

--	--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April - 2019

IMMUNOLOGY

Time: 3 Hours

Max.Marks:70

I Answer any TEN of the following:**(10×2=20)**

1. Differentiate between innate and acquired immunity.
2. What are haptens?
3. Differentiate between isotypic and allotypic variations.
4. Describe the principle of complement fixation.
5. Write a note on immune tolerance.
6. Write the structure of MHC-I and list its functions.
7. Write a note on Tumor Necrosis factor.
8. Define Antigenicity. Give an example.
9. Write the principle for immuno fluorescence technique.
10. Define Autoimmunity.
11. What are interleukins? Explain any two functions.
12. Describe the functions of phagocytic cells.

ST.ALOYSIUS COLLEGE
 PG Library
 MANGALORE-575 003

II Answer any SIX of the following:**(6×5=30)**

13. Explain clonal selection theory.
14. What are epitopes? Describe the properties of T-cell epitopes.
15. What is immunogenicity? Explain the factors that influence immunogenicity.
16. Explain the immunodeficiency in SCID.
17. What are vaccines? Explain their types and features.
18. Define Hypersensitivity. Explain the mechanism of type I and Type II hypersensitivity.
19. Describe the functions of Primary lymphoid organs.
20. Explain the mechanism of antibody class switching.

III Answer any TWO of the following:**(2×10=20)**

21. Explain complement system pathways.
22. Write a note on: a) Rheumatoid Arthritis b) ELISA
23. Classify Immunoglobulin's. Explain their structure and functions of each type.
24. Explain a) The mechanism of B-cell differentiation.
 b) Role of HLA typing in organ transplantation.

PS 512.4

Reg. No:

--	--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April 2019

CELLULAR BIOCHEMISTRY

Time: 3 Hours

Max.Marks:70

I Answer any **TEN** of the following:

(10×2=20)

1. Differentiate between micelle and reverse micelle.
2. What are microfilaments? What is their role?
3. What are flippases? Give their importance.
4. Give the functions of Golgi complex.
5. What are membrane rafts and caveolae?
6. What are integrins? How are they activated?
7. What is fibronectin ? What is its role?
8. Differentiate between apoptosis and necrosis.
9. Write the role of phosphatidyl inositol in intracellular signalling.
10. What are the special features of GPCR?
11. What is Ras? Give its importance.
12. What is metastasis?

ST. ALOYSIUS COLLEGE
PG Library
MANGALORE-575 003

II Answer any **SIX** of the following:

(6×5=30)

13. Explain the role of MAP- kinase in signalling cascade.
14. Describe the structural features and mechanism of Na⁺-K⁺ ATPase.
15. Give the mechanism of chemical carcinogenesis.
16. How are nascent secretory proteins targeted to endoplasmic reticulum?
17. What is MDR? Explain the role of p-glycoprotein in MDR.
18. Describe the acceptable sliding filament model of muscle contraction.
19. Explain the role of cytoskeleton in cell motility.
20. How does nitric oxide act as a second messenger?

III Answer any **TWO** of the following:

(2×10=20)

21. What are different phases of cell cycle? Mention check points of cycle and how is G₂- M transition regulated?
22. Explain Gorter and Grendel's model, Sandwich model and Fluid mosaic model of the plasma membrane. Why is the Fluid mosaic model superior to all the others?
23. What is the role of telomerase in cancer? Explain the mechanism of telomerase action.
24. Write a note on the structure and function of the following
 - a) Nuclear pore complex
 - b) Grana and stroma of chloroplast

--	--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April 2019
GENETIC ENGINEERING

Time: 3 Hours

Max. Marks: 70

(10×2=20)

I Answer any TEN of the following:

1. What are linkers and adapters?
2. Comment on M13 vectors.
3. What are protein expression vectors?
4. Write a note on geminivirus-based vectors.
5. Write a note on calcium phosphate method of gene transfer.
6. Explain the principle of dot blot technique.
7. Define site-directed mutagenesis.
8. Briefly explain the principle of gel mobility shift assay.
9. What is 2-D electrophoresis?
10. What is gene silencing?
11. Discuss the ethical issues in biotechnological research.
12. Write the salient features of transgenic animals.

ST ALOYSIUS COLLEGE
 PG Library
 MANGALORE-575 003

ST ALOYSIUS COLLEGE
 PG Library
 MANGALORE-575 003

II Answer any SIX of the following:

(6×5=30)

13. Describe the general features of E-coli plasmid vectors and add a note on cosmids and plasmids.
14. Discuss the construction and applications of bacterial artificial chromosomes.
15. Elaborate on the principle, working and applications of DNA fingerprinting.
16. What is cDNA library? Discuss the construction with appropriate diagram.
17. Discuss in detail about SAGE.
18. Elaborate on Human genome project
19. Describe principles and applications of microarray.
20. Discuss DNA based diagnostics.

III Answer any TWO of the following:

(2×10=20)

21. Give a detailed account of gene therapy.
22. Describe the principle, working and applications of western blot analysis.
23. What are gene probes? Describe the construction and applications.
24. Define restriction endonucleases. How are they classified? Describe the characteristic features.

