R0211	Sub. Code 502101

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Bioinformatics

INTRODUCTION TO BIOINFORMATICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. What is Unix? (CO1, K2)

   (a) Unix is a programming language

   (b) Unix is a software program

   (c) Unix is an operating system

   (d) Unix is a text editor

2. Choose, which command is used to delete all files in a directory? (CO1, K1)

   (a) del*

   (b) rm*

   (c) mv*

   (d) rmdir*

3. What is sequence alignment? (CO2, K2)

(a) The process of determining the order of nucleotides in a DNA sequence

(b) The process of identifying similarities between two or more sequences

(c) The process of converting DNA sequences into protein sequences

(d) The process of determining the three-dimensional structure of a protein

4. In sequence alignment, what does a high alignment score indicate? (CO2, K2)

(a) High sequence similarity

(b) Low sequence similarity

(c) High sequence length

(d) Low sequence length

5. Find the following which is a protein sequence database (CO3, K1)

(a) DDBJ (b) EMBL

(c) GenBank (d) PIR

6. What are bioinformatics databases? (CO3, K2)

(a) Repositories of biological samples

(b) Online platforms for sharing research papers

(c) Resources that store biological data and provide tools for analysis

(d) Platforms for conducting laboratory experiments

7. ChemDraw used to (CO4, K2)

(a) Drawing a chemical structure

(b) Vishivalization of structure

(c) Analysis the chemical structure

(d) All the above

8. Which database provides information on scientific literature and research publications in the field of biology? (CO4, K1)

(a) GenBank (b) PubMed

(c) Uniprot (d) PDB

9. Find the following can be considered as major development in Community Health Nursing in terms of information technology? (CO5, K1)

(a) Medication dispensing

(b) Telehealth

(c) Patient Monitoring

(d) Prevention of epidemiological diseases through quality care

10. What is not included in stage 1 in the health informatics paradigm shift? (CO5, K2)

(a) Support from the client

(b) Commencing the project

(c) Collecting and analyzing the data

(d) Translate data into information

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Illustrate the Unix operating system. (CO1, K4)

Or

(b) Discuss the open source in bioinformatics. (CO1, K4)

12. (a) Write a short note on Multiple Sequence Alignment. (CO2, K5)

Or

(b) Explain the Tools used for Sequence Alignment. (CO2, K4)

13. (a) Give an account on Specialized Database. (CO3, K5)

Or

(b) Explain the following: (CO3, K4)

(i) Entrez

(ii) TCCG Database.

14. (a) Discuss about the Cheminformatics (CO4, K4)

Or

(b) Explain the CSD and PUBCHEM. (CO4, K4)

15. (a) Describe about Medical Coding. (CO5, K5)

Or

(b) Discuss the Ethics in medical informatics. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Elaborate the basic commands of Windows, Linux and UNIX. (CO1, K5)

Or

(b) Explain the concept of open resources in bioinformatics. (CO1, K4)

17. (a) Give an account on Biological background for sequence analysis. (CO2, K5)

Or

(b) Discuss and Detailed about the sequence alignment. (CO2, K4)

18. (a) Explain about the Nucleic acid database and genome databases. (CO3, K4)

Or

(b) Elaborate the Clinically relevant Drug-Drug Interactions Databases. (CO3, K5)

19. (a) Explain about structural isomers and structure visualization tool. (CO4, K4)

Or

(b) Outline cheminformatics tools used in biological science. (CO4, K5)

20. (a) Explain the informatics application of pharmacy; survey and evaluation of on-line resources. (CO5, K4)

Or

(b) Discuss the Pharmacy system and automation. (CO5, K4)

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R0212	Sub. Code
	502102

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Bioinformatics

MOLECULAR CELL BIOLOGY AND BIOCHEMISTRY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. What part do all prokaryotic and eukaryotic cells have? (CO1, K1)

