(2024 Batch Onwards)

LS2HPHC600 Reg. No.: | | | | | | | | |

St Aloysius (Deemed to be University)

Mangaluru

School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester III – PG Examination

October/November - 2025

MOLECULAR BIOLOGY

Time: $2^1/_2$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. State the role of DNA polymerase γ in mitochondrial DNA replication.
2. Describe the role of sigma factors in prokaryotic transcription initiation.
3. Analyze how the gal operon responds to the presence or absence of its inducer molecule.
4. Mention initiation factors in prokaryotic translation.
5. Can you name some key cellular components and molecules involved in the apoptotic pathway?
6. Expand "PEST" in the context of protein degradation.

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Describe how DNA ligase functions in Okazaki fragment joining.
8. Describe the general transcription factors that are required for RNA polymerase II transcription initiation?
9. Describe the regulation of the lac operon in the presence of lactose
10. Explain how synthetic polynucleotides were used in Khorana's experiments.
11. Compare and contrast meiosis I and meiosis II in terms of their outcomes and the events that occur in each division.
12. Differentiate between leading and lagging strand synthesis.
13. Explain the role of the trp repressor and tryptophan in regulating the trp operon.

SECTION – C

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

14. Analyze the effects of hypoxia on gene expression via HIF-1α and related translational control mechanisms.
15. Analyse the design of the Meselson–Stahl experiment and explain how it ruled out conservative replication after the first generation.
16. Discuss various mechanisms of mRNA splicing in eukaryotic cells.

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School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester III – PG Examination

October/November - 2025

RESEARCH METHODOLOGY, ETHICS AND BIOSTATISTICS

Time: $2^1/_2$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. Define Data in research and mention its significance.
2. List the types of samples.
3. Write the basic principle of intellectual property right.
4. Analyze the importance of scopus indexed Journals.
5. Describe the difference between a histogram and a bar graph, providing an example of when each would be used.
6. State the addition rule of probability.

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Describe the various techniques in sampling.
8. Explain the types of Research.
9. Explain about falsification and fabrication of Research data.
10. In a survey conducted among 50 students about their daily screen time (in hours), the data was grouped into the following intervals:

Interval	Frequency
0-2	10
2-4	15
4-6	12
6-8	8
8-10	5

Calculate the mode.

11. Discuss the concept of linear and non-linear correlation with examples.
12. Explain structure and components of scientific reports.
13. A survey was conducted among 80 people regarding their favorite genre of movies. The results are as follows:

    Action: 30, Comedy: 25, Drama: 15, Science Fiction: 10

    Create a pie chart to illustrate the distribution of favorite movie genres.

Contd...2

SECTION – C

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

14. Analyze the key characteristics of research.
15. Discuss about Research paper writing.
16. In a study of the relationship between smoking habits and gender, 500 individuals were surveyed. The results are as follows:

	Smoker	Non-smoker
Male	90	210
Female	60	140

If it is known that 40% of males and 30% of females smoke in the population, test whether smoking habits are independent of gender at a 5% level of significance. Tabulated chi=3.841.

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(2024 Batch Onwards)

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St Aloysius (Deemed to be University)

Mangaluru

School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester III – PG Examination

October/November - 2025

METABOLISM II

Time: $2^1/_2$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. Explain the role of spermidine and polyamine.
2. Explain how nitrification and denitrification differ in the nitrogen cycle.
3. Name the products of heme degradation
4. What are accessory pigments? Give Examples.
5. Analyze the opposing roles of cytokinins and abscisic acid in leaf senescence.
6. Evaluate the ecological significance of phenolic compounds in plant survival.

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Elaborate on biosynthesis of Epinephrine and Phosphocreatine.
8. Draw a flow chart showing common intermediates in amino acid degradation.
9. Describe major pathways for coenzyme A biosynthesis in cells.
10. Discuss the causes and effects of hyperhomocysteinemia
11. Why is the Rubisco enzyme called RUBP Carboxylase-Oxygenase and what important role does it play in photosynthesis?
12. Analyze the role of Ubiquitin in protein degradation.
13. How does the water-splitting complex in photosystem II contribute to oxygen production and replenishment of electrons in the system?