--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April 2019

BIostatistics and Bioinformatics

Time: 3 Hours

Max. Marks: 70

I Answer any **TEN** of the following:

ST. ALOYSIUS COLLEGE

(10×2=20)

PG Library

MANGALORE-575 003

1. Define data.
2. What is meant by skewness of data?
3. Represent the following data graphically.

Crop	Yield (In metric ton)
Rice	25
Jowar	30
Ragi	105
Maize	65
Wheat	110

4. What is Binomial distribution? Give example.
5. What is a primary database?
6. Define Bioinformatics. How it is different from computational biology?
7. Describe FASTA" format of sequence representation.
8. What is RasMol? Where is it used?
9. Perform alignment using dot matrix and comment.
5'-ATGGCAT-3'
5'-AGGCAG-3'
10. Define homology modelling.
11. What is NCBI?
12. List out the protein family databases.

II Answer any **SIX** of the following:

(6×5=30)

13. What is the probability of getting 0,1,2,3 & 4 heads when a coin is tossed 4 times?
14. What is correlation and regression? What is their application?
15. Data on protein consumption per day by families are given below. Calculate standard deviation.

Protein consumption (unit /day in gms)	No of families
15-25	30
25-35	40
35-45	100
45-55	110
55-65	80
65-75	30
75-85	10

Contd...2

16. Give the classification of databases with example.
17. Describe the different sampling techniques.
18. What is SWISSPROT? Explain.
19. Explain the NCBI flat file format.
20. Discuss the multiple sequence alignment and its uses.

ST. ALOYSIUS COLLEGE
PG LIBRARY
MANGALORE-575 003

III Answer any TWO of the following:

(2×10=20)

21. With your knowledge on sequence alignment align the given sequences and derive the alignment score with match =2, mismatch =0, Gap penalty =-1.

5'-ATGGC-3'

5'-AGGC-3'
22. What is a phylogenetic tree? How is it constructed? What is its importance?
23. Mendel observed 621 tall plants and 187 dwarf plants in F₁ generation out of 808 pea plants. Perform χ^2 test and report whether they obey Mendelian monohybrid cross ratio. (tab $\chi^2 = 3.84$ @ 1 df) at 5%)
24. Explain Randomized block design and add a note on applying ANOVA to RBD.

--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April 2018
IMMUNOLOGY

Time: 3 Hours

Max.Marks:70

I Answer any TEN of the following:

(10×2=20)

1. Name the subsets of T-cells and give their functions.
2. Write a note on macrophages.
3. What is the immunological defect in AIDS?
4. Name the primary and secondary lymphoid organs in man.
5. What are haptens? Give an example.
6. What are plasma cells? What is their origin?
7. What is meant by valency of antibody?
8. What is passive immunization? Name a situation in which it will be useful.
9. What are adjuvants? Give two examples.
10. What are tumour associated antigens?
11. Define immunogenicity and antigenicity.
12. What are isotypes and allotypes?

ST.ALOYSIUS COLLEGE

PG Library

MANGALORE-575 003

II Answer any SIX of the following:

(6×5=30)

13. Explain IDDM as an autoimmune disease.
14. What is primary and secondary immune response? Illustrate with a graph.
15. Write a note on Ig antibody and its role in immunity.
16. What are interleukins? What is their function?
17. Describe the characteristic immune responses to bacterial and viral infections.
18. What are vaccines? Give a short account of any two types of vaccines.
19. What is hypervariable region? What is its role in immunity?
20. Give an account of endogenous pathway of antigen processing and presentation.

III Answer any TWO of the following:

(2×10=20)

21. What is complement system? Describe the classical pathway of complement activation and its biological consequences.
22. Describe MHC class I and class II molecules and their roles in immune responses.
23. Describe antigen-antibody interactions in detail and illustrate two immunotechniques involving these.
24. Describe the salient features of Type I and Type II hypersensitivity reactions.

PS 512.4

Reg. No:

--	--	--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April 2018

CELLULAR BIOCHEMISTRY

Time: 3 Hours

Max.Marks:70

I Answer any TEN of the following:

(10×2=20)

1. What is meant by "Quorum sensing" in bacteria?
2. What is a symport? Give an example.
3. What are ionophores? Give an example.
4. What are second messengers? Briefly explain the importance of cAMP.
5. What is Warburg effect? What is its importance in cancer cells?
6. What is the role of telomerase in maintaining normal functioning of cells?
7. What are integrins? Give an example.
8. What are Caveolae? What is their importance?
9. What is the function of sterols in membrane integrity?
10. What is calmodulin? What is its role?
11. What is action potential? What is its importance in neurotransmission?
12. What are oncogenes? What is their role in tumour development?

II Answer any SIX of the following:

(6×5=30)

13. Explain the patch-clamp technique and its importance.
14. What are ion channels? How are they classified?
15. Describe the biological production of nitric oxide and its role.
16. What are G-proteins? Explain the G-protein cycle.
17. Explain the structural features of mitochondria and chloroplast.
18. Explain the role of tumour suppressor genes in regulation of cell cycle and tumour growth.
19. Explain the role of calcium in muscle contraction.
20. Explain mechanism of bacterial chemotaxis.

