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**St Aloysius (Deemed to be University)  
Mangaluru**

**Semester I – P.G. Examination - M.Sc. Biotechnology**

**November – 2024**

**BIOCHEMISTRY AND METABOLISM**

**Time: 2½ Hours**

**Max. Marks: 60**

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

**I. Write short notes on any FIVE of the following: (5x3=15)**

1. Explain mutarotation in the context of monosaccharides.
2. Investigate the structural differences between saturated and unsaturated fatty acids in relation to their melting points.
3. Explain the concept of hyperchromicity in the context of DNA.
4. Provide an example of a protein with tertiary structure and discuss its function.
5. Explain the significance of the Cori Cycle in maintaining blood glucose levels.
6. Explain the concept of ETC in simple terms. What are the primary goals of ETC in a cell and where does it take place within the cell?
7. Differentiate between deamination and transamination in terms of their primary objectives and the key products generated during these processes.
8. Describe the concept of feedback inhibition in the context of pyrimidine ribonucleotide biosynthesis and its role in regulating the pathway.

**II. Write explanatory notes on any FIVE of the following: (5x5=25)**

9. Describe the basic structure of hyaluronic acid and explain how its repeating disaccharide units contribute to its unique properties.
10. Describe the basic structure of cholesterol, including the arrangement of its rings and the presence of functional groups.
11. Explain Ramachandran plot and how it aids in understanding protein conformation.
12. Explain how miRNAs recognize and bind to their target mRNAs. What are the consequences of miRNA binding with mRNA?
13. Explain TCA cycle and its regulation.
14. Describe chemiosmotic theory.
15. Explain the formation of mevalonate during cholesterol biosynthesis?
16. Analyze the regulatory mechanisms that control the rate of purine nucleotide synthesis.

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**III. Answer any TWO of the following: (2x10=20)**

17. Compare and contrast the structural differences between starch and glycogen.
18. Discuss the classification of amino acids based on charge and polarity. How does this classification affect protein structure and function?
19. Discuss the Glycolysis pathway and its regulations.
20. Illustrate that lipid biosynthesis is a complex process involving multiple steps and regulatory mechanisms. Describe the key stages of fatty acid synthesis in detail; including the enzymes, substrates and cofactors involved.

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**November – 2024**

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**MICROBIOLOGY**

**Time: 2½ Hours**

**Max. Marks: 60**

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

**I. Write short notes on any FIVE of the following: (5x3=15)**

1. Describe the primary role of the 16S rRNA gene in microbial taxonomy and phylogeny.
2. Write a note on synchronous culture.
3. Write a note on applications of microbes of extremophiles in biotechnology.
4. Write a note on the microbes thriving in different environments with examples.
5. Describe the concept of the endpoint dilution assay and how it is used to assess viral infectivity.
6. Explain the primary components of a virus's structure.
7. Define synergism and commensalism with examples.
8. Which organisms are used in microbial fuel cell production?

**II. Write explanatory notes on any FIVE of the following: (5x5=25)**

9. Discuss the strategies and importance of subculturing microorganisms to maintain pure cultures over time.
10. Describe the mechanisms by which selective media work to inhibit the growth of unwanted microorganisms while allowing target microorganisms to thrive.
11. Focus on mycorrhizae and its types, explaining their role in plant-microbe interactions.
12. Write a note on extremophiles and their significance.
13. Explain the key molecular events that occur during the entry phase of the lytic cycle in viral replication. How does the virus gain access to the host cell's interior?
14. Explain the etiology and pathogenesis of H1N1 disease in humans.
15. List out few beneficial marine microorganisms and applications in development of drugs.
16. Explain the field applications and benefits of mycorrhizal biofertilizer.

**III. Answer any TWO of the following: (2x10=20)**

17. Elaborate on molecular identification methods used for the genetic classification of the microorganisms for the construction of phylogenetic tree.
18. Discuss the significance of the human microbiome for health and disease.
19. Explain the concept of "lytic cycle" and "lysogenic cycle" in the context of bacteriophages. Provide examples of phages that follow each cycle.
20. Discuss the isolation, characterization, mass production, field application and assessment of biofertilizers produced by the phosphate solubilizing microbes.

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**Semester I – P.G. Examination - M.Sc. Biotechnology**

**November – 2024**

**FOOD BIOTECHNOLOGY**

**Time: 2½ Hours**

**Max. Marks: 60**

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

**I. Write short notes on any FIVE of the following: (5x3=15)**

1. Can you explain the difference between physical and chemical aspects of food quality?
2. Explain why food adulteration poses a risk to public health.
3. What are endotoxins? Give examples.
4. Comment on the effect of food poisoning on different organs in the body.
5. Differentiate between preservatives and colouring agents as food additives, providing an example for each category.
6. Explain the advantages and disadvantages of preservation of food using low temperature.
7. Outline the basic steps involved in the traditional preparation of tempeh.
8. How do light intensity, temperature and pH influence the growth of Spirulina in a cultivation setup?