   (a) Organelles

   (b) Nuclear Envelope

   (c) Plasma Membrane

   (d) Cell Wall

2. How does a typical prokaryotic cell compare in size to a eukaryotic cell? (CO1, K2)

   (a) It is similar in size

   (b) It is smaller in size by a factor of 100

   (c) It is smaller in size by a factor of 1 million

   (d) It is larger in size by a factor of 10

3. Meiosis is evolutionary significant because it results in (CO2, K1)

   (a) Genetically Similar Daughters

   (b) Four Daughter Cells

   (c) Eggs And Sperms

   (d) Recombinations

4. Meiosis crossing over is initiated at (CO2, K1)

(a) Pachytene (b) Leptotene

(c) Zygotene (d) Diplotene

5. Find the naturally occurring form of amino acid in proteins (CO3, K1)

(a) L-amino acids only

(b) D-amino acids only

(c) Both L and D amino acids

(d) None of these

6. Which of the following biomolecules are not macromolecules? (CO3, K2)

(a) Lipids (b) Nucleic acids

(c) Proteins (d) Polysaccharides

7. Who is known as the "Father of Genetics"? (CO4, K2)

(a) Morgan (b) Mendel

(c) Watson (d) Bateson

8. The alternate form of a gene is (CO4, K1)

(a) Alternate type

(b) Recessive character

(c) Dominant character

(d) Allele

9. Which of the following are normal cellular genes that can be convened to oncogenes? (CO5, K2)

(a) Proto-oncogenes

(b) Oncogenes

(c) Tumor suppressor genes

(d) Cellular oncogenes

10. Which of the following is a property of malignant cells? (CO5, K2)

(a) Uncontrolled cell division

(b) Differentiation

(c) Apoptosis

(d) All of the above

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Discuss the structural organization of prokaryotic and eukaryotic cells. (CO1, K6)

Or

(b) Explain the genome organization of prokaryotic and eukaryotic cells. (CO1, K5)

12. (a) Distinguish between mitosis and meiosis. (CO2, K4)

Or

(b) Describe the structure and function of centrosomes. (CO2, K4)

13. (a) Point out the classifications of biomolecules. (CO3, K3)

Or

(b) List out the properties and biological functions of monosaccharides. (CO3, K4)

14. (a) Explain the host transcriptional modifications. (CO4, K5)

Or

(b) Write short notes on: (CO4, K6)

(i) Maternal inheritance of chloroplast

(ii) Sex-linked inheritance.

15. (a) Give an account on the role of proto-oncogenes. (CO5, K5)

Or

(b) Summarize the role of tumor suppressor genes. (CO5, K3)

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

Answer **all** the questions not more than 1000 words each.

16. (a) Discuss the basic aspects of prokaryotic and eukaryotic cells (Plant Cells). (CO1, K6)

Or

(b) Outline the mechanism of gene expression. (CO1, K4)

17. (a) Summarize the cell cycle and its regulations. (CO2, K3)

Or

(b) Elaborate the components of Cyclin, CDKs and Check points in cell cycle. (CO2, K5)

18. (a) Give an account on the protein structure and its types. (CO3, K4)

Or

(b) List out the types and functions of vitamins. (CO3, K6)

19. (a) Explain Recombinant DNA technology and their applications. (CO4, K5)

Or

(b) Describe the Mendelian principles. (CO4, K5)

20. (a) Write an account on the oncogenes. (CO5, K4)

Or

(b) Explain Retinoblastoma. (CO5, K5)

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R0213	Sub. Code 502103

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Bioinformatics

MATHEMATICS AND STATISTICS FOR BIOLOGISTS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** the following objective questions by choosing the correct option.

