PH 511.4

Reg. No:.

St Aloysius College (Autonomous)

Mangaluru

Semester IV – P.G Examination – M.Sc. Biochemistry

July - 2022

IMMUNOLOGY

Time: 3 Hours

Max. Marks: 70

I **Answer any TEN sub-divisions of the following:** **(10x2=20)**

1. Which are the different subsets of T-cells?
2. What are Antigen-presenting cells? Mention the classical Antigen-presenting cells.
3. Immunological memory is a unique property of the immune system! Justify.
4. What are immunodeficiency disorders? Give examples.
5. What is epitope and paratope?
6. Give an example for hapten and give any one reason why they are not immunogens?
7. Define valency of an antigen.
8. What are idiotypes? Mention their broad types.
9. Define immunological tolerance.
10. What is the immune response to viral infection?
11. What are autoimmune thyroid diseases? Give examples
12. What is recombinant DNA vaccine? Give examples.

II **Answer any SIX of the following:** **(6x5=30)**

13. Discuss about the components of innate immune system.
14. Differentiate between primary and secondary lymphoid organs and mention their immunological functions.
15. Write about immunogens and describe the various properties of the immunogen that contribute to its immunogenicity.
16. Draw a labelled structure of IgA and discuss its characteristic features.
17. Discuss the RIA technique. Write a note on its application.
18. What is complement system? Explain the classical and alternative pathways of complement activation.
19. Describe the properties and functions of cytokines.
20. Give an account on the classification of hypersensitive reactions.

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

21. Compare the structure of MHC I and MHC II. Discuss the processing and presentation of exogenous antigens.
22. Describe the clonal selection hypothesis with regards to the production of B cells.
23. What are tumour antigens? Discuss the factors favoring tumour growth
24. Write the principle, methodology and immunological applications for ELISA & ELISPOT

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Semester II– P.G Examination – M.Sc. Biochemistry

July - 2022

CELLULAR BIOCHEMISTRY

Time: 3 Hours Max. Marks: 70

I Answer any TEN sub-divisions of the following: (10x2=20)

1. Write the difference between osmosis and simple diffusion.
2. What are Glycocalyx? Mention their functions.
3. What are aquaporins?
4. Why is Mitochondria called power house of cells?
5. What is an isotonic solution? Give its effect on the plasma membrane
6. What are Integrins?
7. What is the role of tropomyosin in muscle contraction?
8. Write the difference between Autocrine and Paracrine signalling.
9. How NO induces muscle cell relaxation and blood vessel dilation?
10. Write the difference between Benign and Malignant tumors.
11. What is Warburg effect?
12. What is telomerase?

II Answer any SIX of the following: (6x5=30)

13. What is patch clamp technique? Explain.
14. Explain Davson-Danielli model of membrane. How it is different from Singer and Nicolson model
15. What is Quorum sensing? Explain with an example.
16. Explain Sliding filament theory.
17. Explain the vision cycle.
18. Explain the role of thyroid hormone receptor in gene regulation.
19. Write a note on GTP binding proteins.
20. Write a note on virus induced cancer.

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

21. Explain the Active transport system with a suitable examples.
22. Write the different Cell-Cell and Cell- Matrix interaction.
23. What are secondary messengers? Explain the mechanism of any two secondary messengers.
24. What are tumor suppressor genes? Write the role of p53 and RB in tumor suppression.

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Semester IV– P.G Examination – M.Sc. Biochemistry

July - 2022

GENETIC ENGINEERING

Time: 3 Hours Max. Marks: 70

I Answer any TEN sub-divisions of the following: (10x2=20)

1. What is a Ligase?
2. Give two examples for plant vectors.
3. What is karyotype? What is the basis for the chromosomal arrangements?
4. What is SAGE? Explain its applications.
5. Explain the technique of exon trapping and its application.
6. What are transgenic animals? Give two examples.
7. How can we use the phage display assay in proteomics?
8. What is FISH? Add a note on FISH probes.
9. What are M13 vectors? What are its salient features?
10. What are methylases? Explain its types and applications.
11. What is RACE? Discuss its advantage in cDNA library construction.
12. What is IPR? Describe the different types.

II Answer any SIX of the following: (6x5=30)

13. Describe the essential features and properties of *E.coli* plasmid based vectors with examples.
14. Explain the molecular characterization of genes using Realtime-PCR.
15. Discuss the method of nuclear run-on transcription and reporter gene transcription to measure the rate of transcription.
16. What is human genome project? Explain the strategy adopted and its major findings.
17. What are the ethical and moral issues in biological research? Explain with examples.
18. What are cosmids and phagemids? Give a comparative account of their features and advantages
19. Explain the techniques of introducing genes in prokaryotic system.
20. Describe the Eukaryotic vectors and high-capacity vectors with examples.

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

21. Discuss mapping and methods to quantify transcripts in analysis of gene expression.
22. What are the techniques involved in screening expression libraries in translational analysis?
23. What is gene therapy? Explain the types and their mechanisms.
24. Describe in detail the following techniques used in studying DNA protein interaction
    a. Filter binding assay,
    b. Gel mobility shift assay
    c. DNase foot printing assay

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PS 515.4

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Semester IV– P.G Examination – M.Sc. Biochemistry
July - 2022
BIOSTATISTICS AND BIOINFORMATICS

Time: 3 Hours **Max. Marks: 70**

I Answer any TEN sub-divisions of the following: **(10x2=20)**

1. What are the assumptions of F test?
2. What are the different types of correlation?
3. Differentiate between random and non-random sampling.
4. What are inclusive and mutually exclusive events?
5. What is the scope of Bioinformatics in biological research?
6. What is a signal peptide database? Give example.
7. What is BankIt?
8. What is RDBMS? Mention its types.
9. Comment on pairwise alignment.
10. Differentiate rooted and unrooted phylogenetic tree.
11. What do you understand by heuristic method of sequence alignment?
12. Give the significance of scoring matrices.

II Answer any SIX of the following: **(6x5=30)**

13. The following table represent the colour of hair and gender. Test whether hair colour depends on gender. (Chi-square table value is 3.84)

Hair colour→ Gender↓	Black	Brown
Male	61	42
Female	49	68

14. State the various methods of diagrammatic representation of data.
15. Write a note on NCBI.
16. Write a note on protein structural databases.
17. Discuss the databases that contain the information of nucleic acid sequences.
18. Discuss the difference between global and local sequence alignment.
19. Explain the applications of multiple sequence alignment.
20. What is BLAST? Give the different categories into which BLAST tools can be categorized.

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

21. A drug is given to 10 patients and increments in their blood pressure were recorded to be 3, 6, -2, 4, -3, 4, 6, 3, 2, 2. Test whether the drug has any effect on the change of blood pressure. (Tabulated $t_{5\%}$=2.26 and d.f =9)
22. Calculate the mean, mode and standard deviation for the following data

Size of the item	6	7	8	9	10	11	12
Frequency	3	6	9	13	8	5	4

23. Describe the steps of Homology modelling.
24. Briefly explain the construction of phylogenetic tree.

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