Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UPES

End Semester Examination, December 2024

Course: Introduction to Microbiology — **Semester:** I

Program: BSC-MICROBIOLOGY — **Duration :** 3 Hours

Course Code: HSMB1011_6 — **Max. Marks:** 100

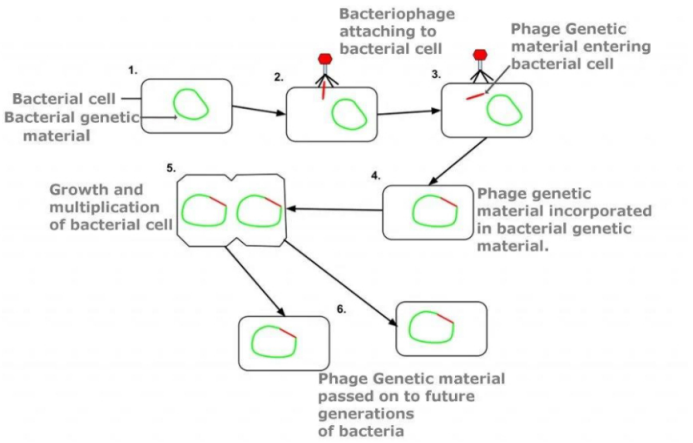
Instructions: "Not Applicable"

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q 1	**A researcher is studying a microorganism that thrives in extremely salty environments. Which group of microorganisms is most likely being studied -** A) Bacteria B) Archaea C) Fungi D) Protozoa	1.5	CO1
Q 2	**Considering the fossil evidence of microorganisms and the geological time scale, which of the following best describes the earliest life forms on Earth -** A) They were complex, multicellular organisms that appeared 1 billion years ago. B) They were prokaryotic, unicellular organisms that appeared around 3.5 billion years ago. C) They were large, eukaryotic cells with distinct organelles. D) They were viruses that evolved from larger organisms.	1.5	CO1
Q 3	**You are given a sample of a microorganism with a size of 1–10 µm and no visible nucleus. Based on this information, which of the following is the most likely classification of the microorganism -** A) Bacterium	1.5	CO1

	B) Protozoa C) Algae D) Fungi		
Q 4	**Carl Woese's three-domain system of classification is based on which of the following characteristics -** A) Physical appearance and behavior of microorganisms B) Genetic similarities, especially ribosomal RNA (rRNA) sequences C) Ecological roles in their respective environments D) The ability to form biofilms	**1.5**	**CO1**
Q 5	**The first observation of microorganisms using a microscope was performed by** A) Robert Koch B) Louis Pasteur C) Anton von Leeuwenhoek D) Joseph Lister	**1.5**	**CO1**
Q 6	**A practical application of Alexander Fleming's discovery of penicillin is** A) The development of the first synthetic vaccine. B) The ability to treat bacterial infections effectively with antibiotics. C) The creation of antiseptic techniques in surgery. D) The development of the first microbiological media for bacterial culture.	**1.5**	**CO1**
Q 7	**Paul Ehrlich contributed to the development of microbiology and immunology as** A) He discovered the role of bacteria in fermentation. B) He developed the concept of selective toxicity, leading to the development of chemotherapy. C) He pioneered the germ theory of disease. D) He identified microorganisms responsible for soil nitrogen fixation.	**1.5**	**CO1**
Q 8	**The scientist associated with the development of the first vaccine for smallpox was** A) Edward Jenner B) Paul Ehrlich C) Elie Metchnikoff D) Alexander Fleming	**1.5**	**CO1**
Q 9	**Characteristics that distinguish prions from other infectious agents like bacteria or viruses -** A) Prions are composed of RNA, while viruses are composed of DNA.	**1.5**	**CO2**

