D–1554

Sub. Code
36411

DISTANCE EDUCATION

M.Sc. DEGREE EXAMINATION, DECEMBER 2025.

First Semester

Microbiology

GENERAL MICROBIOLOGY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Haeckel's three – domain concept
2. Aflotoxins
3. Confocal microscopy
4. Crystal violet
5. Growth kinetics
6. Flagellin
7. Capsule
8. Heterocyst
9. Lichen
10. Viroids

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Write short notes on Whittaker's five kingdom.

Or

(b) Add brief note on industrial applications of yeast and moulds.

12. (a) Give an account on phase contrast microscope.

Or

(b) Add short note on nutritional types of bacteria.

13. (a) Describe the cell wall structure of Gram-positive bacteria.

Or

(b) Give a brief account on structure of flagella.

14. (a) Write brief note on general characteristics of cyanobacteria.

Or

(b) Discuss in brief about importance of Lichens.

15. (a) Illustrate the ultrastructure of viruses.

Or

(b) Add a brief note on viral envelop and their composition.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Elaborate the classification of bacteria according to Bergey's manual.

17. Write detailed note on scanning electron microscope.

18. Discuss in detail about different culture media and nutritional types of bacteria.

19. Explain in detail about structure and function of plasma membrane.

20. Write in detail about the life cycle of viruses.

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D–1555

Sub. Code
36412

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

First Semester

MICROBIAL BIOCHEMISTRY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Classify monosaccharide.

2. Explain gluconeogenesis.

3. Write the structure of sulphur containing aminoacids.

4. Mention the biological importance of glutathione.

5. How are sphingolipids useful in biological recognition?

6. Write the difference between RNA and DNA.

7. What are ribozymes?

8. Write the significance of Km value.

9. What is bacteriochlorophyll? How does it differ from chlorophyll?

10. How are antibiotics classified based on their spectrum of activity?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the role of peptidoglycan in maintaining the rigidity of cell wall.

Or

(b) Explain the energetics of aerobic and anaerobic glycolysis.

12. (a) Explain the quaternary structure of protein with suitable examples.

Or

(b) Discuss in brief the synthesis of non essential aminoacids.

13. (a) Explain the secondary structure of t-RNA with neat illustrations.

Or

(b) Discuss in brief the various stages of lipid peroxidation.

14. (a) Explain the mechanism of competitive enzyme inhibition.

Or

(b) What are allosteric enzymes? Explain with suitable examples.

15. (a) Explain the mode of action of beta-lactam antibiotics.

Or

(b) Explain the role of vitamin D in maintaining calcium homeostasis.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Elaborate in detail the structure of cellulose and its biological significance.

17. Describe in detail structure and functions of glycerophospholipids.

18. Discuss in detail the biosynthesis of purine nucleotides by salvage pathway and its regulation.

19. Describe the kinetics of bisubstrate enzyme catalyzed reactions.

20. Explain the function of phycobiliproteins in cyanobacteria and red algae. How do they enhance photosynthesis in low light conditions?

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D–1556

Sub. Code
36413

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

First Semester

MICROBIAL PHYSIOLOGY

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Synchronous culture.

2. Chemoorganotrophs.

3. Acetyl co A.

4. Carotenoids.

5. Osmoregulation.

6. Denitrification.

7. Free living nitrogen fixing bacteria.

8. NADH.

9. Substrate level phosphorylation.

10. Simple diffusion.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Give an on batch and continuous culture.

Or

(b) Write brief account on major and microelements.

12. (a) Discuss about methanogenic group of bacteria.

Or

(b) Describe the structure of bacterio chlorophyll.

13. (a) Briefly explain about oxidative stress in bacteria.

Or

(b) Write in detail about cyclic and non-cyclic photophosphorylation.

14. (a) Give an account on symbiotic nitrogen fixation.

Or

(b) Briefly explain about the glyoxalate pathway.

15. (a) Add short note on entropy and enthalpy.

Or

(b) Briefly explain about quorum sensing in microbes.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss in detail about the nutritional diversity of bacteria.

17. Give detailed note on reductive acetyl CO A pathway.

18. Explain about the physiology of nitrogen cycle.

19. Write in detail about inhibitors and uncouplers.

20. Describe in detail about active transport and group translocation.

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D–1557

Sub. Code
36421

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Second Semester

MICROBIAL GENETICS

(CBCS 2018-19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — ($10 \times 2 = 20$ marks)

Answer ALL questions.

