R8355	Sub. Code 501201

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Biotechnology

GENETIC ENGINEERING

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Klenow is _____ enzyme

   (a) An engineered (b) A fusion

   (c) A hybrid (d) A restriction

2. Nick translation is _____

   (a) A DNA synthesizing process

   (b) A RNA synthesizing process

   (c) A Protein synthesizing process

   (d) A RNA to protein synthesizing process

3. Which of the following Tag is made of a sequence of a single amino acid?

   (a) GST (b) Flag

   (c) His (d) MBP

4. The His-tagged protein is purified by _____

(a) Nickel column (b) Phosphate column

(c) Neon column (d) Silica gel column

5. The template DNA extracted from bacteria has been mixed with PCR amplified DNA in a tube. How will be remove the DNA extracted from bacteria specifically keeping the PCR amplified DNA intact?

(a) Column chromatography

(b) Dpn I treatment

(c) Nuclease treatment

(d) Exo III treatment

6. Dpn 1 digests specifically _____

(a) Methylated DNA (b) Acetylated DNA

(c) Modified DNA (d) Single strand DNA

7. Immuno-precipitation is carried out usually to find the interaction between

(a) DNA-RNA

(b) Protein-lipid

(c) DNA – carbohydrate

(d) Protein-Protein

8. Pyrosequencing works with

(a) Luciferase enzyme

(b) Tag Polymerase

(c) RNA polymerase

(d) Terminal transferase

9. How will you inactivate expression of a gene permanently?

(a) RNAi technique

(b) shRNA technique

(c) Knockout technique

(d) Methylation technique

10. Alpha Interferon is a

(a) Peptide (b) Organic compound

(c) Antibody (d) Antigen

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe adaptor with its applications.

Or

(b) Describe linker with its applications.

12. (a) Illustrate the polyhedrin promoter in the baculoviral expression vector

Or

(b) How does the tag help to purify its fusion protein? Explain with example.

13. (a) Illustrate the strategy of site directed mutagenesis.

Or

(b) Explain the strategy of primer designing for cloning a gene in an expression vector.

14. (a) You suspect a protein binds in a specific sequence of telomere. How will you check your hypothesis correct or not?

Or

(b) Illustrate a simple technique to study *in-vivo* protein-protein interaction.

15. (a) Explain the possible methods of siRNA delivery in a cell.

Or

(b) How will you confirm that the gene silencing is successful in an experiment?

Part C $(5 \times 8 = 40)$

Answer any **five** questions.

16. You have a purified COVID 19 viral sample. How will you understand the profile and the molecular weight of proteins present in the virus?

17. You have a purified an unknown viral sample. The nature of its genome is not known. Illustrate a strategy to reveal the molecular nature and size of the viral genome.

18. How will you understand localization of a protein tagging it with a known sequence?

19. Narrate Nested PCR with illustration and list clear applications of the technique

20. How will you find a mutation in a given DNA sample?

21. Illustrate all possible methods to deliver a DNA sample in a mammalian cell.

22. How does recombinant DNA technology help medicine and healthcare system?

23. How does recombinant DNA technology help for development of the therapeutically important products?

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R8356	Sub. Code
	501202

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Biotechnology

IMMUNOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Epitope is specific binding site of ————————

   (a) Antibody

   (b) Antigen

   (c) Complex of Antigen and Antibody

   (d) Complement

2. Adaptor is ————————

   (a) a short nucleotide sequence containing specific restriction site

   (b) a RNA binding protein

   (c) a Protein

   (d) a scaffold protein

3. An IgG has

   (a) 4 polypeptides (b) 3 polypeptides

   (c) 2 polypeptides (d) 1 polypeptides

4. Which is the largest Immunoglobulin

(a) IgA (b) IgG

(c) IgM (d) IgD

5. Which of the following is an antigen presenting cell?

(a) Neuron

(b) RBC

(c) Macrophage

(d) Cells in the lens of human eye

6. Which antibody is produced first upon entry of pathogen?

(a) IgA (b) IgE

(c) IgG (d) IgM

7. Graft rejection is not due to

(a) A nucleated cells (b) HLA

(c) MHC (d) Antibody

8. ——————— is an autoimmune disease

(a) Type I diabetes

(b) Type II diabetes

(c) Gestational diabetes

(d) All of the above

9. Recurrence of Tumor is highly associated with

(a) Cancer stem cell (b) Macrophage

(c) B cells (d) T cells

10. Covaxin is a

(a) live recombinant virus

(b) killed virus

(c) purified protein

(d) intact RNA

Part B (5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe innate immunity.

