S–6786

Sub. Code
23MBT1C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

First Semester

Biotechnology

BIOCHEMISTRY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Draw the structure of fructose.

2. Why is deoxyhemoglobin a good buffer?

3. Kennedy pathway.

4. Mineralocorticoids.

5. What is the Second Law of Thermodynamics?

6. What are three molecules that are ketone bodies?

7. List down the non-essential amino acids.

8. What happens to carbon skeleton after deamination?

9. What is the salvage of free purines?

10. Chargaffs rules.

Part B (5 × 5 = 25)

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

11. (a) How do you determine the pH of a buffer using Henderson- Haselbach equation?

Or

(b) Summarize pentose phosphate pathway.

12. (a) Give an account on unsaturated fatty acids.

Or

(b) Brief about sphingolipids.

13. (a) How is standard free energy related to equilibrium constant? Explain.

Or

(b) Outline the urea cycle with a flowchart.

14. (a) Summarize a note on the classification of amino acids.

Or

(b) What are the overall in born error metabolisms?

15. (a) Draw the structure and explain about tRNA.

Or

(b) Explain the catabolism of purine and pyrimidine bases.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Discuss the classification and structure of carbohydrates.

17. Explain the biosynthesis of fatty acids.

18. Enumerate an account on the oxidation of fatty acids.

19. Elaborate the account on structure of proteins with the diagram.

20. Describe the structure and classification of nucleic acids.

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S–6788

Sub. Code
23MBT1C3

M.Sc. DEGREE EXAMINATION, APRIL 2025

First Semester

Biotechnology

MOLECULAR CELL BIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Comment on mitosis.
2. Enlist the organdies in the eukaryotic cell.
3. What is transcription?
4. Brief the structure of Deoxyribonucleic acid.
5. Role of RER in protein synthesis.
6. Brief peri nuclear space.
7. Role of IP3 in cell signaling.
8. What is a giant chromosome?
9. Differentiate oncogenes and proto-oncogenes.
10. Enlist the genes responsible for tumor suppression.

Part B (5 × 5 = 25)

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

11. (a) Describe the Scanning microscope with a diagrammatic representation.

Or

(b) Brief different types of cell junctions.

12. (a) Role of RER in protein synthesis.

Or

(b) Explain in detail about the process and stages of DNA replication.

13. (a) Comment on specialized type of chromosome with suitable illustration.

Or

(b) Justify the nucleus as the "control center of the cell" and describe its structure.

14. (a) Write in detail about the stages involved in the cell cycle.

Or

(b) Write about RTK and JAK-STAT pathways

15. (a) State the methods employed in cancer diagnosis.

Or

(b) Explain in detail about programmed cell death.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the mechanism of active and passive transport with a diagrammatic illustration.

17. Explain in detail about the post-translational modifications of the proteins.

18. Brief the different types of cell signaling.

19. Elaborate the mechanism of cell cycle.

20. What are the multi-stages in cancer development?

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S–6792

Sub. Code
23MBT2C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Biotechnology

MICROBIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Microbial diversity

2. Chemotrophs

3. Enriched media

4. Numerical aperture

5. Microbiome

6. Pandemic disease

7. Zoonotic disease

8. Pathogenesis

9. Extremphiles

10. Ammonification

Part B (5 × 5 = 25)

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

11. (a) Explain the role of temperature and pH on the growth of bacteria.

Or

(b) Cite the difference between biovars and serovars.

12. (a) Discuss about the Florescent microscope.

Or

(b) Classify the microbial growth control.

13. (a) Mention about the host microbe interaction.

Or

(b) Explain shortly about normal microbial flora.

14. (a) Write the general properties of pathogenic bacteria.

Or

(b) Hand wash is the one of the best control measure — Justify.

15. (a) Mention the scope of environmental microbiology.

Or

(b) State the biotechnological application of extremophiles.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Draw a neat diagram of bacterial structure with explains the parts.