1. Define Mutation.

2. What are intercalating agents?

3. Define homologous recombination.

4. What id DNA mobilization?

5. Define Hfr conjugation.

6. Write down the significance of transduction.

7. Define catabolite repression.

8. What are plasmids?

9. Define retrotransposons.

10. Define epigenetics.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the types of mutation.

Or

(b) Describe about DNA damage.

12. (a) Discuss about the biological role of site specific recombination.

Or

(b) Elaborate about transformation by inducing artificial competence.

13. (a) Explain briefly about tryptophan operon and its regulation.

Or

(b) Write short notes on types of plasmids.

14. (a) Explain about plasmid incompatability.

Or

(b) Write short notes on replication of plasmid.

15. (a) Discuss about types of transposable elements.

Or

(b) Describe the significance of Tn3 transposon.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions

16. Describe in detail about the DNA repair pathways.

17. Elaborate about bacterial transformation.

18. Discuss in detail about Lac operon and its gene regulation.

19. Explain about *Agrobacterium* Ti plasmid.

20. Write in detail about molecular basis and functions of bacterial epigenetics.

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D–1558

Sub. Code
36422

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Second Semester

MOLECULAR BIOLOGY AND rDNA TECHNOLOGY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

Write short notes on :

1. Melting curve.

2. Topoisomerase I.

3. DNA gyrase.

4. tRNA.

5. Promoter.

6. pBR322.

7. Insulin.

8. Mapping of genes.

9. RFLP.

10. CaMV vector.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the structure of B-DNA.

Or

(b) Write a short note on theta replication.

12. (a) Give a detailed account on termination of transcription.

Or

(b) Discuss the post transcriptional modifications.

13. (a) Write a brief note on Reverse transcription.

Or

(b) Write a short note on SV4O and adenovirus vectors.

14. (a) Explain the cloning for commercial production of penicillin.

Or

(b) Discuss briefly about genomic library.

15. (a) Comment on inhibition of gene expression by antisense RNA.

Or

(b) Write a brief note on Ti Plasmid.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Give a detailed account on steps involved in DNA replication.

17. Write an essay on Cloning Vectors.

18. Describe the process of cloning of interferon in E.Coli.

19. Explain in detail about Human Genome Project.

20. Discuss in detail about RFLP and its applications.

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D–1559	Sub. Code
	36423

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Second Semester

FOOD AND DAIRY MICROBIOLOGY

(CBCS 2018 – 19 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Differentiate between food spoilage and foodborne pathogens.

2. What are intrinsic factors of food, and how do they influence microbial growth?

3. How does atmospheric gas composition influence food preservation?

4. Why are leafy greens more prone to microbial contamination than root vegetables?

5. Which bacteria are commonly associated with meat spoilage?

6. What is food poisoning, and how does it differ from foodborne infections?

7. What is the difference between foodborne bacterial intoxication and bacterial infection?

8. What is the principle behind drying as a food preservation method?

9. How does pasteurization affect the normal flora of milk?

10. What are the common microbial causes of milk spoilage?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain in detail about the antimicrobial barriers of food.

Or

(b) Elaborate in detail about the extrinsic factors that play critical role in food microbiology.

12. (a) Write in detail about the spoilage of canned foods and the preventive measures taken to avoid the spoilage in food industry.

Or

(b) Discuss the role of bacterial pathogens in causing spoilage in meat.

13. (a) Elaborate on the chemical methods of food preservation.

Or

(b) Explain the rote of bacteria in spoilage of milk.

14. (a) Write in detail about the steps involved in the production of cheese.

Or

(b) Elaborate the role of microorganism in food manufacturing.

15. (a) List out the requirements and the process involved in mushroom cultivation.

Or

(b) Explain in detail on the importance in food sanitation and its impact on public health.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. List out and elaborate any three intrinsic factors that will impact food.

17. Explain in detail about the spoilage of meat by bacterial contamination and the preventive measures taken to avoid it.

18. Elaborate on the role of bacterial and fungal toxins in instigating food poisoning.

19. Write detailed note on preventive measures taken to avoid the outbreak of food borne diseases.

20. Illustrate the significance of AGMARK in food law and quality control.

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D–1560	Sub. Code
	36431

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Third Semester

IMMUNOLOGY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Define lymphoid organs with few examples.

2. What are B cell receptors?

3. Mention two key characteristics of acquired immunity.

4. Haemokines.

5. Define haptens and explain their role in immune response.

6. What are immunogens? Give one example.

7. Write about Agglutination.

8. What is Complement system?

9. Organ transplantation.

10. Comment on Hypersensitivity.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the process of haematopoiesis and its significance.

