S–3411

Sub. Code
23MMI1C2

M.Sc. DEGREE EXAMINATION, APRIL 2026

First Semester

Microbiology

MICROBIAL PHYSIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define passive transport

2. Comment on photoautotrophs

3. Define batch culture

4. What is synchronous culture?

5. Comment on pentose phosphate pathway

6. What is substrate level phosphorylation?

7. What is gluconeogenesis?

8. Write about sulphur oxidation

9. What are the light harvesting pigments of photosynthetic bacteria?

10. Comment on anoxygenic photosynthesis

Part B (5 × 5 = 25)

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

11. (a) Discuss the nutritional type in bacteria

Or

(b) Write short note on passive diffusion and facilitated diffusion

12. (a) Briefly explain about factors affecting growth

Or

(b) Explain briefly about continuous culture system

13. (a) Discuss the functions and regulations of enzymes.

Or

(b) Explain the mechanism of ATP synthesis

14. (a) Write brief note on biosynthesis of pyrimidine

Or

(b) Summarize the biosynthesis of phospholipids sterols.

15. (a) Write short note on oxygenic photosynthesis

Or

(b) Summarize bioluminescence process and application

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain in detail about group translocation and specific transport system

17. Discuss about the measurement of cell number and cell biomass

18. Describe the glyoxylate pathway

19. Write an essay on peptidoglycan synthesis in gram positive bacteria

20. Discuss in detail about Calvin cycle

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S–3412

Sub. Code
23MMI2C1

M.Sc. DEGREE EXAMINATION, APRIL 2026

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. Comment on normal flora

2. Write about RC Medium

3. Define β heamolysis

4. Comment on *Corynebacteria*

5. Write about rocky mountain spotted fever

6. Comment on nosocomial infection

7. Write about KOH mount preparation fungi

8. Define mycotoxin

9. Define Mucormycosis

10. Comment on nistatin

Part B (5 × 5 = 25)

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

11. (a) Give an account on collection and transport of clinical specimen

Or

(b) Write brief note on handling and maintenance of laboratory animals

12. (a) Briefly explain about pathogenesis and laboratory diagnosis of *Pneumonococci*

Or

(b) Describe about the pathogenesis and treatment for *Clostridium*

13. (a) Summarise the characteristic and pathogenesis of *yersinia.*

Or

(b) Explain about prevention and control of zoonotic infection

14. (a) Explain the detection and collection of fungi from clinical specimen

Or

(b) Add short note on superficial mycosis

15. (a) Discuss the clinical manifestation caused by *Histoplasma*

Or

(b) Write shot note on Eumycoti mycetoma

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Write elaborate note on antimicrobial susceptibility testing

17. Discuss in detail about pathogenesis and treatment for tuberculosis

18. Give detailed account on characteristics and pathogenesis of Leptospirosis

19. Describe about the dimorphic fungi causing systemic mycosis

20. Explain in detail about the immunodiagnostic methods in mycology

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S–3413

Sub. Code
23MMI2C2

M.Sc. DEGREE EXAMINATION, APRIL 2026

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. Define prions

2. What is satellite RNAs

3. Define neuraminidase antigen

4. Write the symptoms for rota viral infection

5. Comment on Pi phage

6. Write about viral vaccines

7. What is Trichomoniasis

8. Comment on Giardiasis

9. Write about lymphatic falariasis

10. Comment on metronidazole

Part B (5 × 5 = 25)

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

11. (a) Discuss the cultivation of viruses in embryonated eggs

Or

(b) Briefly explain the about purification of viruses

12. (a) Write brief note on host defences against viral infection

Or

(b) Give a brief account on pathogenesis and laboratory diagnosis of dengue virus

13. (a) Describe the structural organisation and life cycle of lambda phage

Or

(b) Explain about the methods adapted for viral infections

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

Or

(b) Add a brief account on leishmaniasis

15. (a) Discuss about pathogenesis and life cycle of Fasciola hepatica

Or

(b) Summarize the pathogenesis and diagnosis of Ascariasis

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Write in detail about infectivity assays for viruses.

17. Elaborately explain the epidemiology and pathogenesis of Ebola virus.

18. Explain about lysogenic life cycle typing and application in bacterial genetics.

19. Give detailed note on pathogenesis and life cycle of *Trypanasoma*.

20. Discuss the serological and molecular diagnosis of protozans.

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S–3414

Sub. Code
23MMI2E2

M.Sc. DEGREE EXAMINATION, APRIL 2026

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. Explain the mode of disposal of clinically used needles and sharps.