Or

(b) Distinguish haptens from adjuvant.

12. (a) Describe the molecular domains in the lgG molecule.

Or

(b) Distinguish the functions of B Cells from plasma cells in the view of receptors on them.

13. (a) Illustrate molecular structure of type I MHC.

Or

(b) Illustrate anaphylaxis.

14. (a) Why the anucleated cells do not involve in tissue rejection?

Or

(b) Differentiate type II and Type IV hypersensitivity reaction.

15. (a) Illustrate active immunization.

Or

(b) Illustrate the merits and demerits of polyclonal antibodies.

Part C (5 × 8 = 40)

Answer any **five** questions.

16. Illustrate the Lymphoid system with schematic diagram.

17. Illustrate the applications and function of Fab, Fc, and hinge region of lgG.

18. How do IgA molecules penetrate tissues? In addition, how do the IgA molecule help play major roles in immune system?

19. Describe ADIS virus resistant human population in molecular depth with clear illustration.

20. Illustrate clearly with schematic diagrams how the malarial parasite is neutralized by our immune system.

21. Narrate the types of HLA and Illustrate a PCR technique to find HLA types.

22. Excluding the splicing variant, a gene encodes a mRNA which has the information to produce a protein and there is about 22,000 genes in human genome. However, there are countless number of antibodies with unique amino acids sequences in the variable region. How are the varieties of antibodies with different variable regions synthesized in our body? Illustrate with clear schematic diagram.

23. How are millions varieties of T cell surface receptors produced? Illustrate with clear schematic diagram.

———————

R8357

Sub. Code
501203

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Biotechnology

BIOINFORMATICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. _____ is the commonly used sequence format.

   (a) FASTA (b) NBRF

   (c) PIR (d) EMBL

2. Which of the following is a nucleotide sequence database?

   (a) TrEMBL (b) EMBL

   (c) SWISS-PROT (d) PROSITE

3. Which database is collaboration between the EMBL-EBI, SIB and the PIR?

   (a) UniProt (b) NCBI

   (c) TrEMBL (d) Prosite

4. The sequence alignment concept is used by the researchers

(a) to trace out evolutionary relationship

(b) to infer the functions of newly sequenced genes

(c) to predict new members of gene families

(d) all the above

5. In a CLUSTALW, multiple alignment ':' represents

(a) Gapped regions

(b) Non conserved regions

(c) Strongly conserved regions

(d) None of the above

6. The phylogenetic analysis is more difficult for the sequences that have _____.

(a) considerable divergence

(b) no divergence

(c) both (a) and (b)

(d) none of these

7. Hydrogen bonds are fundamentally _____ interaction.

(a) electrostatic (b) van der Waals

(c) covalent (d) both (b) and (c)

8. Fold recognition is a method used to model protein structures that do not have

(a) quaternary sub-units

(b) homologous protein structures

(c) active site information

(d) none of these

9. The inverse protein folding problem is that of designing an amino acid sequence which has a

(a) particular native protein fold

(b) amino groups

(c) hydrogen bond pattern

(d) secondary structures

10. In structure prediction, the fragments with assigned _____ structures are subsequently assembled into a _____ dimensional configuration in Rosetta.

(a) primary, two (b) secondary, three

(c) secondary, two (d) primary, three

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a detailed note on Nucleic acid databases.

Or

(b) Write a note on protein structure databases.

12. (a) Give the importance of backbone construction in modelling protein.

Or

(b) Write a note on pairwise sequence alignment techniques.

13. (a) Write a note on methods in phylogenetic analysis.

Or

(b) Write a note on SEQUIN.

14. (a) Define force field and explain its importance in protein 3-D structure modeling.