1. Choose the correct option for the given matrix. (CO1, K1)

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 3 & 2 & 0 \\ 4 & 5 & 3 \end{bmatrix}$$

(a) Lower triangle matrix
(b) Upper triangle matrix
(c) Diagonal matrix
(d) Unit matrix

2. Choose the correct option and justify your choice: (CO1, K2)

$$\frac{2\tan 30°}{1+\tan^2 30°}$$

(a) sin 60° (b) cos 60°
(c) tan 60° (d) sin 30°

3. The arithmetic mean and geometric mean of two numbers are 14 and 12 respectively. What is the harmonic mean of the numbers? (CO2, K3)

(a) 10 (b) 70/5

(c) 72/7 (d) 32/3

4. Which of the following is measured by the Lorenz curve? (CO2, K2)

(a) Illiteracy

(b) Unemployment

(c) Population growth rate

(d) Inequality of Income

5. Roster form is also known as: (CO3, K1)

(a) Set-builder form

(b) Cardinality

(c) Tabular form

(d) None of these

6. As per De Morgan's Law, $(A \cup B)'$ is equal to (CO3, K1)

(a) $A' \cup B'$ (b) $A' + B'$

(c) $(A \cap B)'$ (d) $A' \cap B$

7. If all the dots of a scatter diagram lie on a straight line falling from left bottom corner to the right upper corner, the correlation is called (CO4, K3)

(a) Zero correlation

(b) High degree of positive correlation

(c) Perfect negative correlation

(d) Perfect positive correlation

8. In regression analysis, the variable that is being predicted is (CO4, K2)

(a) Independent variable

(b) Response, or dependent, variable

(c) Intervening variable

(d) is usually x

9. Analysis of variance is a statistical method of comparing of several populations (CO5, K2)

(a) Means

(b) Variance

(c) Standard Deviation

(d) The T-Test

10. The z-value needed to construct 92.5% confidence interval estimate for the difference between two population proportions is (CO5, K3)

(a) 2.58 (b) 2.33

(c) 1.96 (d) 1.78

Part B (5 × 5 = 25)

Answer **all** questions not more than 500 words each.

11. (a) If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ find $A^2 - 7A - 2I$. (CO1, K2)

Or

(b) Differentiate $\frac{\sin x + \cos x}{\sin x - \cos x}$ with respect to x (CO1, K2)

12. (a) State the rules for diagrammatic representations. (CO2, K2)

Or

(b) The amount of rainfall in a particular season for 6 days are 17.8 cm, 19.2 cm, 16.3 cm, 12.5 cm, 12.8cm and 11.4cm. Find its standard deviation. (CO2, K3)

13. (a) Define and Describes about Student's T-test. (CO3, K3)

Or

(b) Distinguish the relationship between Normal and Poisson distribution. (CO3, K4)

14. (a) Summarizes the various types of correlation. (CO4, K2)

Or

(b) State the assumptions and methods of Karl Pearson's coefficient of correlation. (CO4, K3)

15. (a) Comment the application of Biostatistics with an example. (CO5, K5)

Or

(b) Elaborate the confidence interval in Statistics.

(CO5, K4)

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

Answer **all** questions not more than 1000 words each.

16. (a) Given that $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$, verify that the eigen values of A^2 are the squares of those of A. (CO1, K2)

Or

(b) Using vector method proves that the medians of a triangle are concurrent. (CO1, K3)

17. (a) The following data is the marks in statistics obtained by 100 students in a class. Calculate the median (CO2, K4)

Marks	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
No. of students	12	9	30	5	21	13	6	4

Or

(b) Explain the methods to reduce sampling and non-sampling errors. (CO2, K3)

18. (a) Compare the relationship between Type I and Type II errors. (CO3, K4)

Or

(b) Write an account on Bayes theorem with suitable example. (CO3, K3)

19. (a) Classify the various types of Correlation in detail. (CO4, K2)

Or

(b) Interpret a Spearman Rank Correlation with an example. (CO4, K4)

20. (a) Discuss any one computer software package used for statistical analysis in detail. (CO5, K5)

Or

(b) Discuss the differences, assumptions and hypotheses of ANOVA. (CO5, K6)