17. Write in detail about microscopy.

18. Build the epidemiology of microorganisms.

19. Explain in detail about COVID-19.

20. Build the types and applications of biofertilizers.

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S–6793

Sub. Code
23MBT2C2

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Biotechnology

PLANT AND ANIMAL BIOTECHNOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions

1. Define micropropagation.

2. What are hybrid and cybrid.

3. How to make interaction between Agrobacterium and plant cells.

4. Why the plant growth regulators are important?

5. List out the food products by using plant engineering.

6. What is meant by cell synchronization?

7. What are the parameters for measurement of cell death?

8. Write the importance of stem cells.

9. Define Ti plasmid.

10. List out the importance of phytochemicals.

Part B

$(5 \times 5 = 25)$

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

11. (a) Write about the importance of MS media for plant tissue culture.

Or

(b) Differentiate the RFLP and RAPD markers.

12. (a) Mention about the steps involved in Organogenesis.

Or

(b) How to construct the Ti plasmid with target gene insertion.

13. (a) Explain about the STS and QTL.

Or

(b) How to diagnose the animal health diseases?

14. (a) Describe the cell line and cloning manipulation.

Or

(b) What is the major application of multiple shoot induction from callus?

15. (a) Write about the various types of culture techniques for animal cells.

Or

(b) How to induce the callus culture from explant?

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Write the brief introduction of plant tissue culture technique.

17. Explain the major importance of synthetic seed production.

18. Elaborate the plant transformation by using electroporation and its uses.

19. Explain the NMR monitoring cell metabolism culturing in fluidized bed reactors.

20. Discuss about the culture scale up and mass production of important compounds.

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S–6794

Sub. Code
23MBT2C3

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Biotechnology

GENETIC ENGINEERING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A (10 × 2 = 20)

Answer **all** the questions.

1. Name any two genetic engineering tools

2. Define – Ligation

3. ColE1

4. Cosmids

5. Vectors

6. cDNA

7. Nick translation

8. Random primer labelling

9. Chromosome jumping

10. Gene therapy

Section B (5 × 5 = 25)

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

11. (a) State the selectable markers used in rDNA technology.

Or

(b) Explain about restriction digestion protocol.

12. (a) Difference between - p15A and R1.

Or

(b) Illuminate about filamentous phages.

13. (a) Write the steps of cloning in yeast *saccharomyces cerevisae*.

Or

(b) State the specialized cloning vector for cDNA.

14. (a) State about types of molecular probes.

Or

(b) Write short notes on DNA Finger printing.

15. (a) Explain about site directed mutagenesis.

Or

(b) Discuss about GM foods.

Section C (3 × 10 = 30)

Answer any **three** questions.

16. Elaborate the process of "Gene cloning".

17. Explain about pBR322 and its derivatives in detail.

18. Elucidate the functions and life cycle of SV40.

19. What are the different labeling methods? Explain in detail.

20. Discuss the modern concepts in genetic analysis.

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S–6795

Sub. Code
23MBT2E1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Biotechnology

Elective – REGULATORY AFFAIRS AND INDUSTRIAL STANDARDS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is Traceability?

2. List out the safety equipment's.

3. Definition of water activity.

4. List out use of chemicals in food preservation.

5. What is biodegradable?

6. Define strength properties.

7. List out the bacterial group.

8. Write the pure culture Isolation.

9. Definition of GMP.

10. Write the food safety plan.

Part B (5 × 5 = 25)

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

11. (a) What are the Laboratory safety setting in food laboratory?

Or

(b) Write the storage of chemicals, acids and biological spills in food laboratory.

12. (a) Describe the principles of heat transfer, blanching and heat sterilization.

Or

(b) Explain the new non-thermal methods in food preservation.

13. (a) What are the different packaging materials used in food packaging?

Or

(b) Explain the types of properties.

