 2. A Text Book of Microbiology; Dubey & Maheshwari. 3. Microbiology: An Introduction. Tortora GJ, Funke BR and Case CL. 4. Practical Microbiology; Dubey and Maheshwari. 5. Experiments in Microbiology: Plant Pathology and Biotechnology; K. R. Aneja. 6. A Text Book of Microbiology; R. P. Singh. 7. Prescott's Microbiology. Wiley JM, Sherwood LM and Woolverton CJ. 8. Microbiology. Pelczar MJ, Chan ECS and Krieg NR. 9. General Microbiology. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. 		
Online Resources –		
<ul style="list-style-type: none"> ➤ e-Resources / e-books and e-learning portals ➤ Use of following sites 		
<ol style="list-style-type: none"> 1. www.nos.org/media/documents/dmlt/microbiology 2. www.columbia.edu/itc/hs/medical/pathophys/id/2009 3. https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/botany/04. plant genetic engineering/strategies for resistance to plant viral diseases/lm/403 lm edited module 271m.pdf 		

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Part - A: Introduction				
Program: <i>Certificate Course</i>		Class: B. Sc. Part - I	Year: 2022	Session: 2022-2023
1	Course Code	MICRO -1P		
2	Course Title	BASIC MICROBIOLOGY		
3	Course Type	Laboratory Course		
4	Pre-requisite (if, any)	As per Govt. norms		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to ➤ <i>handle instruments in microbiology lab.</i> ➤ <i>isolate, purify and observe microorganisms.</i> ➤ <i>maintain and preserve microbial culture</i>		
6	Credit Value	02		
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17	

PART -B: Content of the Course

Total No. of Teaching Hours – 20 / 30 Periods		
Group	Topics (Course contents) • It is a tentative list that can be amended by teacher/ department concerned.	No. of Period / Hour
A	1. Basic information about autoclave, hot air oven, laminar air flow and other laboratory instrument 2. Microscopy - Different parts of compound microscope. Handling and care of compound microscope 3. Preparation of solid & liquid culture media 4. Isolation of microorganism from soil, Isolation of single colonies on solid media by streak plate method. 5. Enumeration of bacteria by serial dilution and plating. 6. Measurement of microorganism (micrometry) and camera Lucida drawing of isolated organism. 7. Determination of bacterial growth by optical density measurements.	15 / 10
B	1. Preparation of laboratory Glass wares (Chemical washing, cleaning and drying) and Preparation of culture media (Liquid & solid). 2. Observation of microorganisms through permanent slides - Bacteria, Cyanobacteria, Protozoa, Fungi, Yeasts, and Algae 3. Observation of bacterial motility–Hanging drop technique / Agar Stab culture 4. Staining Techniques–Simple, Differential staining; Gram staining. Aseptic transfer techniques–types–Plate to slant/ slant to slant/ broth to broth. 5. Maintenance and preservation/stocking of pure cultures. 6. Study of the methods of isolation and propagation of plant viruses. 7. Study of cytopathic effects of viruses using photographs.	15 / 10
Keywords	<i>Isolation method, pure culture, culture media</i>	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended:

1. Laboratory Manual of Microbiology and Biotechnology. by Aneja K. R
2. Practical Microbiology, R. C. Dubey and D. K. Maheshwari.
3. Laboratory Manual In Microbiology. By P. Gunasekaran.

OnlineResources –

1. <https://open.umn.edu/opentextbooks/textbooks/499>
2. <https://vlab.amrita.edu/?sub=3&brch=73&sim=720&cnt=1>

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