

- The first person to observe microorganisms using a simple microscope was: (C)
a) Robert Koch b) Louis Pasteur
c) Anton van Leeuwenhoek d) Edward Jenner
- The scientist who discovered the smallpox vaccine is: (B)
a) Louis Pasteur b) Edward Jenner
c) Robert Koch d) Alexander Fleming
- Louis Pasteur is known as the father of: (C)
a) Antibiotics b) Immunology
c) Microbiology d) Pathology
- Robert Koch is famous for: (A)
a) Postulates proving microbes cause diseases
b) Discovery of DNA
c) Gram staining
d) Fermentation
- Which type of microscope is used to view live unstained microorganisms? (C)
a) Bright field b) Dark field c) Phase contrast d) Fluorescent
- Fluorescent microscopy is based on: (B)
a) Light reflection b) Fluorochromes emitting light
c) Staining with crystal violet d) Refraction of light
- The electron microscope with surface images is: (A)
a) SEM b) TEM c) Phase contrast d) Dark field
- The microscope used to study internal structures of viruses is: (B)
a) SEM b) TEM c) Dark field d) Bright field
- Gram staining differentiates bacteria based on: (C)
a) Ribosome structure b) Capsule
c) Cell wall composition d) Nucleoid
- The counterstain used in Gram staining is: (B)
a) Methylene blue b) Safranin c) Malachite green d) Carbol fuchsin
- Acid-fast staining is used to identify: (B)
a) Bacillus b) Mycobacterium c) E. coli d) Salmonella

12. A staining method used for bacterial capsules is: (A)
 a) Negative staining b) Acid-fast staining
 c) Gram staining d) Spore staining
13. Hanging drop method is used to study: (B)
 a) Capsule b) Motility c) Endospore d) Ribosome
14. Flagella staining demonstrates: (B)
 a) Capsule b) Motility organelles
 c) Ribosomes d) Nucleoid
15. A simple stain uses: (A)
 a) One dye only b) Two dyes
 c) Acid and alcohol d) No dye
16. The genetic material of HIV is: (B)
 a) DNA b) RNA c) Protein d) Lipid
17. TMV is a: (B)
 a) DNA virus b) RNA virus c) Prion d) Mycoplasma
18. Lambda bacteriophage is a: (A)
 a) DNA virus b) RNA virus c) Prion d) Fungi
19. The main difference between prokaryotes and eukaryotes is: (B)
 a) Presence of cytoplasm b) Presence of true nucleus
 c) Presence of ribosomes d) Presence of DNA
20. Chlamydia and Rickettsia are: (B)
 a) Viruses b) Bacteria c) Fungi d) Protozoa
21. The smallest free-living organisms without cell wall are: (B)
 a) Viruses b) Mycoplasma c) Cyanobacteria d) Algae
22. Blue-green algae are also called: (B)
 a) Green algae **b) Cyanobacteria** c) Dinoflagellates d) Euglenoids
23. Archaea bacteria are unique because they: (B)
 a) Have no cytoplasm b) Live in extreme environments
 c) Lack ribosomes d) Do not have DNA
24. Fungal cell wall is made up of: (B)
 a) Peptidoglycan b) Chitin c) Cellulose d) Lipids
25. Eukaryotic microorganisms include: (B)
 a) Bacteria b) Fungi c) Viruses d) Cyanobacteria

II. **Filling the Blanks**

- The father of Microbiology is **Louis Pasteur**.
- Anton van Leeuwenhoek** first observed microorganisms.
- The smallpox vaccine was discovered by **Edward Jenner**.
- The scientist who proposed postulates to prove microbes cause diseases is **Robert Koch**.
- A microscope used to study viruses is **Electron microscope**.
- The full form of SEM is **Scanning Electron Microscope**.
- The full form of TEM is **Transmission Electron Microscope**.

8. Gram-positive bacteria retain **Crystal violet** stain.
9. Gram-negative bacteria appear **pink/red** after staining.
10. Acid-fast staining is used to identify **Mycobacterium tuberculosis**.
11. A stain that uses only one dye is called a **Simple stain**.
12. Negative staining is mainly used for **Capsule** demonstration.
13. The method used to study bacterial motility is **Hanging drop method**.
14. The locomotory organelles of bacteria are **Flagella**.
15. The genetic material of TMV is **RNA**.
16. HIV belongs to the group of **Retroviruses**.
17. Lambda phage infects **E. coli**.
18. The type of cell that lacks a true nucleus is **Prokaryote**.
19. The type of cell that has a true nucleus is **Eukaryote**.
20. Chlamydia and Rickettsia are **Obligate intracellular parasites**.
21. The smallest bacteria without a cell wall are **Mycoplasma**.
22. Blue-green algae are also called **Cyanobacteria**.
23. Archaea bacteria survive in **extreme environments**.
24. The fungal cell wall contains **Chitin**.
25. Algae and Fungi are examples of **Eukaryotic microorganisms**.

III. Important Questions

1. Explain the contributions of Leeuwenhoek, Louis Pasteur, Robert Koch, and Edward Jenner to microbiology.
2. Describe the principles and applications of Bright field, Dark field, Phase contrast, Fluorescent, SEM, and TEM microscopes.
3. Write a detailed note on staining techniques: Simple, Differential, Acid-fast, Negative, Capsule, Flagella, and Spore staining.
4. Differentiate between Prokaryotic and Eukaryotic microorganisms with suitable examples.
5. Explain the structure and features of Viruses: TMV, HIV, and Lambda bacteriophage.