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R0214	Sub. Code 502501

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

First Semester

Bioinformatics

Elective : GENERAL CHEMISTRY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. Choose the correct pyramidal shape? (CO1, K2)

   (a) SO_3 (b) PCl_3

   (c) CO_3^{2-} (d) NO^{3-}

2. Find which substance that react with both acids and bases are called (CO1, K1)

   (a) Neutral

   (b) Conjugate bases

   (c) Amphoteric substances

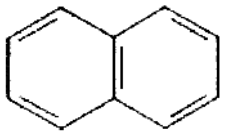
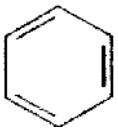
   (d) Conjugate acids

3. What is the name of the compound with the chemical formula C_6H_7N? (CO2, K2)

(a) Phenol (b) Aniline

(c) Pyridine (d) Benzene

4. Choose the following compounds is not aromatic? (CO2, K2)

(a)  (b) 

(c)  (d) 

5. Find out the one of the following examples comes under semiconducting nano-wires (CO3, K1)

(a) Nickel (b) SiO_2

(c) Silicon (d) None of the above

6. Ideal characteristics of targeted drug delivery system (CO3, K2)

(a) Nanotoxic and biodegradable

(b) Biocompatible and physicochemically stable

(c) Predictable and controllable rate of drug release

(d) all of the above

7. Loss of electrons can be termed as (CO4, K2)

(a) Metabolism (b) Anabolism

(c) Oxidation (d) Reduction

8. Identify the function of hemoglobin and the metal responsible for it (CO4, K1)

(a) O_2 transport and Fe

(b) O_2 transport and Cu

(c) Electron transport and Fe

(d) Electron transport and Cu

9. Select the following is not a classification of drugs (CO5, K2)

(a) Based on size

(b) Based on chemical structure

(c) Based on drug action

(d) Based on target

10. Antibiotics are used to treat infections by (CO5, K2)

(a) Virus

(b) Bacteria

(c) All the microorganisms

(d) None of the above

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Summarize the major types of chemical bond. (CO1, K4)

Or

(b) Principle of HSAB. (CO1, K3)

12. (a) Explain about Grignard Synthesis. (CO2, K4)

Or

(b) Discuss the Beer Lambert's Law. (CO2, K4)

13. (a) Write a note on properties of carbon nanotubes. (CO3, K5)

Or

(b) Give a account on synthesis of PVP. (CO3, K4)

14. (a) Describe the structure and functions of Hemerythrin. (CO4, K5)

Or

(b) Details about electron transfer proteins of Ferredoxins. (CO4, K5)

15. (a) Discuss the any three antibiotic drugs. (CO5, K4)

Or

(b) Explain in detail about the cis-platin. (CO5, K4)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Elaborate the MO theory of homodiatomic molecules C_2-. (CO1, K4)

Or

(b) Explain in detail about with examples of following; (CO1, K4)

(i) Resonance

(ii) Conjugation

(iii) Delocalization

(iv) Hyperconjugation.

17. (a) Write a account on following (CO2, K5)

(i) Pyrrole

(ii) Thiophene

(iii) Furan.

Or

(b) Write a note on infra-red spectroscopy technique. (CO2, K4)

18. (a) Classification nanomaterials and examples. (CO3, K5)

Or

(b) Any three preparation and uses of synthetic fibres. (CO3, K5)

19. (a) Elaborate a structure and functions of Hemoglobin. (CO4, K5)

Or

(b) Explain in detail about the vitamin B12. (CO4, K4)

20. (a) Any three Fungal drugs mode of action and side effects. (CO5, K4)

Or

(b) Discuss about the antiviral and anticancer agents. (CO5, K5)

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R0215	Sub. Code
	502301

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Bioinformatics

GENETICS AND GENETIC ENGINEERING

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. The physical appearance of an organism is called: (CO1, K2)

