

F. Y. B. Sc. Microbiology
Paper II: Fundamental Methods in Microbiology

Chapter 1: Microscopy

Q. 12 marks each

1. What is aberration? Explain different types of aberrations.
2. What is microscope? Explain different types of lenses used in compound microscope and mention their functions.
3. What is numerical aperture? Explain the principle and working of oil immersion lens.
4. Compare bright field and dark field microscope. Add a note on image formation in compound microscope.
5. Explain the concepts of magnification, resolution and numerical aperture.

Q. Short notes – 4 marks each.

1. Compare bright field and dark field microscope.
2. Types and functions of condenser.
3. Types and functions of objective.
4. Types and functions of ocular.
5. How is image formed in compound microscope?
6. Explain the principle and working of oil immersion lens.
7. Magnification.
8. Resolution.
9. Numerical aperture.
10. Chromatic aberration.

Q. Short answer – 6 marks each.

1. Define microscope. Explain types and functions of condenser.
2. Define microscope. Explain types and functions of objective.
3. Define aberration. Explain chromatic and spherical aberration.
4. Define aberration. Explain coma, astigmatism and distortion.
5. With suitable diagram explain image formation in compound microscope.
6. With suitable diagram explain the principle and working of oil immersion lens.
7. What is microscope? Compare bright field and dark field microscope.
8. Explain the terms magnification and resolution.
9. What is aberration? Explain any 3 types.
10. Numerical aperture.

Q. Definition ---- 2 marks each.

1. Microscope.
2. Condenser.
3. Objective lens.
4. Ocular lens.
5. Bright field microscope.
6. Dark field microscope.
7. Numerical aperture.
8. Angular aperture.
9. Resolution.
10. Magnification.

11. Aberration.
12. Chromatic aberration.
13. Spherical aberration.
14. Coma.
15. Astigmatism.
16. Distortion.
17. Later color.
18. Curvature of field.

Chapter 2: Biological staining.

Q. 12 marks each

1. What is dye and stain? Explain the chromophore and auxochrome concept with examples.
2. Define dye and explain different types of dyes with suitable example.
3. What is dye and stain? Explain the uses of stains.
4. What is mordant? How it is classified? Give mechanism of action with suitable example.
5. What is mordant? Explain the mechanism of action and method of application.
6. What is stain? Explain simple staining.
7. What is stain? Explain Gram staining.
8. What is stain? Explain Acid fast staining.

Q. Short notes – 4 marks each.

1. Concept of dye and stain.
2. Explain the term chromophore.
3. Explain the term auxochrome.
4. Explain the uses of stain.
5. Neutral dyes.
6. What is mordant? Explain the method of application.
7. What is mordant? Give the mechanism of action.
8. What is mordant? Explain the types and examples.
9. Explain the terms natural, synthetic and leuco dyes.
10. Comment on Gram variable reaction.
11. Write a note on differences between Gram positive and Gram negative cell wall.
12. Explain the mechanism of Gram staining.
13. Explain the mechanism of acid fast staining.
14. What is monochrome staining? Give procedure.
15. Give examples of stains used in simple and differential staining.

Q. Short answer – 6 marks each.

1. What is dye? Explain acidic, basic and neutral dyes with examples.
2. What is dye? Explain natural, synthetic and leuco dyes with examples.
3. Explain the types and mechanism of action of mordant.
4. Explain the mechanism of action of mordant and give examples.
5. Write a note on simple staining.
6. Write a note on Gram staining.
7. Write a note on acid fast staining.

Q. Definition ---- 2 marks each.

1. Stain.
2. Dye.
3. Chromophore.
4. Auxochrome.
5. Mordant.
6. Leuco dyes.
7. Synthetic dyes.
8. Compound dyes.
9. Acidic dyes.
10. Basic dyes.
11. Simple staining.
12. Differential staining.

Chapter 3: Cultivation of microbes.

Q. 12 marks each

1. Explain the nutritional requirements of bacteria.
2. Define medium. Write a note on ingredients used in preparation of laboratory media.
3. What is medium? Explain types of media based on application.
4. What is medium? Explain types of media based on nature of ingredients.
5. What is enrichment? Explain physical methods of enrichment.
6. What is enrichment? Explain chemical and biological methods of enrichment.
7. Explain MacIntosh and Brewer's jar.
8. Explain chick embryo technique.
9. Explain use of cell cultures in cultivation of animal viruses.