Or

(b) Explain the types, functions of lymphoid organs in the immune system.

12. (a) Define cytokines. Explain their roles in the immune system.

Or

(b) Explain the antigen-antibody reaction, mentioning its types and significance in immunity.

13. (a) Describe the five classes of immunoglobulins and their functions.

Or

(b) Give an account on complement system.

14. (a) Write a short note on autoimmune disorders.

Or

(b) What are induced pluripotent stem cells (iPSCs)? Discuss their advantages and applications.

15. (a) Define HLA typing. Explain its significance in organ transplantation.

Or

(b) Give an account on Oncogenes.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the structure and function of T cell receptors (TCRs), highlighting their role in antigen recognition and the differences between $\alpha\beta$ and $\gamma\delta$ TCRs.

17. Explain the concept of immunogenicity, including the factors influencing it and its significance in immune responses.

18. Describe the Major Histocompatibility Complex (MHC), its types, structure, and role in antigen presentation.

19. Explain the hybridoma technology and also the steps involved in hybridoma formation and its applications in research and medicine.

20. Explain the mechanisms of different types of vaccines.

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D–1561	Sub. Code
	36432

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Third Semester

MEDICAL MICROBIOLOGY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is risk assessment in a laboratory, and why is it necessary?

2. What are the key factors to consider when collecting a blood sample for laboratory testing?

3. What precautions should be taken when transporting highly infectious clinical samples?

4. Name two diseases caused by *Staphylococcus aureus* and briefly describe their clinical significance.

5. How does *Enterococcus faecalis* contribute to hospital-acquired infections?

6. What are the key symptoms and complications of *Salmonella typhi* infection?

7. What are the key infection control practices to prevent hospital-acquired infections caused by Gram-negative non-spore-forming bacilli?

8. What role does seasonal flu vaccination play in controlling Swine Flu outbreaks?

9. Write the mechanism of action of aminoglycosides and why they are ineffective against anaerobic bacteria.

10. How does Amphotericin B disrupt fungal cell membranes, and why is it toxic to human cells?

PART B — (5 × 5 = 25 marks)

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

11. (a) Describe the key components of laboratory inventory management and explain how proper inventory control enhances workflow and reduces contamination risks.

Or

(b) Explain the standard protocols for the collection, storage and transportation of fecal samples to minimize contamination and ensure accurate diagnostic outcomes.

12. (a) Explain the virulence factors *Streptococcus pneumoniae* and explain how they contribute to pneumonia.

Or

(b) Comment on pathogenesis of *Bordetella pertussis*.

13. (a) Explain the pathogenesis of *Mycobacterium leprae* and describe how its virulence factors contribute to nerve damage.

Or

(b) Discuss the Ziehl-Neelsen and Kinyoun staining techniques for detecting acid-fast bacteria.

14. (a) Explain how different HPV types contribute to benign and malignant diseases.

Or

(b) Discuss the diagnostic approaches for detecting SARS-CoV infections.

15. (a) Describe the different microscopic techniques used for diagnosing amoebiasis.

Or

(b) Write the principles and applications of rapid diagnostic tests in malaria detection.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss in detail about the microbial flora of genitourinary tract.

17. Write in great detail about the control measures of Gram-negative cocci diseases with an example.

18. Explain in detail about the diseases caused by enteric Gram-negative bacilli and their control.

19. Discuss in detail about Hepatitis its cause, symptoms and diagnosis.

20. Elaborate on the impact of National Programme in prevention of infectious diseases in infection control.

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D–1562

Sub. Code
36433

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Third Semester

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. List abiotic factors.

2. Define Food chain.

3. What is saccharification?

4. Comment on activated sludge.

5. Xenobiotics.

6. Greenhouse effect.

7. Phyllospheer.

8. Lipoxygenase.

9. Bunchy top of banana.

10. Biological control.

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Describe about communities and ecosystem.

Or

(b) Give a brief on ecological pyramids.

12. (a) Write brief note on vermicomposting.

Or

(b) Briefly explain about activated sludge digestion.

13. (a) Write about the degradation of xenobiotics.

Or

(b) Add short notes on Ozone depletion.

14. (a) Discuss in detail about classification of soil.

Or

(b) Add short note on symbiotic interaction of rhizosphere microbes.

15. (a) Write an account on carbons cycle.

Or

(b) Add a brief note on grassy shoot of sugar cane.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Discuss in detail about conservation and management of ecosystem.