	B) Prions are composed solely of protein, with no nucleic acid component. C) Prions cause viral infections, unlike bacteria. D) Prions have a DNA-based genome that can be transmitted.		
Q 10	**The primary difference between the lytic and lysogenic cycles of a bacteriophage** A) In the lytic cycle, the phage integrates its genome into the host's DNA, whereas in the lysogenic cycle, the phage destroys the host cell. B) The lytic cycle results in the destruction of the host cell, while the lysogenic cycle does not immediately destroy the host cell. C) In both cycles, the host cell is destroyed immediately. D) The lysogenic cycle involves the production of new viral particles, while the lytic cycle does not.	**1.5**	**CO2**
Q 11	**The following is true about the shape and arrangement of prokaryotic cells -** A) Prokaryotic cells are always spherical (cocci) in shape. B) Prokaryotic cells can be found in rod, spherical, or spiral shapes, and can exist singly or in groups. C) Prokaryotic cells never form clusters or chains. D) All prokaryotic cells are spiral-shaped (spirilla).	**1.5**	**CO2**
Q 12	**Following is the primary function of the cell wall in prokaryotic cells -** A) To regulate gene expression B) To protect the cell and provide structural support C) To store genetic material D) To produce energy through respiration	**1.5**	**CO2**
Q 13	**The following is a characteristic of parasitism -** A) Both organisms benefit equally. B) One organism benefit at the expense of the other. C) Both organisms are harmed. D) Neither organism is affected.	**1.5**	**CO2**
Q 14	**The term used for organisms that transmit parasites to humans -** A) Hosts B) Vectors C) Carriers D) Pathogens	**1.5**	**CO2**
Q 15	**The following is a mode of transmission for protozoa like Plasmodium -** A) Direct contact B) Airborne transmission	**1.5**	**CO2**

	C) Vector-borne transmission (e.g., mosquitoes) D) Waterborne transmission		
Q 16	**A method of preserving microorganisms that involves drying them under a vacuum at low temperatures -** A) Slant culture B) Lyophilization (freeze-drying) C) Stab culture D) Soil culture	**1.5**	**CO3**
Q 17	**A physical method of sterilization is** A) Ethylene oxide gas B) Autoclaving (steam under pressure) C) Hydrogen peroxide D) Iodine solution	**1.5**	**CO3**
Q 18	**The bacteria that would be best identified using an endospore staining technique -** A) *Staphylococcus aureus* B) *Bacillus subtilis* C) *Escherichia coli* D) *Salmonella enterica*	**1.5**	**CO3**
Q 19	**The principle behind Gram staining -** A) It differentiates bacteria based on their ability to metabolize sugar. B) It differentiates bacteria based on the composition of their cell wall. C) It differentiates bacteria based on their flagella. D) It differentiates bacteria based on their DNA sequence.	**1.5**	**CO3**
Q 20	**The primary purpose of staining in microbiology -** A) To kill microorganisms B) To enhance the visibility of microorganisms under a microscope C) To identify microorganisms by their metabolic activity D) To break down bacterial cell walls	**1.5**	**CO3**
	Section B **(4Qx5M=20 Marks)**		
Q 1	Explain Carl Woese's three kingdom classification system with examples.	**5**	**CO2**
Q 2	Provide the significance and transmission of Viroids and Prions.	**5**	**CO2**
Q 3	Analyze the general characteristics of algae compared to bacteria and fungi.	**5**	**CO1**
Q 4	Categorize various Staining techniques. Provide the importance of staining in microbiology.	**5**	**CO3**

Section C **(2Qx15M=30 Marks)**			
Q 1	**A newborn has a kind of blood stream infection. The mother of the newborn went to the doctor and told him that the baby has a bacterial infection.** 1. Elucidate the bacterial infection baby can probably have? 2. Discuss the approaches that are recommended to identify these bacteria? 3. Analyze the best approach for their identification in the clinical laboratory in a timely manner, Screening to Confirmatory?	**5+5+5**	**CO1**
Q 2	**You are the lab supervisor at a research facility. During a routine inspection, you discover that some lab equipment, such as petri dishes and pipettes, have not been properly sterilized, leading to contamination in several experiments. The lab staff is concerned about the possibility of compromised results and the potential risks of cross-contamination.** 1. Classify sterilization methods are commonly used in laboratories, and how do they work? 2. As a microbiologist explains the risks of improper sterilization in a lab environment? 3. If contamination is found due to improper sterilization, enlist the approaches to lab address the issue and prevent future occurrences?	**5+5+5**	**CO3**
Section D **(2Qx10M=20 Marks)**			
Q 1	 1. Elucidate the above diagram. Describe the above process.	**6+4**	**CO2**

	2. Enlist two Gram positive and two Gram negative bacteria which are pathogenic in nature?		
Q 2	 1. Name the numbers mentioned above of simple microscope. Describe the light path of a microscope. **2.** Differentiate resolution and magnification. To improve the image quality, Identify the parameter that should be primarily focused.	**7+3**	**CO3**