

PH 501.1

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St Aloysius College (Autonomous)
Mangaluru

Semester I - P.G. Examination - M.Sc. Biotechnology
November/December - 2023

BIOCHEMISTRY AND METABOLISM

Max. Marks : 70

Time : 3 Hours

Note: Draw neat labeled diagrams/schematic sketches/structures wherever Necessary.

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MANGALORE-575 002

(5x3=15)

I. Write short notes on any FIVE of the following.

1. What is the difference between structural isomers and stereoisomers? Give an example.
2. Define oxygenated fatty acid with an example
3. Write a note on cot curve.
4. Explain the significance of peptide bonds in protein structure and function.
5. Explain Chemiosmotic theory.
6. Explain the Coris cycle.
7. Compare deamination with that of transamination.
8. List the key enzymes involved in ketogenesis and draw a schematic representation of the process.

(5x5=25)

II. Write explanatory notes on any FIVE of the following

9. Discuss on MUFA and PUFA with examples.
10. Explain the structure and properties of Cholesterol and Bile.
11. Explain how miRNAs recognize and bind to their target mRNAs. What are the consequences of miRNA binding with mRNA?
12. Briefly explain the chemical reaction that occurs during the Edman degradation process.
13. Describe chemiosmotic theory
14. Explain the inhibitors of ETC.
15. Illustrate the process of formation of mevalonate and mention how it plays critical role in the regulation of fatty acid biosynthesis?
16. Elaborate on the Carnitine shuttle mechanism.

(3x10=30)

III. Answer any THREE of the following:

17. Compare and contrast the structural differences between Sucrose and Lactose.
18. Explain the concept of ketogenic and glucogenic amino acids. Provide examples of each and describe their metabolic pathways.
19. Explain Glycolysis and add a note on its regulation.
20. Summarize the sequence of reactions in the urea cycle and how it converts toxic ammonia into urea for excretion.
21. Discuss the structure and function of peptidoglycan and pectin.

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Semester I - P.G. Examination - M.Sc. Biotechnology
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MICROBIOLOGY

Max. Marks : 70

Time : 3 Hours

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(5x3=15)

I. Write short notes on any FIVE of the following.

1. Name the microorganisms adapted to extremely acidic and alkaline conditions.
2. Outline the process of subculturing pure cultures and discuss its role in the long-term maintenance of microbial isolates.
3. How do the microbes thrive in extreme environments?
4. Define antagonistic symbiosis and provide examples.
5. Write a note on SARS-CoV
6. List three types of host cells commonly used for the cultivation of animal viruses.
7. Which marine microbes are used in drug discovery?
8. How does the Ribosomal Database Project (RDP) contribute to the field of microbiology, and what specific services does it offer to researchers?

II. Write explanatory notes on any FIVE of the following

(5x5=25)

9. Explain the techniques involved in measurement of microbial growth.
10. Elaborate on the importance of the 16S rRNA gene in microbial taxonomy and identification. How does its sequence help classify bacteria and archaea?
11. Explain commensalism with suitable examples
12. Explain the concept adaptation of microbes to different environments.
13. Explain the ultrastructure of TMV.
14. Explain the ultrastructural components of viruses.
15. Explain the field applications and benefits of mycorrhizal biofertilizer.
16. Explain why the study of microorganisms is crucial for various industries.

III. Answer any THREE of the following:

(3x10=30)

17. Explain the key differences between complex and synthetic culture media, highlighting the rationale for using each type in microbiological studies.
18. Explain in detail the nutritional types of bacteria with examples
19. Elaborate on the two different cycles of viral replication.
20. What are bioactive agents? Explain their role in treatment of diseases.
21. Elaborate on the ecological roles of extremophilic microorganisms and their adaptations.

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Semester I - P.G. Examination - M.Sc. Biotechnology
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CELL AND MOLECULAR BIOLOGY

Max. Marks : 70

Time : 3 Hours

Note: Draw neat labeled diagrams/schematic sketches/structures wherever Necessary.

(5x3=15)

I. Write short notes on any FIVE of the following.

1. Apply the principles of osmosis to describe how water moves across a selectively permeable membrane.
2. Name the major types of proteins found in cell membranes.
3. What is the significance of co-activators and co-repressors in transcriptional regulation by transcription factors?
4. What is the genetic code, and how does it determine the sequence of amino acids in a protein during translation?
5. Distinguish between general transcription factors and sequence specific transcription factors.
6. Explain the mechanism of trans splicing in *Typanosoma*.
7. Discuss on a bacterial carcinogen.
8. Differentiate between cMyb and vMyb.

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II. Write explanatory notes on any FIVE of the following

(5x5=25)

9. Analyze the concept of alternative splicing and its implications for gene regulation. Provide examples of genes that undergo alternative splicing and how it affects protein diversity.
10. Explain translational activation of genes in *xenopus* egg following fertilization.
11. What is Rb gene? Explain how mutations in Rb induces cancer.
12. Discuss on cell cycle regulatory proteins and its role in cell cycle regulation.
13. Describe the function of coat proteins in vesicle formation.
14. Describe the role of DNA ligase in the final steps of DNA replication. What is its function, and when is it crucial?
15. Discuss selective gene amplification in eukaryotes.
16. Explain the mechanism of cancer metastasis.

III. Answer any THREE of the following:

(3x10=30)

17. Explain the molecular mechanisms that underlie nuclear transport processes.
18. Describe the process of translation in eukaryotes.
19. Give an account of pattern formation in *Drosophila* with respect to anterior -posterior axis
20. Comment on Immunotherapy for cancer.
21. Explain the mechanism of intein-mediated protein splicing in detail, including the steps involved in the removal of the intein and the ligation of exteins.

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Semester I - P.G. Examination - M.Sc. Biotechnology
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MOLECULAR AND HUMAN GENETICS

Max. Marks : 70

Time : 3 Hours

Note: Draw neat labeled diagrams/schematic sketches/structures wherever Necessary.

(5x3=15)

- I. Write short notes on any FIVE of the following.
1. Define F plasmid with a schematic representation of its conjugation.
 2. Define multiple alleles with blood group as an example.
 3. Identify the dosage compensation mechanism in Drosophila and write a note on it.
 4. Describe the typical age of onset and progression of symptoms in individuals with Prader Willi syndrome.
 5. Compare and contrast Isodicentric 15 with Familial Down's syndrome.
 6. Explain allopatric speciation.
 7. Explain the importance of pedigree analysis and write a note on pedigree symbols.
 8. Discuss on Recapitulation theory.

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(5x5=25)

- II. Write explanatory notes on any FIVE of the following
9. Explain site specific recombination.
 10. Summarize the process of non epistatic interaction in Bell pepper.
 11. Explain the experiment to prove the process of transformation.
 12. Compare and contrast the physical characteristics of Down's syndrome with that of Martin Bell syndrome.
 13. Explain the concept of genome sequencing and how it was applied in the Human Genome Project.
 14. Explain the process of Amniocentesis.
 15. Provide an example of an organism often used to illustrate Darwinism and describe how it is thought to have evolved.
 16. Discuss on the different experiments to prove Biogenesis.

(3x10=30)

III. Answer any THREE of the following:

17. Explain in the the process of SOS and mismatch repair mechanism.
18. Explain the central idea of Lamarckism, emphasizing how it differs from Charles Darwin's theory of natural selection.
19. Illustrate on the X and Y linked pedigree, its characteristics and one disease as an example for each.
20. Explain Hardy-Weinberg law and its assumptions.
21. Illustrate on the different mechanisms of sex determination.