Q. Short notes – 4 marks each.

1. Comment on carbon, nitrogen and energy requirement of bacteria.
2. Define medium. What is the role of peptone, NaCl and agar in the medium?
3. Define medium. What is the role of yeast extract, malt extract and agar in the medium?
4. Define medium. Explain the types of medium based on physical state.
5. Explain synthetic and semi synthetic medium with example.
6. What is enrichment? Explain use of incubation temperature and pH of medium for enrichment.
7. What is enrichment? Explain use of inhibitory substances for enrichment.
8. What is enrichment? Explain micromanipulator technique.
9. Define anaerobe. Explain candle jar method.
10. Write a note on MacIntosh jar.
11. Define anaerobe. Explain use of pyrogallolic acid.
12. Comment on cultivation of plant viruses.
13. Types of tissue culture.

Q. Short answer – 6 marks each.

1. What is cultivation? Explain growth factor requirements of bacteria.
2. What is cultivation? Explain carbon, nitrogen and energy requirements of bacteria.
3. What is cultivation? Explain H,S,P and mineral requirements of bacteria.

4. Define medium. Explain selective and differential media with example.
5. Define medium. Explain living and nonliving media with example.
6. Write a note on preparation of medium.
7. Chemical methods of enrichment.
8. What is enrichment? Explain any two biological methods of enrichment.
9. What is enrichment? Explain physical methods of enrichment.
10. Define anaerobe. Explain any two methods for their cultivation.
11. What are viruses? Describe cultivation of bacteriophages.
12. What are viruses? Describe cultivation of viruses in living animals.

Q. Definition ---- 2 marks each.

1. Cultivation
2. Inoculum
3. Culture.
4. Colony.
5. Mixed culture.
6. Pure culture.
7. Autotroph.
8. Heterotroph.
9. Medium.
10. Enrichment.
11. Anaerobes.
12. Viruses.

Chapter 4: Pure culture technique and identification of bacteria.

Q. 12 marks each.

1. Explain isolation of bacteria by streak plate technique and spread plate technique.
2. Explain isolation of bacteria by pour plate technique and spread plate technique.
3. What is isolation? Explain different methods used for isolation.
4. What is isolation? Explain isolation in liquid medium. Add a note on two membered cultures.
5. Explain IMViC test in detail.

Q. Short notes – 4 marks each.

1. What is pure culture? Write a note on origin of pure culture.
2. Roll tube method.
3. Spread plate technique.
4. Fermentation of carbohydrate.
5. Indol test.
6. Explain use of enzyme production for identification of organisms.
7. With suitable diagram explain the methods for streak plate technique.

Q. Short answer – 6 marks each.

1. Streak plate technique.
2. Pour plate technique.
3. Two membered cultures.
4. Explain isolation in liquid medium.
5. Describe colony characters on solid medium.
6. H₂S production.
7. Explain MR-VP test.

Q. Definition ---- 2 marks each.

1. Isolation.

Chapter 5: Control of microorganisms.

Q. 12 marks each.

1. Comment on need to control microorganisms. Explain the conditions affecting the effectiveness of antimicrobial agent activity.
2. Define sterilization. Explain the use of moist heat to control microorganisms.
3. Define sterilization. Explain the use of dry heat to control microorganisms.
4. Explain the use of hot air oven and autoclave to control microorganisms.
5. What is sterilization? Give a detailed account of radiation sterilization.
6. What is sterilization? Describe sterilization by filtration.
7. Explain characters of an ideal antimicrobial chemical agent.
8. Enlist the major groups of antimicrobial agents. Explain halogens.
9. Explain the mechanism of action and applications of heavy metals and alcohol.
10. Explain the mechanism of action and applications of dyes and quaternary ammonium compounds.

Q. Short notes – 4 marks each.

1. Comment on – i) need to control microorganisms, ii) patterns of microbial death.
2. Comment on modes of action of antimicrobial agents.
3. Define pasteurization and explain methods.
4. Fractional sterilization.
5. Describe use of low temperature to control microorganisms.
6. Desiccation.
7. Use of osmotic pressure to control microorganisms.
8. What is radiation sterilization? Give mechanism and one example.
9. HEPA filter.
10. Membrane filter.
11. Seitz filter.
12. Mechanism of action and applications of mercury.
13. Aldehydes to control microorganisms.

Q. Short answer – 6 marks each.

1. Hot air oven.
2. Autoclave.
3. Pasteurization as a method to control microorganisms.
4. Describe use of low temperature and osmotic pressure to control microorganisms.
5. Mechanism of action and applications of ultraviolet rays.
6. Ionizing radiations.
7. What is filtration? Explain any two filters used for sterilization.
8. Triphenylmethane dyes.
9. Quaternary ammonium compounds.
10. Gaseous sterilization.

Q. Definition ---- 2 marks each.

1. Sterilization.
2. Pasteurization.
3. Autoclave.
4. Tyndallization.
5. Surface tension.
6. Filtration.
7. Ionizing radiation.
8. Nonionizing radiation.
9. Disinfection.
10. Disinfectant.
11. Antiseptic.
12. Sanitizer.
13. Germicide.
14. Bactericide.