SECTION – C

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

14. Elaborate on the biosynthesis of the aromatic amino acids (phenylalanine, tyrosine, and tryptophan). Use a flow chart to illustrate the common pathway leading to chorismate and the subsequent branched pathways for each amino acid.
15. Explain the salvage pathways for nucleotide biosynthesis.
16. Analyze the components of the photosynthetic machinery in purple bacteria, and evaluate how their photosynthetic process differs from that of higher plants.

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(2024 Batch Onwards)

LS2HPSC621 Reg. No.: | | | | | | | | |

St Aloysius (Deemed to be University)

Mangaluru

School of Life Sciences (PG Programme)

M.Sc. Biochemistry Semester III – PG Examination

October/November - 2025

CLINICAL BIOCHEMISTRY AND CLINICAL RESEARCH

Time: $2^1/_2$ Hours **Max Marks: 60**

Note: Draw neat, labelled diagrams /schematic sketeches/structures wherever necessary

SECTION – A

Write Short note on any FIVE of the following. **(5x2=10)**

1. What is Bioavailability?
2. List any two Westgard rules.
3. What is the normal range of ESR for adult males and females?
4. Describe the Sulphanilamide tragedy
5. Mention two diseases giving cross-reaction in Brucella test.
6. List the four core principles of bioethics.

SECTION - B

Write Explanatory notes on any SIX of the following. **(6x5=30)**

7. Differentiate between hypochlorhydria and achlorhydria.
8. Classify types of laboratory errors and indicate how each is addressed by quality assurance.
9. Discuss the importance of "Essential Documents" in a clinical trial as outlined by GCP.
10. List the core responsibilities of the European Medicines Agency (EMA).
11. Write about acetaminophen metabolism and NAPQI formation.
12. Describe the significance of Phase I metabolism in drug detoxification with examples.
13. Recall the four phases of clinical trials and their objectives.

SECTION – C

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

14. Discuss in detail the physical and microscopic evaluation of CSF and how these findings aid in differential diagnosis of meningitis.
15. Describe different methods of randomization and their implications for trial integrity.
16. Discuss the function and importance of CYP450 and non-CYP450 enzymes in drug metabolism.

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St Aloysius (Deemed to be University)

Mangaluru

School of Physical Sciences (PG Programme)

M.Sc. Analytical Chemistry - Semester III – PG Examination

October/November - 2025

ELECTROANALYTICAL RADIOCHEMICAL AND THERMO-ANALYTICAL TECHNIQUES

Time: $2^1/_2$ Hours **Max Marks: 60**

SECTION – A

Answer any <u>FIVE</u> of the following. **(5x2=10)**

1. Can you list the components of a typical glass electrode?
2. What is liquid junction potential?
3. Define decomposition potential and give its significance.
4. Compare the methodology between polarography and cyclic voltammetry.
5. How radioactive labelling technique is used to study the mechanism of chemical reaction?
6. Write any two applications of Controlled potential coulometry.
7. What are the main components of a thermometric titration apparatus and what are their functions?
8. How does DSC measure heat flow in a sample?

SECTION - B

Answer any <u>TEN</u> of the following. **(10x5=50)**

9. Explain the factors that influence the electrode potential of an electrochemical cell.
10. Analyze the advantages and challenges associated with semiconductor electrodes in comparison to traditional metal electrodes in electrochemical applications.
11. Explain with an example the working of a reference electrode.
12. Discuss two step processes involved in stripping voltammetry.
13. Write a note on the nature of electrodes and methodology involved in biamperometric titrations.
14. List the advantages and disadvantages of polarography.
15. Discuss the effect of physical variables on electrogravimetry.
16. Discuss the principle and method involved in neutron activation analysis.
17. Write the principle of chronopotentiometry with its applications.
18. What technique can be used to analyze the phase transitions, melting, crystallization, and sublimation of a sample? Explain.
19. How does TGA help in characterizing the purity of a substance? Provide a practical example.
20. What are the important parameters calculated from dilatometry and thermometric titration curves?

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