S–6686

Sub. Code
23MMI1C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

First Semester

Microbiology

MICROBIAL PHYSIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are chemotrophs?

2. Differentiate active and passive transport.

3. How is growth measured in microbial populations?

4. What are the four phases of bacterial growth?

5. Define oxidation-reduction potential.

6. What is Pasteur effect?

7. Define Methanogenesis.

8. Differentiate aerobic and anaerobic respiration.

9. Define Photosynthesis.

10. Define bioluminescence.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the transport of nutrients by active transport mechanism.

Or

(b) What are the types of chemotrophs? Explain any two with examples.

12. (a) Explain the factors affecting growth of bacteria.

Or

(b) Explain batch culturing of bacteria.

13. (a) Describe the steps of Entner-Doudoroft (ED) pathway and their significance in trachea.

Or

(b) Explain election transport chain and its significance in respiration.

14. (a) Discuss peptidoglycan synthesis in bacteria.

Or

(b) Discuss the 'de-nova' synthesis of pyrimidine.

15. (a) Discuss the process and application of bioluminescence.

Or

(b) Illustrate Calvin-Benson cycle.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss how bacteria transport nutrients in the absence of energy.

17. Explain any three methods of culturing bacteria in commercial plant.

18. Discuss the molecular mechanism of ATP synthesis.

19. Explain the biosynthesis of essential amino-acid.

20. Explain in detail about oxygenic photosynthesis.

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S–6694

Sub. Code
23MMI2C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Microbiology

MEDICAL BACTERIOLOGY AND MYCOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Transport media
2. Stool specimen
3. Tuberculosis
4. Staphylococcus
5. Nosocomial infection
6. Mycoplasma
7. Superficial mycoses
8. Mycotoxins
9. Aspergillosis
10. Mycetoma

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Briefly explain normal flora of human body.

Or

(b) Summarize processing of urine specimen.

12. (a) Why Streptococci appear in chain? Justify.

Or

(b) Describe the pathogenesis of Neisseriae.

13. (a) Explain the disease caused by Vibrio.

Or

(b) How opportunistic infections could be prevented? Explain.

14. (a) Give a brief account on classification of fungi.

Or

(b) What are antifungal agents? Explain.

15. (a) Describe about dimorphic fungi.

Or

(b) Why disease caused by Blastomyces is known as systemic mycoses? Justify.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe antimicrobial susceptibility testing.

17. Why Bacillus anthrax is known as bioweapon? Justify.

18. Elaborate the pathogenesis of Bordtella. Add a note on its treatment.

19. Explain the yeasts of medical importance.

20. What is the significance of immunodiagnostic methods in Mycology?

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S–6695

Sub. Code
23MMI2C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Microbiology

MEDICAL VIROLOGY AND PARASITOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Viroids
2. Plaque
3. Rotavirus
4. HIV
5. Temperate phage
6. Antiviral agents
7. Giardia
8. Leishmania
9. Cestodes
10. Ascaris

Part B

$(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Enlist the general properties of viruses.

Or

(b) Summarize the significance of plaque assay method.

12. (a) Summarize the laboratory diagnosis and treatment of Rhabdo virus.

Or

(b) Describe the pathogenesis of Adeno virus.

13. (a) Explain the serological methods of diagnosis of viral infections.

Or

(b) Describe about the significance of viral vaccines.

14. (a) Give a brief account on life cycle of *Entamoeba.*

Or

(b) Explain the laboratory diagnosis and treatment of *Trichomonas.*

15. (a) How antiprotozoan drugs are useful in treatment of pasasitic infections?

Or

(b) Explain about pathogenicity of Trichuris

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe the cultivation of animal viruses.

17. Explain the pathogenesis and laboratory diagnosis of Dengue virus.

18. Elaborate the life cycle of T4 phage.

19. Give a detailed account on pathogenesis and laboratory diagnosis of *Trypanosoma.*

20. Summarize the life cycle of Taenia *solium*.

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S–6697

Sub. Code
23MMI2E2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Microbiology

Elective – CLINICAL DIAGNOSTIC MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the standard precautions for handling infectious biological samples?

2. Define biological hazards. Give few examples.

3. Why should improperly labeled specimens be rejected?

4. What type of transport medium is used for stool samples?

5. How do physicians differentiate between bacterial and viral infections?

6. What is automated blood culture testing?

7. What is the role of Mueller-Hinton agar in the Kirby-Bauer test?

8. Define minimum bactericidal count.

9. Explain the significance of hand hygiene in preventing nosocomial infections.

10. How do catheter-associated urinary tract infections occur in hospitals?

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) What are Biosafety Levels (BSL)? Explain their classification and significance.

Or

(b) Write short notes on biomedical waste management.

12. (a) How does temperature variation affect specimen integrity and test results?

Or

(b) What are the general acceptance and rejection criteria for clinical specimens?