14. (a) Write the characteristics of Microbial growth.

Or

(b) What are the methods involved in microbiological examination of food?

15. (a) Write the food safety management risk analysis.

Or

(b) Explain about food products recall and sanitation.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Briefly explain the accreditation and different types accreditation bodies.

17. Write the principles and chemical additives in food preservation technology.

18. Elaborate the types of packaging.

19. Describe the microbial food spoilage and food borne diseases.

20. Explain the HACCP principles and limitation.

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S–6797

Sub. Code
23MBT2E3

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Biotechnology

***Elective* – ENVIRONMENTAL BIOTECHNOLOGY**

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Conservation

2. What are radioactive pollutants?

3. Reactor

4. List the types of reactors.

5. What microorganisms are involved in wastewater treatment?

6. Which method is used to measure the amount of oxygen by aerobic microorganisms?

7. List the types of toxicity evaluation.

8. Biofuels

9. Xenobiotics

10. Vermiculture

Part B (5 × 5 = 25)

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

11. (a) Write a brief note on environmental laws involved in conservation.

Or

(b) Discuss about oil pollution and its control strategies.

12. (a) Continuous flow Stir tank reactor.

Or

(b) Elucidate about plug flow reactor.

13. (a) Write a short note on biological method of wastewater treatment.

Or

(b) Distinguish between BOD and COD.

14. (a) Give a guide to short note on biofuels.

Or

(b) Write a short note on biomagnification.

15. (a) Find the process of methane production.

Or

(b) Explain about Degradative plasmid.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Describe the different types of pollution and it's control strategies.

17. Enumerate the steps of engineering design of reactor in detail.

18. Discuss role of microbes in wastewater management.

19. Elaborate the biomonitoring of toxic materials.

20. Explain the process of vermiculture and its application.

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S–6798

Sub. Code
23MBT2S1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Second Semester

Biotechnology

TISSUE ENGINEERING

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Write the basic biology of tissue engineering?
2. List out the types of tissue.
3. Write the growth factors in tissue engineering.
4. Define Organs.
5. What are nanocomposites?
6. Define Extracellular matrix.
7. Definition of Artificial Womb.
8. What is red blood cell substitutes?
9. Define brain implants.
10. Write about skin tissue engineering.

Part B (5 × 5 = 25)

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

11. (a) Describe the process of morphogenesis.

Or

(b) Write the growth of tissue engineering.

12. (a) Describe the tissue engineering bioreactors.

Or

(b) Explain the 3D cell culture.

13. (a) What are biomaterials used in tissue engineering?

Or

(b) Write about scaffolds in tissue engineering.

14. (a) Describe the Bioartificial pancreas.

Or

(b) Explain about the Hematopoietic system.

15. (a) Describe the Neutral stem cell.

Or

(b) Write about Periodontal application.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Explain the basic biology of tissue engineering.

17. Describe the organotypic and histotypic engineered tissues.

18. Discuss the approaches on transplanting engineered cells.

19. Write an essay on Hepatassist liver support system.

20. Elaborate the bone regeneration through cellular engineering.

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S–6799

Sub. Code
23MBT3C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Third Semester

Biotechnology

BIOINFORMATICS

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the four main components of a database?
2. Why it is need important, history bioinformatics.
3. List the types of BLAST.
4. Write the biological motivation bioinformatics.
5. Gene ontology data
6. Pymol
7. PAM Matrices
8. SCOP
9. Spdp viewer
10. Write its Drug designing tool

Part B (5 × 5 = 25)

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

11. (a) Short notes on BLAST.

Or

(b) Discuss in detail about the motivation Artificial neural network.

12. (a) Write a note on PAM and Blossom matrices.

Or

(b) Explain about Global and Local alignment algorithms.

13. (a) Describe about the Protein secondary structure prediction.

Or

(b) Write notes on protein structure X-ray crystallography.

14. (a) Elucidate the relationship between genes and proteins.