   (a) Phenotype (b) Genotype

   (c) Allele (d) Dominance

2. When one allele is completely masked by the other allele is called: (CO1, K1)

   (a) Incomplete dominance

   (b) Co-dominance

   (c) Dominance

   (d) Recessiveness

3. The process by which DNA is copied is called (CO2, K2)

   (a) Transcription

   (b) Translation

   (c) Replication

   (d) Transcription and translation

4. The mRNA is produced by: (CO2, K2)

(a) Transcription (b) Translation

(c) Replication (d) None of the above

5. The Gene expression first occurs at the: (CO3, K1)

(a) Genome level (b) DNA level

(c) RNA level (d) Protein level

6. The Splicing of introns from mRNA occurs in: (CO3, K1)

(a) Prokaryotes

(b) Eukaryotes

(c) Both prokaryotes and eukaryotes

(d) None of the above

7. The Transformation was first demonstrated in: (CO4, K2)

(a) E. *coli* (b) Yeast

(c) Fruit fly (d) Tobacco mosaic virus

8. The Conjugation involves the transfer of DNA via: (CO4, K1)

(a) Transduction (b) Transformation

(c) Conjugation (d) Transfection

9. The first transgenic plant was produced by: (CO5, K2)

(a) Hybridization

(b) Somaclonal variation

(c) Anther and microspore culture

(d) Agrobacterium-mediated transformation

10. The CRISPR is a technique used for: (CO5, K2)

(a) Splicing (b) Gene silencing

(c) Gene editing (d) DNA sequencing

Part B (5 × 5 = 25)

Answer **all** the questions not more than 500 words each.

11. (a) Point out the Definition and scope of Genetics. (CO1, K4)

Or

(b) Describe the Mendel's experiments and Law of segregation. (CO1, K3)

12. (a) Compare and discuss the structure and organization of human chromosomes and mitochondria. (CO2, K5)

Or

(b) Differentiate between the ABO blood group system and Rh factor in humans. (CO2, K6)

13. (a) Explain post-transcriptional modifications. (CO3, K4)

Or

(b) Write a short note on mechanisms of genome alterations with suitable examples. (CO3, K3)

14. (a) Summarize the principles of Hardy Weinberg equilibrium. (CO4, K4)

Or

(b) Explain the concept and applications of linkage mapping in humans examples. (CO4, K4)

15. (a) Demonstrate *Agrobacterium-mediated* plant transformation. (CO5, K6)

Or

(b) Point out the applications of genetic engineering in transgenic crops. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Briefly summarize the key differences between Mendelian genetics and multi-factorial inheritance. (CO1, K4)

Or

(b) Differentiate between autosomal dominant and autosomal recessive patterns of inheritance. (CO1, K5)

17. (a) List out the various types of mutations and their effects on phenotype with suitable examples. (CO2, K4)

Or

(b) Give an account on deviations from Mendelism with one suitable example. (CO2, K5)

18. (a) Compare and contrast the prokaryotic and eukaryotic genome organization and mechanisms of gene expression. (CO3, K6)

Or

(b) Explain the methods used for studying gene expression and regulatory sequences with examples. (CO3, K5)

19. (a) Give an account on the methods of genetic transfer in bacteria-transformation, conjugation and transduction with examples. (CO4, K3)

Or

(b) Write a short note on the concept of genetic variations and polymorphism at the genome level. (CO4, K6)

20. (a) Point out the applications of plant genetic engineering in developing abiotic and biotic stress resistance in plants. (CO5, K5)

Or

(b) Explain the biosafety role of genetic engineering and transgenic products. (CO5, K5)

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R0216	Sub. Code
	502302

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Bioinformatics

STRUCTURAL BIOLOGY

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** the following objective questions by choosing the correct option.