Or

(b) Write in detail about the small peptide methodology.

15. (a) Discuss the inverse protein folding problem.

Or

(b) Discuss in detail about the BLAST tool with the significance of E-value and Z-score.

Part C $(5 \times 8 = 40)$

Answer any **five** questions.

16. Explain the tree representation, methods for constructing phylogenetic tree and its application in evolutionary analysis.

17. Briefly explain the applications of multiple sequence alignment technique.

18. Discuss in detail Sequence retrieval system.

19. Explain the levels of protein structure and its structural classification.

20. Give a detailed note on DNA sequence databases.

21. Write in detail about the steps involved in homology modeling.

22. Discuss in detail about the Fold recognition and threading methods.

23. Write a detailed note on gene prediction methods and tools.

R8358	Sub. Code
	501204

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Biotechnology

GENOMICS AND PROTEOMICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Endosymbiont theory resulted in which of these organelles

   (a) Nucleus

   (b) Endoplasmic reticulum

   (c) Mitochondria and Chloroplast

   (d) Peroxisomes

2. Which is the well-established method for plasmid isolation

   (a) CTAB method

   (b) Phenol-chloroform method

   (c) Trizol Method

   (d) Alkaline lysis method

3. Which enzyme induces double stranded breaks and also rejoins them

(a) DNA ligase

(b) Phosphorylase

(c) DNA gyrase

(d) Restriction endonuclease

4. Which of the following enzyme is not used in pyrosequencing

(a) Pyrophosphatase

(b) ATP sulfurylase

(c) Both

(d) None of the above

5. Which organizations initiated Human Genome Project

(a) NIH and DOE

(b) NIH and DDBJ

(c) DDBJ and DOE

(d) NIH and EBI

6. Which function determines the effect of proteins on entire organism

(a) Cellular Function

(b) Phenotypic Function

(c) Molecular function

(d) Enzymatic function

7. Molecular markers are used in constructing the following

(a) Chromosomal Maps

(b) Physical Maps

(c) Cytogenetic Maps

(d) All of these

8. Who discovered mass spectrometer

(a) Francis Aston

(b) J.J. Thomson

(c) Ernest O. Lawrence

(d) Walter Kaufmann

9. Transcriptome represents

(a) Host gene expression

(b) Host-pathogen interaction

(c) Immune system function

(d) None of the above

10. The following chemical is DNA intercalator

(a) UV rays

(b) 5-Bromo Uracil

(c) Ethyl Methane sulfonate

(d) Acridine orange

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Write a brief account on extra-chromosomal DNA.

Or

(b) What are the genetic and physical maps. Explain briefly

12. (a) Write a brief note on bioinformatics tools used in genome analysis.

Or

(b) What is 16S rRNA and how it used in bacterial identification.

13. (a) Discuss briefly about 2D-PAGE gel electrophoresis.

Or

(b) Write a brief note on proteome databases.

14. (a) What are the applications of protein chips?

Or

(b) What is chromosome walking and how it is used in human diagnostics.

15. (a) Write a brief note on metabolomics and lipidomics.

Or

(b) What are the applications of systems biology?

Part C $(5 \times 8 = 40)$

Answer any **five** questions.

16. Write in detail about eukaryotic genome organization.

17. Discuss the principle of cytogenetics and explain in detail about its applications.

18. What are single nucleotide polymorphisms Explain their applications in detail.

19. Explain in detail about the principle, apparatus and applications of MALDI-TOF

20. Define proteomics and explain its applications in clinical and biomedical sectors.

21. Define the principle of transcriptome analysis and explain in detail about the identification and functional annotation of genes?

22. How do you determine gene location in genome sequence? Explain in detail.

23. Explain in detail about endosymbiotic theory.

———————

R8359

Sub. Code
501205

M.Sc. DEGREE EXAMINATION, APRIL 2023

Second Semester

Biotechnology

MOLECULAR DIAGNOSTICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 1 = 10)$

Answer **all** questions.