2. What is the purpose of wearing personal protective equipment (PPE) in a microbiology lab?

3. Name two commonly used transport media in microbiology

4. What is the importance of proper specimen collection in clinical microbiology?

5. Define antimicrobial susceptibility testing

6. Explain the principle of agglutination test.

7. Define Minimum inhibitory concentration (MIC).

8. What is the role of CLSI or EUCAST in standardizing AST methods?

9. Mention two pathogens commonly responsible for ventilator-associated pneumonia.

10. What is the role of fomites in the transmission of nosocomial infections?

Part B (5 × 5 = 25)

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

11. (a) Explain the process of autoclaving and its importance in the disposal of infectious waste.

Or

(b) Explain the factors that contribute to their resurgence of reemerging infectious disease.

12. (a) Outline the general processing steps carried out in a laboratory upon receiving a clinical specimen.

Or

(b) Explain the effect of temperature on transport and storage of clinical specimens.

13. (a) Explain the benefits and limitations of rapid and point-of-care diagnostics in microbial disease detection.

Or

(b) Explain the significance of CRISPR-based diagnostic tools in infectious disease detection.

14. (a) Outline the steps involved in Kirby-Bauer disc diffusion method of antibiotic susceptibility testing.

Or

(b) Explain the principle, procedure, and interpretation of the epsilometer test.

15. (a) Write a short note on the Hospital Infection Control Committee (HICC).

Or

(b) Explain the major sources and reservoirs of nosocomial infections.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the importance of training, awareness, and institutional policies in maintaining laboratory bio-safety and effective biomedical waste management.

17. Summarize the pre-analytical, analytical, and post-analytical stages of diagnostic microbiology in ensuring accurate laboratory diagnosis and patient care.

18. Discuss the role of automation in microbial diagnosis. Explain how systems like VITEK, BACTEC, and automated PCR platforms enhance lab efficiency.

19. Discuss the Stokes disc diffusion method for antibiotic sensitivity testing. How does it differ from the Kirby-Bauer method?

20. Discuss the pathogenesis of nosocomial infections and the factors that increase susceptibility in hospitalized patients.

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S–3416

Sub. Code
23MMI2S1

M.Sc. DEGREE EXAMINATION, APRIL 2026.

Second Semester

Microbiology

VERMITECHNOLOGY

(CBCS 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Mention two exotic species of earthworms used in vermiculture.

2. What is bait food in the context of vermiculture?

3. List any two anatomical features of Lumbricidae.

4. Define fecundity in the context of earthworm biology.

5. Name two types of animal manure used in vermitech systems.

6. What is the purpose of pre-composting in vermicomposting?

7. What causes sour crop in vermicomposting systems?

8. How do ants and rodents affect vermicomposting systems?

9. What is vermiculture biotechnology?

10. How is vermimeal used in fisheries?

Part B (5 × 5 = 25)

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

11. (a) Explain the role of earthworms in maintaining soil fertility and texture.

Or

(b) Write the role of earthworms in the biotransformation of human-generated residues.

12. (a) Write a short note on the taxonomy and reproduction of Eiseniafetida.

Or

(b) Explain the effect of climatic conditions and light on earthworm activity.

13. (a) Compare the windrow and wedge systems of vermicomposting.

Or

(b) What are the key features of the continuous flow system in vermicomposting?

14. (a) What are the causes and solutions for odour problems in vermibeds?

Or

(b) What parameters are tested during the nutritional analysis of vermicompost?

15. (a) Write a short note on vermiwash and its method of application.

Or

(b) Explain the contribution of vermiculture in forest regeneration.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Discuss in detail the role of earthworms in sustainable agriculture and organic farming.

17. Write a detailed account of the anatomy, physiology, and reproduction of *Eisenia fetida*.

18. Explain the design and working of the continuous flow vermicomposting system.

19. Elaborate in detail on the various causes of failure in vermicomposting systems and their preventive measures.

20. Explain in detail how vermiculture can aid in sustainable forest regeneration and soil conservation?

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S–3417

Sub. Code
23MMI3C1

M.Sc. DEGREE EXAMINATION, APRIL 2026.

Third Semester

Microbiology

IMMUNOLOGY, IMMUNOTECHNOLOGY AND MICROBIAL GENETICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Define Haptens and Adjuvants.
2. Differentiate active and passive immunity.
3. What is the significance of somatic hyper mutation in antibody diversity?
4. Explain the function of C3b in the complement cascade pathway.
5. What is multiepitope vaccine?
6. Explain the principle of Radio immunoassay.
7. What is genome imprinting?
8. How does the structure of mitochondrial DNA differ from nuclear DNA?
9. What is horizontal gene transfer?
10. Explain the role of calcium chloride in artificial transformation of bacteria.

Part B (5 × 5 = 25)

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

11. (a) Explain the cytosolic pathway of antigen processing.

Or

(b) Briefly explain the role of primary lymphoid organ in immune response.

12. (a) Explain the role of toll like receptors in innate immune response.

Or

(b) Outline the Production of Monoclonal Antibodies and its clinical applications.