1. Choose the triclinic crystal system parameter (CO1, K1)

   (a) $a \neq b \neq c \;\&\; \alpha \neq \beta \neq \gamma$

   (b) $a \neq b \neq c \;\&\; \alpha = \beta = \gamma$

   (c) $a \neq b \neq c \;\&\; \alpha = \gamma = 90; \beta \neq 90$

   (d) $a = b = c \;\&\; \alpha = \beta = \gamma$

2. Which one of the following exhibits the most well defined X-ray diffraction pattern? (CO1, K2)

   (a) A polycrystalline aggregate

   (b) A single crystalline material

   (c) An amorphous material

   (d) A plastically deformed crystal

3. How many possible orientations can a spin 1 nuclei adopt when placed in an applied magnetic field? (CO2, K2)

   (a) 1 (b) 2

   (c) 3 (d) 4

4. Optical fiber works on the phenomenon of _____ (CO2, K1)

(a) Total internal reflection

(b) Diffraction

(c) Polarization

(d) Refraction

5. Why is crystal growth important? (CO3, K1)

(a) Increase the value of the product

(b) Information about the structure

(c) Increase the size of the compound

(d) Information regarding the quality of product

6. X-ray diffractometers are not used to identify the physical properties of which of the following? (CO3, K2)

(a) Metals

(b) Liquids

(c) Polymeric materials

(d) Solids

7. What is a bond between amino acids called? (CO4, K1)

(a) Ionic bond (b) Acidic bond

(c) Peptide bond (d) Hydrogen bond

8. Which of the following methods could be used to check the molecular weight of your purified protein? (CO4, K1)

(a) SDS-PAGE only

(b) Mass spectrometry only

(c) Analytical SEC only

(d) All of the above

9. How many bonded atoms are required to constitute a dihedral (torsion) angle, such as phi or psi? (CO5, K2)

(a) 2 (b) 3

(c) 4 (d) 5

10. Which type of proteins residues are usually found on the surface of the protein in contact with the aqueous solvent? (CO5, K2)

(a) Nonpolar residues

(b) Charged polar residues

(c) Hydrophobic residues

(d) Uncharged polar residues

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

Answer **all** the questions not more than 500 words each.

11. (a) Explain the Bravais Lattices. (CO1, K5)

Or

(b) Derive Bragg's law equation. (CO1, K6)

12. (a) Explain powder diffraction and its application. (CO2, K5)

Or

(b) Explain: Synchrotron radiation. (CO2, K5)

13. (a) Difference between the small molecule and macromolecule give five points. (CO3, K4)

Or

(b) Derive Fourier refinement. (CO3, K6)

14. (a) Different type of crystallization method in macromolecule. (CO4, K4)

Or

(b) Explain protein folding. (CO4, K5)

15. (a) Explain planarity and chirality. (CO5, K5)

Or

(b) Explain the internal geometry of molecule. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) Define phase problem. How to solve? (CO1, K3)

Or

(b) Elaborate seven crystal system and it's parameters with the diagram. (CO1, K6)

17. (a) Cryo- Electron Microscopy and its application in structural biology. (CO2, K4)

Or

(b) Elaborate NMR technology and its importance in structural biology. (CO2, K6)

18. (a) Small Molecule structure solving and refinement methods. (CO3, K4)

Or

(b) Single crystal X-ray data collection and data reduction. (CO3, K5)

19. (a) Explain: (CO4, K5)

(i) Protein structure analysis and validation.

(ii) Ramachandran plot.

Or

(b) SAD and MAD method protein structure determination. (CO4, K6)

20. (a) Application of X-ray crystallography in drug design. (CO5, K6)

Or

(b) Explain: primary secondary, tertiary and quaternary structures with diagram (CO5, K5)

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R0217	Sub. Code
	502303

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Bioinformatics

PHARMACOGENOMICS

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** the following objective questions by choosing the correct option.