1. Which of the following is a classic example of point mutation?

   (a) Phenylketonuria (b) Sickle cell anaemia

   (c) Haemophilia (d) Thalassemia

2. The set of DNAs generated by using random primers in a PCR reaction is called

   (a) RAPD (b) RFLP

   (c) AFLP (d) in situ hybridization

3. The PCR technique designed to minimize amplification of non-specific PCR products by using 2 primer sets is

   (a) Multiplex PCR

   (b) Mini primer PCR

   (c) Nested PCR

   (d) qPCR

4. Which of the following is incorrect about a microarray?

(a) It is a slide attached with a high-density array of immobilized DNA oligomers representing the entire genome of the species under study

(b) Array of immobilized DNA oligomers cannot be cDNAs

(c) Each oligomer is spotted on the slide and serves as a probe for binding to a unique complementary cDNA

(d) It is the most commonly used global gene expression profiling method

5. Which of the following is the safest and least cumbersome selectable marker

(a) Ampicillin resistance gene

(b) Tetracyclin resistance gene

(c) Kanamycin resistance gene

(d) $\beta-$ galactosidase gene

6. Fragile X syndrome involves which of the following genes?

(a) FMR1 (b) FMRP

(c) GATTACA (d) SRPX

7. In Von Hippel Lindau Syndrome, the retinal vascular tumours are often associated with intracranial hemangioblastoma. Which one of the following regions is associated with such vascular abnormalities in this syndrome?

(a) Optic radiation (b) Optic tract

(c) Cerebellum (d) Pulvinar

8. Which of the following tools is used for the identification of motifs?

(a) BLAST (b) COPIA

(c) PROSPECT (d) Pattern hunter

9. Which of the signal transduction inhibitor is/are involved in the targeted therapy of melanoma

(a) Dabrafenib (b) Trametinib

(c) Vemurafenib (d) All of the above

10. Indicate method of diagnostic cancer in-situ

(a) Histology (b) Cytology

(c) Ultrasonography (d) X-ray

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Write short notes on clinical variability and genetically determined adverse reaction to drugs.

Or

(b) Write short notes on human identity?

12. (a) Describe in detail about bioinformatics data acquisition and analysis?

Or

(b) Give short notes on microarray chips

13. (a) Write short notes on gene markers for antibiotic resistance?

Or

(b) Give a brief account on methods for identification of pathogenic organisms.

14. (a) Write short notes on inherited diseases?

Or

(b) Give a brief account on von-Hippel lindau disease

15. (a) What are the types of cancer-causing alterations revealed by next — generation sequencing of clinical isolates?

Or

(b) Write short notes on matching targeted therapy?

Part C $(5 \times 8 = 40)$

Answer any **five** questions.

16. Write a detailed account on chromosomal structure and mutations?

17. Describe about the quality oversight, regulations and approved testing?

18. Explain in detail about how LCMS and NMR techniques are used for metabolite profiling in various metabolic disorders?

19. Write a detailed on diagnostic proteomics?

20. Explain in detail about the direct detection and identification of pathogenic — organisms that are slow growing or not appropriate for invitro cultivation?

21. Write a detailed account on Fragile X Syndrome?

22. Explain in detail about the Nucleic acid sequencing?

23. Write a detailed account on personalized onco-therapy of human diseases?

R8360	Sub. Code
	501206

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Biotechnology

RESEARCH METHODOLOGY AND SCIENTIFIC COMMUNICATION SKILLS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. The review of literature
   (a) describe the overall developments of a specific area
   (b) methodologies available in a specific area
   (c) experimental data of a specific area
   (d) none of the above
2. Collection of review of literature should be completed
   (a) before setting objectives
   (b) after setting objectives
   (c) before writing manuscript
   (d) before starting experiments
3. Which of the following is correct flow of research
   (a) Hypothesis-literature survey- setting of objectives – finding the methodology – execution of experiments
   (b) literature survey – setting of objectives – Hypothesis–finding the methodology – execution of experiments
   (c) setting of objectives – literature survey- Hypothesis-finding the methodology – execution of experiments
   (d) setting of objectives – literature survey -finding the methodology – execution of experiments – Hypothesis

4. A good guide has

   (a) continuous track of publication and funding

   (b) a lot of network

   (c) good writer and speaker

   (d) soft and smiling attitude

5. Which of the following is important for clear data presentation?

   (a) clear understanding about the data and many rehearsals

   (b) a great spoken language

   (c) friendly atmosphere

   (d) all of the above

6. Group discussion helps to

   (a) improve the standard of research

   (b) increase social skill

   (c) gain more confidence on the direction of the research

   (d) all of the above

7. You already published an article in a journal. Now you are preparing another manuscript on the further development of the same work. Which of the following is wrong?