III Answer any TWO of the following:

(2×10=20)

21. Explain how membrane models have evolved over the years. Describe the salient features of Singer-Nicolson's model of the membrane and its limitations.
22. What is cancer metastasis? Explain cellular factors which favour metastasis. Add a note on therapeutic intervention in cancer.
23. Give a detailed account of the biochemistry of vision.
24. a) Give the general mechanism of signalling by peptide hormones.
b) Give the general mechanism of signalling by steroid hormones.

--	--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April 2018
GENETIC ENGINEERING

Time: 3 Hours

Max.Marks:70

I Answer any TEN of the following:**(10×2=20)**

1. What is RT-PCR? Give its application.
2. What is COSMID vector?
3. What are shuffle vectors? Mention their applications.
4. How cDNA libraries differ from genomic libraries?
5. Mention the limitations of PCR.
6. What are the salient features of pBR322?
7. What is meant by Intellectual Property Rights?
8. What are VNTRs? Mention its uses.
9. Give the applications of FISH.
10. Comment on chromatin immunoprecipitation.
11. What is phagemid? Give its advantages.
12. Write a note on any two ethical issues associated with GMO.

ST.ALOYSIUS COLLEGE
 PG Library
 MANGALORE-575 003

II Answer any SIX of the following:**(6×5=30)**

13. Write a note on nomenclature, classification of restriction endonucleases.
14. Explain the construction of bacterial artificial chromosome.
15. Write a note on DNA microarray.
16. Explain site-directed mutagenesis and its application.
17. How do mRNA regulate gene expression?
18. Discuss the methods for introduction of foreign gene into eukaryotic cells.
19. Write an account on construction and application of genomic libraries.
20. Discuss any two methods employed for DNA protein interaction.

III Answer any TWO of the following:**(2×10=20)**

21. Explain the working principles and applications of different types of PCR techniques.
22. Explain in detail the various eukaryotic expression vectors.
23. Describe various blotting techniques and their applications.
24. Give a detailed account on gene therapy.

PS 515.4

Reg. No:

--	--	--	--	--	--

St Aloysius College (Autonomous)
Mangaluru
Semester IV - P.G. Examination - M.Sc. Biochemistry
April 2018

BIOSTATISTICS AND BIOINFORMATICS

Time: 3 Hours

Max.Marks:70

I Answer any TEN of the following:

(10×2=20)

1. What is frequency polygon?
2. Why do you need a correct sample size for statistical analysis?
3. A farmer has 10,000 sheep. The mean weight is 50 Kg and SD is 10. How many sheep will weigh between 50 and 60 Kgs? (Given: Area under the normal curve from 0 to 1 SD is 0.3413.)
4. What is one way ANOVA? When is it used?
5. What is meant by skewness of data?
6. A bag contains 5 black balls and 3 white balls. If two balls are taken consecutively, What is the probability that both are white?
7. What is PFAM database?
8. Distinguish between ortholog and paralog with an example.
9. What is Pfam database?
10. What is RasMol? Where is it used?
11. What is a clade? Give an example.
12. What are curated databases?

II Answer any SIX of the following:

(6×5=30)

13. Explain the different methods of obtaining a sample for statistical analysis.
14. What are the different graphical representation of statistical analysis.
15. Calculate mean and standard deviation of 5,8,12,6,9
16. Explain Random Block design.
17. Explain SWISS-PROT.
18. What is the scope and applications of Bioinformatics?
19. Explain BLAST and Clustal Omega.
20. Align the following two nucleotide sequences by dot matrix method. Comment on your results.

AGCTTGACGTATGCCTAGAG
AGCTAGACGTATGGCTAGAG

Contd...2

III Answer any TWO of the following:

21. A chemist was asked to test the purity of a sample. He did 5 trials and the purity was as follows: 99.6%, 99.5%, 100.1%, 99.7%, 99.6%. Using the Student's t-test find out whether the sample is 100% pure. (Given $t_{0.05}=2.13$).
- a) In a two factor cross, pea plants with round and yellow seeds were crossed with plants having wrinkled and green seeds. The F1 progeny were self crossed. In the F2 progeny, the following seeds were obtained: Round and yellow=1100, round and green =390, wrinkled and yellow =380, and wrinkled and green = 130. Using the χ^2 test find out whether the data are according to the predictions of Mendel's law of independent assortment.
(Given $\chi^2_{0.05} = 7.82$).

22. a) Calculate the correlation coefficient for the following data

X value	Y value
5	3
10	7
15	10
20	12
25	14
30	17

TALAYSIUS COLLEGE
PG L
MADGALORE-575 103

- b) The probability of a seed germinating was 0.8. If 10 seeds are planted, what is the probability that 8 seeds will germinate?
23. What are Databases? Give an account of the Nucleic acid Databases.
24. What is a phylogenetic tree? How is the tree constructed? Explain the rooted and unrooted trees.
