

SARDAR PATEL UNIVERSITY
S. Y. B. Sc. Microbiology
Semester III
US03CMI01-Fundamental Microbiology
(03 Credits; 3 Hrs/week)
(Effective from June 2011)

Unit 1

History of Microbiology

- Discovery of Microorganisms
- Spontaneous generation versus Biogenesis.
- Fermentation
- Germ theory of disease
- Laboratory techniques and pure cultures
- Immunity

Unit 2

Widening horizons of microbiology:

Medical microbiology

Agricultural and Industrial microbiology

Molecular biology

Stains and staining:

- Chemistry of dyes and stains, types of dyes
- Principles of staining techniques in Bacteria
- Theory of staining
- Steps in staining process.
- Role of intensifier and mordants.
- Role of decolorizer.

Unit 3

Staining and Microscopy

- Types of staining:

Simple staining

Negative staining

Differential staining (Gram staining and acid fast staining)

Supra vital and Intra vital staining

- Principle, working and instrumentation of bright field microscopy.

Unit 4

Microscopy

- Dark field microscopy
- Fluorescence microscopy
- Phase contrast microscopy
- Electron microscopy –TEM & SEM
- Limitations of electron microscopy

Unit 5

Morphology and Ultra structure of Bacterial cell

- Morphology of bacteria
- Basic structure of Bacterial cell
- Structure external to the cell :
 - Flagella (Structure and function), Pili, Capsules, Sheaths, Prosthecae and stalks.
 - Cell wall structure and chemical composition.

Unit 6

Ultra structure of Bacterial cell

- Structure internal to the cell wall :
 - Cytoplasmic membrane
 - Protoplasts and spheroplasts
 - Membranous intrusions and Intracellular membrane systems.
 - The cytoplasm
 - Cytoplasmic inclusions and vacuoles
 - Nuclear material
- Spores and Cysts – structure.

Reference Books:

1. Microbiology- Pelczar, Chan and Krieg, 5th Ed.
2. Elementary Microbiology- H. A. Modi

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S. Y. B. Sc. Microbiology
Semester III
US03CMI02-Fundamental Microbiology
(03 Credits; 3 Hrs/week)
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Unit 1

Characterization of Microorganisms.

- Place of microorganisms in living world
- Haeckel's classification
- Whittaker's five kingdom concept
- Bergey's Manual of Systematic Bacteriology.
- Major characteristics of Microorganisms.
- Discovery, significance and general characteristics of bacteriophage.

Unit 2

Classification and Identification of Microorganisms.

- Microbial Classification : Taxonomic groups
General Methods of Classifying Bacteria-
Intuitive method, Numerical Taxonomy &
Genetic Relatedness.
- Nomenclature and Identification

Unit 3

Cultivation of Bacteria:

- Nutritional requirements.
- Nutritional types of bacteria
- Common ingredients of media
- Types of media

Unit 4

Cultivation and Isolation bacteria

- Physical conditions required for growth :
Temperature, Gaseous requirements (Aerobes and Anaerobes), PH &
Miscellaneous
Physical requirements.

Isolation:

- Pure cultures
- Methods of isolating pure cultures
- Maintenance & Preservation of Pure cultures

Unit 5

Growth of Bacteria

- Mathematical expression of Growth
- Growth curve of Bacteria
- Synchronous Growth
- Continuous culture
- Measurement of Growth.

Unit 6

Virology

Morphology, structure and composition of Bacterial, Plant and Animal viruses.

Replication of Bacterial viruses (Lytic cycle and Lysogeny)

Cultivation of animal viruses, plant viruses and bacteriophage

Reference Books:

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2. Elementary Microbiology- H. A. Modi

SARDAR PATEL UNIVERSITY
S. Y. B. Sc. Microbiology
Semester III
US03CMI03-MICROBIOLOGY PRACTICALS
(03 Credits; 6 Hrs/week)
(Effective from June 2011)

1. Introduction to Laboratory apparatus.
2. Cleaning, Neutralization and Preparation of glassware for sterilization.
3. Disposal of Laboratory waste and media.
4. Preparation of media and reagents – Nutrient broth, Preparation of normal and molar solution of HCL, NaOH and Sodium Citrate, Preparation of Phosphate Buffer.
5. Simple staining and Demonstration of preparation of permanent slide
6. Study of motility by hanging drop preparation.
7. Gram's staining
8. Spirochete staining.
9. Cell wall staining
10. Capsule staining.
11. Endospore staining.
12. Metachromatic granule staining.
13. Micrometry.
14. Streak plate method for isolation of bacteria.
15. Spread plate technique for isolation of bacteria.
16. Detection of Bacteriophage (spot test)