   (a) You can cite your previous work in the new manuscript

   (b) You can use a figure of your previous article in the new manuscript

   (c) You cannot write even single line about the previous finding

   (d) all

8. Professional Software tools to check plagiarism
   (a) find grammar and spelling mistakes
   (b) find repetition within the manuscript
   (c) finds copy of the methodology in other articles
   (d) finds copy of the text of manuscript as a whole or a part in other articles

9. Covishield is a
   (a) live recombinant virus
   (b) killed virus
   (c) purified protein
   (d) intact RNA

10. Mostly an abstract consists of
   (a) 300 words (b) 600 words
   (c) One page (d) 50 words

Part B $(5 \times 5 = 25)$

Answer **all** questions choosing either (a) or (b).

11. (a) Explain the importance of control with example.

Or

(b) An observation of blind children and their blind present has identical facial expressions such as the pattern smiling, laughing and other emotion. There are tools to find the degree of matches on human facial expression. How will you set a plan of data collection to test the observation?

12. (a) Why the laboratory note book is much important for a researcher in a research team?

Or

(b) Explain about the research question.

13. (a) How can you improve your skill in presenting your data?

Or

(b) If you are an Vice Chancellor, What will you do to encourage team work in the campus?

14. (a) Explain the Plagiarism and its impact on development of career in science.

Or

(b) How will you find an idea is novel? Explain it with schematic diagram.

15. (a) Describe the scientific misconducts and its harm in development of science.

Or

(b) List the importance of peer review system.

Part C $(5 \times 8 = 40)$

Answer any **five** questions.

All questions carry equal marks.

16. Differentiate the empirical and descriptive sciences.
17. Assume you are a research team leader. How will you set an apt research question for your team?
18. Illustrate the types of research questions with schematic diagram.
19. Assume you have completed a project successfully and now how will you prepare the report? Explain it with schematic diagram. Illustrate the importance of a technical writing skill for a researcher
20. Differentiate the writings of result from discussion vividly.
21. Illustrate the strategies for an acceptable scientific presentation.
22. Illustrate the framing of abstract and title.
23. Explain the component of a research article with the schematic diagram.

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R8361	Sub. Code
	501207

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Biotechnology

Lab IV – MOLECULAR BIOLOGY AND GENETIC ENGINEERING

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Gene expression takes place in *E. coli* when,
   (a) both lactose and glucose are present
   (b) both lactose and glucose are absent
   (c) lactose is present and glucose is absent
   (d) glucose is present and lactose is absent
2. An arginine auxotroph can grow when
   (a) the medium is supplemented with arginine only
   (b) the medium is supplemented with lysine only
   (c) the medium is not supplemented with arginine
   (d) the medium not supplemented with arginine and lysine
3. Absorbance ratio of ———— at 260 nm and 280 nm determines the DNA as 'pure'
   (a) 2.2 (b) 1.6
   (c) 2.0 (d) 1.8

4. How does ethidium bromide make DNA visible?

(a) Intercalating between bases

(b) Deleting and replacing bases

(c) Phosphorescence

(d) Enzymatic degradation of DNA

5. An ideal PCR primer length range between

(a) 18-24 bases (b) 20-40 bases

(c) 6-10 bases (d) 12-16 bases

6. Which of the following is NOT used to induce competence in *E. coli*?

(a) Rubidium chloride (b) Magnesium chloride

(c) Silver chloride (d) Calcium chloride

7. Endonucleases

(a) cleave hydroxyl group of bases at the 3' terminus of DNA

(b) cleave phosphodiester bond between the internal nucleotides

(c) cleave phosphate group of bases at the 5' terminus of DNA

(d) ligate the 3' and 5' terminus of DNA

8. Which of the following is used as a tag for recombinant protein purification?

(a) Histidine (b) Proline

(c) Isoleucine (d) Valine

9. Southern blotting is performed to transfer ———— to nitrocellulose membrane

(a) Lipids (b) Protein

(c) RNA (d) DNA

10. SDS is used to

(a) Polymerize resolving gel

(b) Break disulfide bonds

(c) Generate free radicals

(d) Confer positive charge to proteins

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the catabolite repression of lac operon.