13. (a) Discuss in brief the role of MHC in Allograft rejection.

Or

(b) Write short notes on DNA based vaccine.

14. (a) Briefly explain the unique characteristics of mitochondrial genomes.

Or

(b) Explain the structure and function of a typical prokaryotic chromosome.

15. (a) Differentiate between generalized and specialized transudation.

Or

(b) How do retroposons contribute to genome evolution?

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Elaborate in detail development and differentiation of B lymphocytes.

17. Describe the process of clonal proliferation following T cell activation.

18. Give a detailed account on Type I hypersensitivity reaction and its treatment strategies.

19. Describe in detail the structural organization of eukaryotic genome.

20. Discuss the structure and function of transposons in Saccharomyces cerevisiae (yeast). How do these transposable elements contribute to genome variability?

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S–3418

Sub. Code
23MMI3C3

M.Sc. DEGREE EXAMINATION, APRIL 2026.

Third Semester

Microbiology

FERMENTATION TECHNOLOGY AND PHARMACEUTICAL MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Define fermentation.
2. Define sterilization.
3. What is yield coefficient?
4. Define fermentation economics.
5. What is meant by downstream processing?
6. Define crystallization.
7. Write down the microorganisms present in the skin flora.
8. What are the contaminations of pharmaceutical products?
9. Define quality assurance.
10. What is ISO?

Part B (5 × 5 = 25)

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

11. (a) Explain the strain improvement methods for fermentation process.

Or

(b) Describe about medium formulation for fermentation.

12. (a) Discuss about the effects of aeration and agitation on fermentation.

Or

(b) Summarize the computer applications in fermentation technology.

13. (a) Describe about cell disintegration methods in fermentation process.

Or

(b) Elaborate the solvent extraction methods.

14. (a) Explain about the ecology of microorganisms in the atmosphere.

Or

(b) How to prepare ophthalmologic preparations in pharmaceutical industries'?

15. (a) Write short notes on immunodiagnostics.

Or

(b) Discuss about sterility tests for pharmaceutical products.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe in detail a bout the medium optimization methods.

17. Elaborate about the design, types and construction of fermenter.

18. Discuss about the purification methods of intracellular and extracellular products.

19. Explain about design and layout of sterile manufacturing unit.

20. Elaborate about the regulatory aspects of WHO and US certification.

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S–3419

Sub. Code
23MMI4C1

M.Sc. DEGREE EXAMINATION, APRIL 2026.

Fourth Semester

Microbiology

FOOD AND ENVIRONMENTAL MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Why is Clostridium botulinum, a serious concern in canned foods?

2. Explain the significance of starter cultures in dairy products.

3. What are mycotoxins?

4. Differentiate between microbial food contamination and food intoxication.

5. What is hydrosphere?

6. How do microgravity conditions affect microbial growth?

7. What is solid waste? Give examples.

8. List out biological reference standards in waste treatment monitoring.

9. Mention the role of pectin in plants.

10. What are xenobiotics? Give one example.

Part B (5 × 5 = 25)

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

11. (a) What are Class I and Class II preservatives? Give one example for each.

Or

(b) Explain in detail the spoilage of egg and the causative microorganisms.

12. (a) What is HACCP? Mention its importance.

Or

(b) Briefly explain the sources and symptoms of protozoan pathogens causing food borne diseases.

13. (a) Outline the basic steps involved in the treatment of drinking water to make it safe for consumption.

Or

(b) Explain the nitrogen and the involvement of bacteria at different stages.

14. (a) Explain in brief the secondary treatment of industrial effluents.

Or

(b) Explain two methods used for the proper management and disposal of electronic waste.

15. (a) Outline the steps involved in the microbial degradation of lignin.

Or

(b) What is Environmental Impact Assessment (ETA)? Explain its purpose and steps involved.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe in detail various physical methods used in the preservation of food.

17. Give a detailed account on food adulteration. Enlist the common adulterants and the health risks associated.

18. Describe the importance of microbiological research in space. Mention two applications for human health on space missions.

19. Elaborate in detail the production of biomanure and biogas from organic waste. Add a note on its environmental benefits.

20. Discuss in detail the role of microbes in the biodegradation of herbicides and pesticides and how this helps in reducing soil and water pollution.

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S–3420

Sub. Code
23MMI4C2

M.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Microbiology

RESEARCH METHODOLOGY AND BIOSTATISTICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What are the common constraints encountered during research process?

2. What is the difference between qualitative and quantitative research?

3. Define sampling distribution.

4. State the purpose of using a research design in a study.

5. Define median and mode.

6. What is variance in statistics?

7. Define the term “line of best fit.”

8. Comment on standard error.

9. What is Response Surface Methodology (RSM)?

10. Write short notes on conditional probability.

Part B (5 × 5 = 25)

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

11. (a) What is Research Problem? Explain the components of Research Problem.