17. Give elaborate note on secondary treatment of waste.

18. Elaborate the role mycorrhizae in agriculture.

19. Describe in detail about the phosphorous cycle.

20. Discuss about the biotechnological approaches to plant disease management.

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D–1563

Sub. Code
36441

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Fourth Semester

BIO PROCESS TECHNOLOGY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is the purpose of media sterilization in fermentation?

2. List the components involved in the fermentation process.

3. What is the role of baffles in fermentor?

4. What are aerobic conditions in fermentation?

5. What is the role of foam separation in downstream processing?

6. Name any two salts used for precipitation.

7. Which microorganism is used for the production of glutamic acid?

8. What is the primary use of riboflavin (Vitamin B2) in industry?

9. What is the main raw material used for producing ethanol?

10. What is filtration?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Discuss the range of fermentation processes.

Or

(b) What are the key components and considerations involved in formulating a fermentation medium.

12. (a) Sketch out the basic design of a microbial fermentor.

Or

(b) Differentiate between batch and continuous fermentation.

13. (a) Describe any two chemical methods of cell disruption.

Or

(b) State the importance of downstream processing in industrial fermentation processes.

14. (a) Outline the production process of Vitamin B12 through fermentation.

Or

(b) How do maintenance legislation affect the production of antibiotics and recombinant proteins?

15. (a) Briefly explain about the types of fermentation vessels with a neat diagram.

Or

(b) Discuss the membrane process of cell disruption method.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain starter culture technology, its role in fermentation, and how it is prepared for large-scale industrial use.

17. Explain the role of dual and multiple fermentation in enhancing the production of bio-based products.

18. Write in detail about the recovery and purification of fermentation products.

19. Narrate out the steps involved in production of penicillin.

20. Bring out the difference between aerobic and anaerobic fermentation.

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D–1564

Sub. Code
36442

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Fourth Semester

MICROBIAL BIOTECHNOLOGY

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Mention two algal applications in medicine.

2. Define Microbial Biotechnology.

3. What is parasitism?

4. What is BT cotton?

5. What are antagonists in microbial ecology?

6. Define cytokines.

7. What is bio compost?

8. Define microbial biosensor.

9. Define GMO.

10. What is biodiesel?

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Describe the concept of SCP and its significance.

Or

(b) Discuss the biotechnological applications of algae in agriculture and the environment.

12. (a) Compare and contrast antagonism and amensalism with examples.

Or

(b) Explain the role of *Pseudomonas* in the production of microbial insecticides.

13. (a) Give short notes on VAM and their importance.

Or

(b) Explain the concept of entamopathogenic fungi and their role in pest control.

14. (a) What is tissue plasminogen activator? Discuss its importance in medicine.

Or

(b) Discuss the types of microbial polysaccharides and their applications in biotechnology.

15. (a) Explain the mechanisms of biogas production and its significance.

Or

(b) Write short notes on ethical issues surrounding genetically modified microorganisms.

PART C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the methods of algae transformation and the role of expression vectors.

17. Describe the production and types of microbial pesticides and their uses.

18. Explain how microbial fuel cells work and discuss their applications.

19. Discuss the types of biosensors and their applications.

20. Explain the applications of Genetically Modified Microorganisms in various industries.

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D–1565

Sub. Code
36443

DISTANCE EDUCATION

M.Sc. (Microbiology) DEGREE EXAMINATION,
DECEMBER 2025.

Fourth Semester

BIOINFORMATICS AND BIOSTATISTICS

(CBCS 2018 – 2019 Academic Year Onwards)

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. Differentiate UNIX and LINUX.

2. Define Genomics.

3. Define Biostatistics.

4. What is Mean, Median and Mode?

5. Define Probability.

6. What is the degree of freedom?

7. Differentiate standard errors and standard deviations.

8. Define correlation.

9. Write the importance of statistical software in data analysis.

10. What are the methods of ANOVA?

SECTION B — (5 × 5 = 25 marks)

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

11. (a) Write an overview of the functions of computer components.

Or

(b) Explain a few applications in Unix, Linux, and Windows.

12. (a) Write a brief note on the sequence database.

Or

(b) Discuss the importance of pairwise and multiple sequence alignment.

13. (a) Explain the applications of integrated sequence analysis.

Or

(b) Explain about Biostatistics and their application.

14. (a) Describe the analysis of ANOVA.

Or

(b) Illustrate about types of Correlation.

15. (a) Write about the theorems of Probability.

Or

(b) Explain about Protein modeling.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Describe the GenBank sequence in detail.

17. Detailed explanation of biological databases.

18. Detailed explanation of structural databases.

19. Explain about the concepts of sequence alignment.

20. Write briefly about correlation and regression.

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