Or

(b) How can amino acid auxotroph mutants be selected?

12. (a) How does genetic transfer occur through conjugation in bacteria?

Or

(b) Briefly explain the protocol of phage titration.

13. (a) Mention the principle and explain the process of agarose gel electrophoresis. Draw a table on agarose gel concentration and DNA size resolution.

Or

(b) Write a note on different types of restriction enzymes. How does restriction digestion work with plasmid DNA?

14. (a) How is the transformation efficiency of competent cells determined?

Or

(b) What types of ligases are used in joining ends of DNA? Give their mechanism.

15. (a) Discuss the role of stacking gel and resolving gel components used in SDS PAGE.

Or

(b) Write a short note on Southern hybridization mentioning its significance.

Part C $(5 \times 8 = 40)$

Answer any **five** questions.

16. Explain the regulation of gene expression in prokaryotes by lac operon.

17. What are the methods used for gene mapping in bacteria? Discuss.

18. Brief the process of plasmid isolation and how DNA can be assessed for its quantity and quality?

19. What are the components of a PCR reaction? Detail the process and list the applications of PCR technique.

20. List the essential components of a plasmid vector used in genetic engineering. How is ligation reaction performed?

21. What are the steps involved in restriction mapping to confirm the insertion of a gene into a vector?

22. Recombinant His-tagged fusion proteins can be purified using Ni-NTA affinity chromatography. Explain its principle.

23. Elaborate on the process of colony PCR technique.

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R8362	Sub. Code
	501208

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Biotechnology

LABORATORY V : IMMUNOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Which blood type can be transfused to the individual whose blood type is unknown?

   (a) AB positive (b) AB negative

   (c) O positive (d) O negative

2. Giemsa stain is a commonly used *histological stain that colors the cytoplasm*

   (a) blue to pink (b) Pink to blue

   (c) green to blue (d) blue to green

3. On collecting blood, what solution is added to it?

   (a) Sodium sulphate

   (b) Potassium citrate

   (c) Potassium sulphate

   (d) Sodium citrate

4. Radial immune diffusion is similar to

(a) Double diffusion

(b) gel diffusion

(c) Ouchterloney technique

(d) All of these

5. ———————— is used to detect and amplify an antigen-antibody reaction.

(a) Calorimetric biosensor

(b) Optical biosensor

(c) ELISA

(d) Potentiometric biosensor

6. Flow cytometry uses _____

(a) Heavy isotope

(b) Radioactive elements

(c) Immunological techniques

(d) Energy content

7. The speed of migration of ions in electric field depends upon:

(a) Shape and size of molecule

(b) Magnitude of charge and shape of molecule

(c) Magnitude of charge shape and mass of molecule

(d) Magnitude of charge and mass of molecule

8. A thin blood smear is used as a specimen for the microscopic detection of Plasmodia, which of the following dyes/stain is used for the identification?

(a) Lactophenol cotton blue

(b) Giemsa stain

(c) Safranin

(d) Crystal violet

9. The electrophoretic mobility denoted as μ is mathematically expressed as :

(a) VE (b) E/V

(c) 1/EV (d) V/E

10. The initial complement component that is bound by complement-fixing antibodies is:

(a) Clq (b) Cls

(c) C3b (d) C5a

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Write short notes on immunization and different methods of blood collection?

Or

(b) Write short notes on different types of WBC cells?

12. (a) Describe in detail about ABO blood grouping.

Or

(b) Give short notes on separation of mononuclear cells.

13. (a) Write short notes on identification of leucocytes by Giemsa stain.

Or

(b) Give a brief account on dextran method for separation of leucocytes

14. (a) Write short notes on ELISA?