13. (a) Discuss the role of serological tests in diagnosing viral infections.

Or

(b) What are microarray-based techniques, and how are they used for microbial detection?

14. (a) Explain the procedure and significance of the E-test in determining antibiotic susceptibility.

Or

(b) Discuss the advantages and disadvantages of dilution methods (agar and broth) compared to disc diffusion tests.

15. (a) Explain the role of personal protective equipment (PPE) in preventing nosocomial infections.

Or

(b) Discuss the different modes of transmission of hospital-acquired infections.

Part C $(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the standard operating procedures (SOPs) for working safely with pathogenic microorganisms.

17. Discuss the precautions to be taken during the transportation of infectious specimens.

18. Explain in detail the significance of CRISPR-based diagnostic tools in infectious disease detection.

19. Elaborate in detail methodology for determination of MIC and MBC. Add a note on its clinical significance.

20. Discuss the major functions of HICC in preventing and controlling hospital-acquired infections (HAIs).

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S–6699

Sub. Code
23MMI2E4

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Microbiology

Elective – BIONFORMATICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. BLOSUM
2. Pairwise alignment
3. Dendrogram
4. Hierarchical Clustering
5. Phylogenetic tree
6. Homology modelling
7. Ligand
8. 3 D Morse code
9. Molecular docking
10. Subtractive genomics

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Write a short note on Biological data mining.

Or

(b) Define PAM and write its role in bioinformatics

12. (a) Explain Evolutionary model briefly

Or

(b) Write an account on distance based methods in phylogenetic tree construction

13. (a) What are the tools available for molecular visualization. Explain any one briefly

Or

(b) Describe 3 D structure prediction and uses

14. (a) Define QSAR and write a note on 4-QASR role in bioinformatics

Or

(b) Describe 3 D auto correlation and its application

15. (a) How to calculate surface volume area? Explain the tool used to calculate

Or

(b) Write a brief note on active site prediction

Part C

$(5 \times 10 = 30)$

Answer any **three** questions.

16. Define sequence alignment and its types. Explain Multiple Sequence Alignment.

17. Detailed note on the concept of Dendrogram.

18. Explain the principles of immunoinformatics.

19. Write the major strategies of computational method for protein prediction.

20. Write an elaborate note on comparative molecular field Analysis.

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S–6700	Sub. Code
	23MMI2E5

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Microbiology

Elective – BIOSAFETY, BIOETHICS AND IPR

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Trade Secrets
2. Patent infringement
3. Patent harmonization.
4. USPTO
5. TRIPS
6. Global Patent
7. Bioethics
8. CBD
9. Gene therapy
10. Nuremberg Code.

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the purpose and importance of NDAs

Or

(b) Define trade agreements and discuss their importance in global trade.

12. (a) Briefly describe the process of filing a patent application.

Or

(b) What is a sui-generis system and How does it relate to IP protection?

13. (a) Discuss the relevance of existing international patents in the context of biotechnology.

Or

(b) What are some tentative efforts towards harmonizing patent laws internationally?

14. (a) Outline the key protocols involved in exchanging biological material across borders.

Or

(b) How can GMOs affect the natural gene pool?

15. (a) What are the ethical issues addressed by the Nuremberg Code?

Or

(b) Discuss the ethical considerations of using animals in research.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the main functions of the (WIPO) and analyze its impact on global IPR protection.

17. Explain the concept of patent mapping and It's applications in strategic ,decision-making

18. Compare write the merits and demerits of a uniform patent law system.

19. Evaluate the applications of bioethics in addressing ethical dilemmas in healthcare, providing specific examples.

20. Evaluate the ethical concerns and protocols involved in prenatal diagnosis and how they impact patient care.

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S–6701

Sub. Code
23MMI2E6

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Microbiology

Elective – CLINICAL RESEARCH AND CLINICAL TRIALS

(CBCS – 2023 onwards)

Time 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Pharmacokinetics
2. Bioavailability
3. FDA
4. MHRA
5. Ethics Committee
6. Investigator's Brochure
7. Quality Assurance
8. QA audit plan
9. Startup phase
10. CRO

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Discuss the four main components of Pharmacokinetics.

Or

(b) Explain the basics of Pharmacodynamics.

12. (a) Detail the structure and harmonisation of ICH.

Or

(b) Write a note on the Drugs and Cosmetics Act.

13. (a) Explain the role of ethics committee in reviewing clinical trials.

Or

(b) What are the roles and responsibilities of Institutional Review Board?

14. (a) Why is 21 CFR Part 11 important in clinical research?

Or

(b) Write a detailed note on Corrective and Preventive Action (CAPA) Plans in clinical research.

15. (a) Discuss the role of business development manager in clinical research industry.

Or

(b) Describe the advantages and disadvantages of clinical outsourcing.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Detail the steps involved in the drug discovery pipeline.