Or

(b) Command on microarray designing in bioinformatics.

15. (a) Short notes ADME.

Or

(b) Write about the Ligand and target-based approach in computer drug design.

Part C

$(3 \times 10 = 30)$

Answer any **three** questions.

16. Briefly explain the Protein and DNA alignment.

17. Elaborates notes the SCOP and CATH.

18. Illustrate on protein fold, and transmembrane topology prediction.

19. Briefly describe Methods molecular visualization tool :

    (a) Rasmol

    (b) Chime viewer

    (c) SPDP viewer

20. Discuss the role Drug discovery for disease gene and medical application.

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S–6805

Sub. Code
23MBT4C1

M.Sc. DEGREE EXAMINATION, APRIL 2025

Fourth Semester

Biotechnology

RESEARCH METHODOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Section A (10 × 2 = 20)

Answer **all** questions.

1. Definition of basic research.

2. What is the basic concept of research?

3. How to write a literature review in research methodology?

4. Write the main objectives of research.

5. What are the five purposes of research?

6. How do you find the error of a square?

7. Why is open office used in research?

8. Define sampling fundamentals.

9. How do you find journal articles on PubMed?

10. Short notes on generating graphs in research.

Section B (5 × 5 = 25)

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

11. (a) What are the four types of research problems?

Or

(b) Short notes on criteria of good research.

12. (a) How do you process and analyze data in research?

Or

(b) Elaborate the sampling fundamentals.

13. (a) What are the components of a research report?

Or

(b) How to make a research paper title with examples?

14. (a) How to publish articles in PubMed?

Or

(b) Describe about the WWW in research.

15. (a) Mention briefly about the presentation tool in research.

Or

(b) Describe about the advanced search technique in research.

Part C (3 × 10 = 30)

Answer any **three** questions.

16. Explain the types of research with examples.

17. Describe the ANOVA in research methodology.

18. Enumerate the features for statistical data analysis.

19. Elaborate in detail about the Methodological approaches in web search research.

20. Discuss in detail about the role of Microsoft PowerPoint in the creation of research presentation.

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S–6806	Sub. Code 23MBT4E1

M.Sc. DEGREE EXAMINATION, APRIL 2025.

Fourth Semester

Biotechnology

Elective : STEM CELL BIOLOGY

(CBCS – 2023 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Pluripotency.

2. Write Importance use of stem cells.

3. Adult stem cell.

4. What is stem cell receptor?

5. Master Cell Bank (MCB).

6. Germline Stem Cells (GSC).

7. Potencial role of tyrosine kinase in cell signalling pathway.

8. Cytoplasm.

9. How do you get bone marrow stem cells?

10. Cell Apoptosis.

Part B (5 × 5 = 25)

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

11. (a) Write the Properties and important feature uses of stem cells with example.

Or

(b) Details notes on classification stem cell and draw diagram cells.

12. (a) Explain about the therapeutic applications of Hematopoietic stem cells.

Or

(b) Write the notes interaction between stem cell and stem cells niche structure and function.

13. (a) Explain the methods isolation and characterization neural stem cells.

Or

(b) Explain isolation, cultivation characterization, Human Mesenchymal stem cell.

14. (a) Describe application, sources embryonic stem cell.

Or

(b) Detailed explain JAK-STAT Signalling pathway in Drosophila follicle elongation process.

15. (a) Write notes on ethics of embryonic stem cell research.

Or

(b) Short on Leukaemia Inhibitory factor.

Part C

(3 × 10 = 30)

Answer any **three** questions.

16. Describe about the Concept, properties and characterization stem cell.

17. Overview stem cell niche, receptor and markers.

18. Briefly Explain the application of primary human neural stem cells.

19. Discuss about the Ras\Raf pathway cell cycle control.

20. Difference between Hematopoietic stem cells (HSCs) and Mesenchymal stem cell (MSCs).

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