Or

(b) Give a brief account on different protein separation methods

15. (a) Describe in detail about radial immune diffusion.

Or

(b) Write short notes on complement fixation test?

Part C ($5 \times 8 = 40$)

Answer any **five** questions.

16. Write a detailed account on serum separation and storage?

17. Describe in detail about the different types of blood cells?

18. Explain in detail about Rh grouping and its significance?

19. Write a detailed on different methods for detection of antigen and antibody?

20. Explain in detail about the immunoblotting?

21. Write a detailed account on ELISPOT?

22. Explain in detail about the phagocytosis of latex beads and their cryopreservation?

23. Write a detailed account on Ficoll-Hypaque and their cryopreservation?

———————

R8363	Sub. Code
	501504

M.Sc. DEGREE EXAMINATION, APRIL – 2023

Second Semester

Bio-Technology

Elective: ENVIRONMENTAL BIOTECHNOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A $(10 \times 1 = 10)$

Answer **all** questions.

1. Which of the following leads to the release of environmental nuisance?
   (a) Oxygen
   (b) Hydrogen
   (c) Nitrogen
   (d) Volatile compounds

2. A nondirected physico-chemical interaction between heavy metal ions and the microbial surface is called
   (a) Biotransformation
   (b) bioconversion
   (c) biosorption
   (d) biomining

3. Which of the following is said to be biodegradable waste?
   (a) Plastics (b) Glasses
   (c) Eggshells (d) Polythene

4. Bioaugmentation involves

(a) eliminating sludge

(b) plants usage for bioremediation

(c) addition of microbes to a clean-up site

(d) bioventing

5. This clean-up approach includes removing groundwater or soil from its natural setting to permit bioremediation

(a) Bioaugmentation

(b) in situ bioremediation

(c) Ex-situ bioremediation

(d) Phytoremediation

6. Rotenone is used as a

(a) Bioherbicide

(b) insect hormone

(c) natural insecticide

(d) natural herbicide

7. Trichoderma, harzianum is used for

(a) wasteland reclamation

(b) bioremediation of contaminated soil

(c) biocontrol agent against plant pathogens

(d) gene transfer

8. Which of the following is not a biopesticide?

(a) *Nucleopolyhedrovirus*

(b) *Xanthomonas campestris*

(c) *Bacillus thuringiensis*

(d) *Trichoderma harzianum*

9. Biomass is used in the production of

(a) Fibres

(b) chemicals

(c) transportation fuels

(d) biochemicals

10. Production of bioethanol is through fermentation of_____ and starch components

(a) Alcohol (b) sugar

(c) milk (d) acid

Part B $(5 \times 5 = 25)$

Answer **all** questions, choosing either (a) or (b).

11. (a) Narrate the role of soil microorganisms in biogeochemical cycles.

Or

(b) Brief the challenges in treating hazardous wastes

12. (a) Brief the concept of bio-stimulation and bioaugmentation.

Or

(b) Describe the metabolic pathway involved in the degradation of PAH. Mention the limitation in the degradation of PAH.

13. (a) What is phytoremediation? How is it helpful in reducing heavy metal pollution in soil and water

Or

(b) Discuss the role of bacteria and fungi in bioremediation.

14. (a) Explain the mode of action and mechanism of Trichoderma sp. and pseudomonas sp. in controlling these diseases caused by pathogens.

Or

(b) Describe the beneficial effects of plant growth promoting rhizobacteria.

15. (a) Discuss the different types of biofuels and their merits and demerits.

Or

(b) Narrate the process of microbiologically enhanced oil recovery.

Part C $(5 \times 8 = 40)$

Answer any **five** questions.

16. Discuss the effects of air pollution on human health.

17. How GMMs are created? Explain their application in bioremediation.

18. Write a detail account on biodegradation of aromatic xenobiotics.

19. Discuss about environmentally significant bacteria and fungi.

20. Discuss the significance of biodiversity conservation.

21. Discuss about Indian energy scenario.

22. Describe the technologies used in the preparation of biofuel.

23. Narrate the process of paper production and role of microbial enzymes.

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