Or

(b) Explain the significance of Questionnaire in data collection.

12. (a) Outline the guidelines for writing a good research article.

Or

(b) What is plagiarism and self-plagiarism in academic research? Explain how they affect the credibility of scholarly work.

13. (a) Explain any two methods of collecting primary data.

Or

(b) Ranks of 5 students in two subjects are give below, calculate Spearman's rank correlation coefficient:

Student	Rank in Math (X)	Rank in Science (Y)
A	1	2
B	2	1
C	3	3
D	4	5
E	5	4

14. (a) What is chi-square test? Explain its significance in statistical analysis

Or

(b) Explain the properties of regression lines and regression coefficient.

15. (a) Illustrate how surface contour plots help in identifying the optimal conditions in a response surface study.

Or

(b) Briefly explain the Baye's theorem with suitable example

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Describe the steps involved in conducting an effective literature review. Mention sources commonly used for academic reviews.

17. Discuss the importance of research design and explain different types of research designs with suitable examples.

18. Explain the measures of dispersion. Calculate mean, variance and standard deviation for the given data.

Height (cm)	135-140	141-145	146-150	151-155	156-160	161-165	166-170
Frequency	08	12	18	22	20	14	10

19. Explain the types of correlation and correlation coefficient with suitable examples.

20. Elaborate in detail the construction and interpretation of regression models in RSM.

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S–3422

Sub. Code
23MMI4E2

M.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Microbiology

Elective – MARINE MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Benthic Zone

2. Endosymbionts

3. Phototrophic bacteria

4. Biodeterioration

5. Extremophiles

6. Halophilic microorganisms

7. Symptoms of *Leptospira* infections in humans

8. List two diseases caused by *Aeromonas* sp. in fish

9. Microbial biotechnology

10. Probiotic bacteria

Part B (5 × 5 = 25)

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

11. (a) Explain the littoral zone and its microbial inhabitants.

Or

(b) Write the significance of marine fungi with examples.

12. (a) Describe the oceanic carbonate system and its relevance to climate change.

Or

(b) Explain the concept and mechanism of microbial leaching.

13. (a) Explain the structural and functional features of barophilic microbes.

Or

(b) Explain the role of compatible solutes in osmophilic adaptations.

14. (a) Write a short note on Salmonella contamination in seafood.

Or

(b) Explain how Corynebacteria affect fish health?

15. (a) Write short notes on microbial enzymes and their industrial uses.

Or

(b) What are marine toxins, and how are they utilized biotechnologically?

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe the structure, function, and ecological significance of mangrove microbial communities.

17. Discuss the impact of iron limitation and ozone fertilization in marine nitrogen-fixing microorganisms.

18. Write in detail the role of marine extremophiles in the bioremediation of extreme environments.

19. Elaborate on the integrated approach of biosecurity and microbiological testing in aquaculture disease management.

20. Evaluate the advantages and limitations of using marine microbes over terrestrial microbes in industrial applications.

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S–3424	Sub. Code 23MMI4S1

M.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Microbiology

MICROBIAL QUALITY CONTROL AND TESTING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What does ATCC stands for?

2. List any two post-analytical QA techniques.

3. Define wastewater.

4. What is the main cause of water pollution?

5. What is the role of UV in water disinfection?

6. Define the term MPN in microbiological water analysis.

7. Define bioaerosols.

8. Name any two airborne fungal genera commonly found in indoor environments.

9. Define preventive quality control.

10. How does quality control differ from quality assurance?

Part B (5 × 5 = 25)

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

11. (a) Explain the principles and importance of Total Quality Management (TQM) in laboratories.

Or

(b) Write a short note on MTCC with examples of their applications.

12. (a) What is water recycling? Explain its importance in water management.

Or

(b) Discuss the importance of wastewater from pulp and paper mills on the environment.

13. (a) What is the presence/absence test? Mention its advantages and limitations.

Or

(b) Name any two water borne diseases, mentioning the causative agent and transmission.

14. (a) Write a short note on the significance of bioaerosols in the pharmaceutical industries.

Or

(b) Discuss the different types of culture media used for isolating airborne bacteria and fungi.

15. (a) Describe the importance of PPE equipment in maintaining food hygiene and safety.

Or

(b) Write a brief note on the assessment process of pharmaceutical quality.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe in detail the phases of quality assurance-pre-analytical and post analytical-with suitable examples.

17. Discuss the steps involved in the operation of a wastewater treatment plant with a neat diagram.

18. Describe in detail the control methods for water-borne pathogens, including precipitation, filtration, chemical disinfection and high temperature treatment.

19. Explain the process of air sample collection, including types of air samplers and analysis methods.

20. Discuss the structure and components of a pharmaceutical quality assurance framework.

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