

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV EXAMINATION – SUMMER 2025

Subject Code:3140408

Date:12-05-2025

Subject Name:Microbiology

Time:10:30 AM TO 01:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) State the historical significance of Louis Pasteur's contributions to microbiology.	03
	(b) Explain the significance of endospore formation in bacteria. How does it benefit certain bacterial species?	04
	(c) Describe how a combination of techniques such as GC%, homology, and 16S rRNA analysis can provide a comprehensive approach to organism characterization. Illustrate with examples.	07
Q.2	(a) Define the term "microenvironment" in the context of microbial habitats.	03
	(b) Compare culture-independent and culture-dependent methods for studying microbial communities, providing one advantage and one limitation of each.	04
	(c) What are microbial biofilms, and how do they form? Discuss the significance of biofilms in natural and artificial environments.	07
OR		
	(c) Compare microbial communities in terrestrial and aquatic habitats. How do the physical and chemical characteristics of these habitats affect microbial diversity?	07
Q.3	(a) List three distinctive characteristics that differentiate bacteria from fungi.	03
	(b) Describe how confocal microscopy differs from traditional light microscopy and mention one of its applications.	04
	(c) What are endospore-forming bacteria? Describe their classification, ecological importance, and the process of endospore formation in harsh environments.	07
OR		
Q.3	(a) What are the main characteristics of viruses that distinguish them from other microorganisms?	03
	(b) Compare the resolving powers of light, scanning electron, and transmission electron microscopes.	04
	(c) Compare and contrast Cyanobacteria, Acetic Acid Bacteria, and Mycoplasma in terms of their structural characteristics, habitats, and roles in the environment.	07
Q.4	(a) Draw a neat structure of a bacteriophage.	03
	(b) Describe the structure and function of fungal mycelium.	04
	(c) Compare and contrast the lytic and lysogenic cycles of bacteriophages. How does each cycle impact the bacterial host?	07
OR		
Q.4	(a) Enlist three general characteristics of bacteriophages.	03
	(b) What is the difference between yeast and mold in terms of morphology?	04
	(c) Explain the process of bacteriophage replication, including the stages of attachment, penetration, replication, assembly, and release. (With process diagram)	07
Q.5	(a) List the common methods of reproduction in fungi.	03
	(b) What is the difference between scanning electron microscopy (SEM) and transmission electron microscopy (TEM) in terms of image formation and application?	04

- (c) Discuss the evolution of microbial diversity and how taxonomic classification systems have evolved to accommodate new discoveries. How do techniques like sequencing and conserved gene analysis contribute to this understanding? **07**

OR

- Q.5** (a) Write the role of spores in fungal reproduction. **03**
- (b) Explain the freeze-etch and freeze-fracture methods in electron microscopy. How do these techniques aid in studying cell membranes and internal structures? **04**
- (c) Halophiles and Methanogens are two distinct groups of Archaea with unique adaptations to extreme environments. Discuss how these microorganisms survive in their respective habitats and explain their ecological significance. Illustrate your answer with specific examples of environments where Halophiles and Methanogens are commonly found, and describe the roles they play in those ecosystems. **07**
