Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B^{++}' Grade (CGPA 2.96)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Microbiology

Name of the Course: B.Sc. I Sem. I & II (Liberal Science)
(Syllabus to be implemented from June 2022)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

B.Sc. (HONOURS) MICROBIOLOGY

GENERIC ELECTIVE 1 (GE-1):

POs / PSOs (Programme Outcomes/ Programme Specific Outcomes):

1. Academic outcomes

- It reveals an understanding of the methods of inquiry and analysis both within and among traditional liberal courses and sciences.
- To develop a strong academic foundation in interdisciplinary and multidisciplinary education.
- To improve or increase the transferable skills like research aptitude, qualitative and quantitative reasoning, critical thinking, good communication with scientific temper.

2. Social Responsibility

    - To inculcate the skills at local, regional, national and global communities.
    - To contribute sustainable development of environment by using domain knowledge and research skills.
    - To imbibe equity and social justice to make awareness towards issues concerning social and culturally outskirts community Groups.
    - To develop leadership quality to solve novel problems inside the organizations and communities.
    - To engage successfully in workspaces through teamwork and ethical behavior.

B.Sc. (HONOURS) MICROBIOLOGY

GENERIC ELECTIVE 1 (GE-1):

INTRODUCTION TO MICROBIOLOGY (THEORY)

SEMESTER –I **PAPER 1**

TOTAL HOURS: 30 **CREDITS: 2**

Unit I: Prokaryotes and Eukaryotes/ Diversity of Microorganisms (15)

A) Definition of Microorganism, Microbiology and Microscope

B) General characteristics of different Microorganisms:

i) Cellular microorganisms (Prokaryotes: Archaea and Bacteria)

ii) Bacteria- cell size, shape and arrangement and types

iii) Ultrastructure and functions of different organells of bacteria- cell wall, cell membrane, mesosome, capsule and slime layer, pili and flagella.

iv) Archea- General characteristics, habitat, methanogens, thermophiles and halophiles

v) Eukaryotes : Algae, Fungi and Protozoa

a) Fungi- general characteristics of fungi, moulds and yeast

b) Algae- general characteristics of algae, nutrition and mode of reproduction

c) Protozoa- general characteristics of protozoa, mode of nutrition, locomotion and reproduction

Unit II: Introduction to acellular organisms (viruses) (15)

A) Definition of Virus, viroid and prions

B) General properties of viruses

C) Morphological characters: capsid symmetry and different shapes of viruses with example.

D) Description of important viruses: salient features of the viruses infecting different hosts, Mode of reproduction of -

Bacteriophages (T4); Plant (TMV), Human (HIV)

B.Sc (HONOURS) MICROBIOLOGY

GENERIC ELECTIVE (GE)-
SCOPE OF MICROBIOLOGY (THEORY)

SEMESTER I **PAPER- 2**

TOTAL HOURS: 30 **CREDITS: 2**

Unit I- Role of Microbes in Human Health Agriculture & Environment (15)

A) Medical microbiology and immunology:

i) List of important human diseases and their causative agents.

ii) Definition, Types of antigen,

iii) Definition and types of antibody.

iv) Definitions of immunity (active/passive), primary and secondary immune response.

B) Agricultural Microbiology:

i) Definitions and examples of important microbial interactions – mutualism, commensalism, parasitism and antagonism

ii) Symbiotic and non symbiotic nitrogen fixer

iii) Microorganisms used as biopesticides (*Bacillus thuriengeneis*) and biofertilizers(*Rhizobium*)

C) Environmental microbiology:

Role of Microbes in biodegradation, biodeterioration and bioremediation (*e.g.* hydrocarbons in oil spills)

Unit II- Role of Microbiology in Fermentation and Food and Dairy Industry

A) Role of Microbiology in Fermentation

i) Definition of fermentation

ii) Designing of Fermenter

iii) primary and secondary metabolites

iv) Types of fermentations and important industrial products through fermentation.

B) Food and Dairy Microbiology

i) Microorganisms as food (SCP)

ii) Definition of food spoilage, food infection and Food poisoning

iii) Role of Microorganisms in food spoilage

iv) List of dairy products and their producers.

GE-1: INTRODUCTION AND SCOPE OF MICROBIOLOGY (PRACTICALS)

SEMESTER –I

1. Demonstration of Microbiology Laboratory Management and Biosafety.
2. To study the principle and applications of important instruments (biological safety cabinets, autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter) used in the microbiology laboratory
3. Preparation of culture media for bacterial cultivation
4. Sterilization of medium using Autoclave and assessment for sterility
5. Sterilization of glassware using Hot Air Oven and assessment for sterility
6. Sterilization of heat sensitive material by filtration and assessment for sterility
7. Isolation of microflora in the environment by exposing nutrient agar plates to air.
8. Study of different shapes of bacteria using permanent slides
9. Demonstration of inoculation techniques – Broth, Slant, Stab, Spot, Spread, Streak and Pour plate.
10. Isolation of microbes (bacteria) from rhizosphere.
11. Assessment of microbiological quality of water (MPN)
12. Isolation of microorganism from spoiled food.
13. Isolation of microorganism from water.
14. Determination of CFU by Serial Dilution Technique using sewage / food / soil/ water sample
15. Study of colony characteristics of bacterial isolates.
16. Microbial fermentation for the production and estimation of amylase
17. Microbial fermentation for the production of citric acid and determination of titrable acidity.
18. Microbial fermentation for the production and estimation of ethanol
19. Mounting and study of fungi using Lactophenol cotton blue- *Aspergillus* and *Penicillium*
20. Morphological study of bacteria using – i) Simple staining ii) Negative staining
21. Differential staining- Gram staining

SUGGESTED READING

1. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education.

2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms.14th edition. Pearson International Edition.

3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited.

4.Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International.

5. Atlas RM. (1997). Principles of Microbiology. 2nd edition. WM.T.Brown Publishers.

6. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.

7. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan.

8. Biology of Microorganisms – Brock, Parker, Madigen, 9th edition

9. Microbiology – Prescott and Harley, 5th edition

10.General microbiology – Powar and Daginawala Vol I and II

11.Textbook of Biotechnology – R.C. Dubey,

12. Text book of Medical Microbiology – Ananthnarayan