17. What are IND and NDA applications?

18. Explain the types of clinical trial designs.

19. Brief about Standard Operating Procedures for Clinical Trials (SOPs).

20. Discuss the scope and future of clinical research organizations.

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S– 6702

Sub. Code
23MMI2S1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Microbiology

VERMITECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Soil fertility.
2. Purpose of vermiculture
3. *Elsenia* in soil fertility
4. Anatomy of Eisenia
5. Role of animal manures
6. Windrows system
7. Stacked system
8. Vermicomposting bin
9. Vermi meal
10. Vermicompost tea

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Define vermiculture and explain its significance in sustainable agriculture.

Or

(b) Describe the economic importance of vermiculture in organic farming.

12. (a) Explain the anatomy of Eudrilidae earthworms.

Or

(b) What is the alimentation process of Eisenia fetida?

13. (a) Describe the maturing and stabilization phase in the vermicomposting process.

Or

(b) What are the key stages in the basic vermicomposting process?

14. (a) What are the steps involved in packing vermicompost?

Or

(b) Outline the importance of nutritional analysis of vermicompost.

15. (a) What are the applications of vermiculture in biotechnology?

Or

(b) Describe the use of vermicastings in organic farming.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Provide detailed information on useful, local, and exotic species of earthworms.

17. Explain the anatomy, physiology and reproduction of *Lumbricidae*.

18. Explain the significance of the initial pre-composting phase in vermicomposting.

19. Describe the migration method for harvesting earthworms and its benefits.

20. Describe the use of vermicompost in agricultural fields for crops, fruits, vegetables and flowers.

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S–6703

Sub. Code
23MMI3C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Microbiology

IMMUNOLOGY, IMMUNOTECHNOLOGY AND MICROBIAL GENETICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. B cells.

2. Antibody.

3. Hypersensitivity.

4. MCA.

5. Minor blood groups.

6. RIA.

7. Nucleus.

8. Methylation.

9. Natural competence.

10. Transposons.

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Write an account on Acquired immunity.

Or

(b) Give a short notes on B lymphocytes with neat diagram.

12. (a) Discuss about Polyclonal antibodies and its synthesis.

Or

(b) Comment on T cell surface antigens with neat diagram.

13. (a) Describe in detail of Tumor immunity with example.

Or

(b) Write short notes on Bombay blood group with neat illustration.

14. (a) Give a brief account on Eukaryotic genome with neat sketch.

Or

(b) Explain in a detail of Nucleosomes with its structure and functions.

15. (a) Discuss about Transformation with a neat illustration.

Or

(b) Write a short notes on Transduction and its types.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain in detail about T lymphocytes with neat illustration.

17. Give a detailed account on Monoclonal antibody production.

18. Write an account on ABO blood grouping with neat sketch.

19. Explain about Prokaryotic genome with neat diagram.

20. Discuss in detail of Transposable elements with a neat illustration.

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S–6705

Sub. Code
23MMI3C3

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Microbiology

FERMENTATION TECHNOLOGY AND PHARMACEUTICAL MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Upstream process
2. Inoculum preparation
3. Agitation
4. pH
5. Filtration
6. Liquid extraction
7. Spoilage
8. Sterile injectable
9. Immunoglobulin
10. ISO

Part B

$(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Write an account on inoculum preparation for fermentation.

Or

(b) Give a short notes on Media Sterilization in Bioprocess technology.

12. (a) Discuss about types of fermentors with neat illustration.

Or

(b) Comment on fermentation economics in fermentation technology.

13. (a) Describe in detail of Flocculation with neat diagram.

Or

(b) Write short notes on Precipitation and its advantages.

14. (a) Give a brief account on Contamination of pharmaceutical products.

Or

(b) Explain in a detail of Sterile manufacturing unit design and construction.

15. (a) Discuss about Streptokinase production with neat sketch.

Or

(b) Describe in detail of regulatory aspects of pharmaceutical products.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about preservation of industrially important strains in fermentation technology.

17. Give a detailed account factors that affect fermentation process.

18. Write an account on Filtration methods with neat sketch.

19. Explain about raw materials used for the production of pharmaceutical product.

20. Discuss in detail of immunoglobulin production in pharmaceuticals with one example.

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S–6710

Sub. Code
23MMI4C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Microbiology

FOOF AND ENVIRONMENTAL MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Canned food
2. UV radiation
3. FDA
4. Contamination
5. Lithosphere
6. Potable water
7. Sludge
8. E-waste
9. TNT
10. Effluents

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain about the scope of food microbiology.

Or

(b) Describe briefly about the contamination and spoilage of vegetables and fruits.

12. (a) Explain the food born bacterial infection.

Or

(b) Write the short notes on FAD and HACCP.

13. (a) Write the importance of energy flow of carbon and nitrogen in ecosystem.