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**II. Write explanatory notes on any FIVE of the following: (5x5=25)**

9. Compare and contrast the regulatory frameworks of Codex Alimentarius and the USFDA regarding food safety standards and enforcement.
10. Compare the roles of grades and standards in distinguishing food qualities.
11. Which organisms are involved in spoilage of canned food? Describe the features of canned food spoilage.
12. Describe the beneficial aspects of moulds in food stuffs.
13. Briefly explain the two main methods of canning.
14. List the common woods used in smoking of food and mention about the different types of smoking.
15. Discuss the steps of fermentation of beer till it is bottled.
16. Elaborate on the general steps involved in Cheese production.

**III. Answer any TWO of the following: (2x10=20)**

17. Develop a personalized diet using genetics, nutraceuticals, prebiotics and probiotics.
18. Elaborate on the factors affecting growth of microorganism in food leading to spoilage.
19. Illustrate on the types of food additives and write a note on e-number.
20. Provide a comprehensive overview of the traditional Japanese method of soy sauce production, detailing each stage and key ingredients.

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**MOLECULAR GENETICS**

**Time: 2½ Hours**

**Max. Marks: 60**

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

**I. Write short notes on any FIVE of the following: (5x3=15)**

1. Define transformation and name two organism that follow this mechanism of recombination.
2. Identify two features of Rec A protein and mention the repair mechanisms in which it is involved.
3. Define Genic Balance Theory and explain.
4. Compare and contrast the genetic basis and clinical features of Cri du Chat syndrome with another genetic disorder of your choice.
5. Describe autosomal recessive pedigree and give an example.
6. List the benefits of genetic counselling.
7. Define the central idea of Lamarckism and explain with an example.
8. Describe allopatric speciation with an example.

**II. Write explanatory notes on any FIVE of the following: (5x5=25)**

9. How does site specific recombination occur between a phage and a bacterium?
10. Define gene interaction with the example of Bell Pepper.
11. Explain the concept of multiple alleles in ABO blood group.
12. Analyze the salient features and the Sanger method of sequencing of Human Genome Project.
13. Explain the genetic basis of Martin Bell syndrome and list the common characteristics associated with individuals who have this syndrome.
14. Explain the process of Transabdominal CVS.
15. Explain Darwins principle of "natural selection and survival of the fittest".
16. Explain the different types of pre-zygotic and post-zygotic barriers of reproduction.

**III. Answer any TWO of the following: (2x10=20)**

17. Explain the experiment to prove the process of conjugation.
18. Elaborate on the different mechanisms of sex determination.
19. Illustrate on the types of X linked pedigree with examples.
20. Explain the theories of origin of life and add a note on the experiments of biogenesis.

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**Semester I – P.G. Examination - M.Sc. Biotechnology**

**November – 2024**

**RESEARCH METHODOLOGY, ETHICS AND SCIENTIFIC COMMUNICATION**

**Time: 2½ Hours**

**Max. Marks: 60**

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

**I. Write short notes on any FIVE of the following: (5x3=15)**

1. List the obligations researchers have towards participants.
2. Explain why scientific misconduct is considered unethical in research.
3. Mention the different types of research design.
4. Explain the conditions that say that there is an existence of a research problem.
5. Distinguish between SNIP and SJR.
6. What are the key components of a successful research grant proposal?
7. Mention the factors that researcher must remember while selecting the appropriate method for data collection.
8. Distinguish between thesis and research article.

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**II. Write explanatory notes on any FIVE of the following: (5x5=25)**

9. Compare qualitative and quantitative research methodologies.
10. Analyze the limitations of correlational research in establishing causality.
11. Explain nonprobability sampling techniques.
12. Explain the difference between questionnaire and schedules.
13. Explain how to make effective scientific oral presentation.
14. Distinguish between dense and sparse indexing of databases.
15. What is the significance of experimental preparation in scientific research?
16. Distinguish between g-index and i10 index.

**III. Answer any TWO of the following: (2x10=20)**

17. Evaluate the ethical principles governing research involving human subjects and their role in protecting participants' rights and welfare.
18. Discuss various types of complex random sampling techniques with an example for each.
19. Elaborate on how to Identify predatory publishers and journals.
20. Discuss the responsibilities of stakeholders in maintaining ethical standards in scholarly publishing and emphasize the importance of publication ethics.

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