Or

(b) Explain the responsible factor and monitoring methods for air pollution

14. (a) Write about the factors affecting solid waste treatment

Or

(b) Explain the details of primary, secondary, tertiary industrial effluent treatment.

15. (a) Explain about the degradation of Lignin, cellulose organic matter.

Or

(b) Write about the biodegradation of hydrocarbons.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Write in detail account on types of food preservative

17. Explain about the nonbacterial

    (a) food borne illness

    (b) Helminthes, nematodes, protozoa

18. Describe about the treatment and safety of drinking water

19. Explain about the process and harvesting the vermicomposte

20. List out the laws related to pollution control and environmental protection in India

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S–6711	Sub. Code
	23MMI4C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Microbiology

RESEARCH METHODOLOGY AND BIOSTATISTICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Research methodology
2. Questionnaire
3. Sampling frame
4. Nominal variable
5. Coefficient of variation
6. Nominal scale
7. Positive correlation
8. ANOVA
9. Response Surface Methodology (RSM)
10. Binomial distribution

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe the key components of a research methodology.

Or

(b) Compare and contrast qualitative and quantitative research

12. (a) Describe the cluster sampling method and provide an example of its application.

Or

(b) Explain the difference between discontinuous and continuous variables with suitable examples.

13. (a) Explain the use of bubble plots in visualizing three-dimensional data.

Or

(b) Describe the steps involved in performing an independent samples t-test.

14. (a) Describe the steps to calculate Karl Pearson's coefficient of correlation.

Or

(b) Explain the difference between positive and negative correlation with examples.

15. (a) Describe the basic concept of probability theory with an example.

Or

(b) How does a binomial distribution function, and provide a sample problem.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the ethical considerations in collecting and using primary and secondary data in research

17. Describe various types of research reports and their characteristics.

18. Discuss the advantages and limitations of mean, median, and mode as measures of central tendency.

19. Provide a detailed explanation of ANOVA, including its purpose, types (one-way and two-way classification).

20. Discuss the steps involved in the Box-Behnken design, its advantages, and a case study where it has been effectively applied.

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S–6713

Sub. Code
23MMI4E2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Microbiology

Elective – MARINE MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Salt pans
2. Marine ecosystems
3. Marine microbes
4. Carbon sink
5. Marine extremophiles
6. Psychrophilic microbes
7. Water-borne pathogens
8. Viral disease
9. Probiotic bacteria
10. Methods of food preservation

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the role of protozoa in marine microbial communities

Or

(b) Discuss the importance of marine fungi in nutrient recycling.

12. (a) Define bioleaching and give an example of its application.

Or

(b) Explain the role of marine microbes in the carbon cycle.

13. (a) Describe the adaptive mechanisms in thermophilic microorganisms.

Or

(b) What are marine extremophiles and how do they survive in extreme environments?

14. (a) Explain the methods used for the rapid diagnosis of contamination in seafood.

Or

(b) Explain the role of *Aeromonas* in marine microbial diseases.

15. (a) How are antibiotics produced by marine microbes utilized in medicine?

Or

(b) What are biosurfactants, and how are they used in industrial applications?

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss various examples of endosymbiosis in marine systems and their evolutionary and ecological significance

17. Explain the process and importance of nitrogen fixation by marine microbes in the nitrogen cycle.

18. Describe the various mechanisms marine extremophiles use to survive in extreme environments.

19. Explain the various types of *Vibrio* pathogens and their impact on marine life and human health.

20. Discuss the various industrial applications of enzymes produced by marine microbes.

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S–6715	Sub. Code
	23MMI4S1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Microbiology

MICROBIAL QUALITY CONTROL AND TESTING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. CQI
2. Presumptive test in MPN
3. Food X ray inspection
4. HEPA Filter
5. MTCC
6. Microflora of water
7. CFU
8. Water harvesting
9. Air sampler
10. IoT and Quality Control

Part B (5 × 5 = 25)

Answer **all** questions choosing either (a) or (b).

11. (a) Write the principles of Total Quality Management.

Or

(b) What are the concept of QC techniques? Explain

12. (a) What are the characteristics of waste water from industries?

Or

(b) Explain how do you prevent water borne disease

13. (a) Account on the waterborne pathogens

Or

(b) Elaborate note on prevention of water borne disease

14. (a) Write a short note on culture media preparation for fungi isolation and identification

Or

(b) What are the control measures of aerosol?

15. (a) Write a brief note on QA framework and its significance

Or

(b) Explain the determinants of pharmaceutical Quality

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Define MPN. Describe the steps involved in MPN test.

17. Detailed note on water management in waste water microbiology.

18. Define Total Quality Management. Explain the importance of TQM.

19. Explain in detail about the collection of air sample and method of analysis.

20. Write an elaborate note on Quality control of pharma products.

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