1. It is a database contains information on known genetic variations and their association with diseases? (CO1, K2)

   (a) GenBank (b) dbSNP

   (c) ENCODE (d) FlyBase

2. Which of the following is an example of Homology and Similarity tool? (CO1, K1)

   (a) BLAST (b) EMBOSS

   (c) RasMol (d) PROSPECT

3. Identify the most commonly referred variant in human genome? (CO2, K2)

   (a) Defective gene splicing

   (b) Premature stop codon

   (c) Nucleotide base insertion

   (d) Single-nucleotide polymorphism

4. What are the four main processes of pharmacokinetics? (CO2, K2)

(a) Absorption, dissemination, mechanism, excretion

(b) Adaptation, distribution, medical, exclusion

(c) Absorption, distribution, metabolism, excretion

(d) Alignment, digestion, movement, execution

5. CYP2D6 polymorphism associated with following property of drug discovery mechanism (CO3, K4)

(a) Drug delivery

(b) Toxicity

(c) Drug interaction potential

(d) All of these

6. Which of the following is the correct definition of bioavailability? (CO3, K3)

(a) Bioavailability describes the proportion of the drug administered that is metabolised very quickly and thus is not available to induce a physiological effect

(b) Bioavailability describes the ability of the administered drug metabolites to cause undesirable physiological effects

(c) Bioavailability is used to describe the fraction of the dose of drug administered that is present within the body and facilitates the desired physiological effects

(d) Bioavailability is the length of time an administered drug is present in the body and thus is available to cause a physiological effect

7. What results would you expect in a patient who is a CYP2D6 ultra rapid metabolizer and taking codeine? (CO4, K6)

(a) Lower than normal plasma concentrations of morphine and toxicity

(b) Lower than normal plasma concentrations of morphine and lack of effect

(c) Higher than normal plasma concentrations of morphine and toxicity

(d) Higher than normal plasma concentrations of morphine and lack of effect

8. Which one of the following projects would be best suitable for Next Generation Sequencing? (CO4, K2)

(a) To determine if a tumor sample contains a common missense mutation

(b) To find the transcriptome of a tumor sample

(c) To genotype ten genomic DNA samples for a known single nucleotide polymorphism

(d) All of the above

9. A Patient has two "no function" allele variants for CYP2D6. Which anticancer drug may not be a good option for this patient? (CO5, K5)

(a) Letrozole (b) Tamoxifen

(c) Fulvestrant (d) Exemestane

10. Which of the following is a cancer database? (CO5, K1)

(a) TCGA (b) CRDB

(c) OncoDB (d) All of the above

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

Answer **all** the questions not more than 500 words each.

11. (a) Give an account on OMIM database; Write key applications of OMIM. (CO1, K2)

Or

(b) Elaborate Gene expression Profiling with suitable note. (CO1, K1)

12. (a) Describe the influence of polymorphisms in drug targets. (CO2, K3)

Or

(b) Explain the comparison the genome of two different species, briefly explain with suitable note. (CO2, K3)

13. (a) Summarizes the role of SNPs on genetic disease also lists the types of SNPs. (CO3, K2)

Or

(b) Discuss Drug efficacy in the context of dose-response curve. (CO3, K3)

14. (a) Write a short note on Mechanism and applications of SNP array in genetic diagnosis. (CO4, K4)

Or

(b) Compare and Interpret the Next Generation Sequencing techniques. (CO4, K5)

15. (a) Evaluate the importance of any one cancer specific database in cancer research. (CO5, K6)

Or

(b) Illustrate the applications of cancer genomics in the cancer therapy. (CO5, K5)

Part C (5 × 8 = 40)

Answer **all** the questions not more than 1000 words each.

16. (a) List out the regulatory regions present in the genome? How it associated with gene expression? (CO1, K1)

Or

(b) Bioinformatics has developed lots of Resources and Repositories. Elaborate the bioinformatics platforms used in Pharmacogenomics studies. (CO1, K2)

17. (a) Why unequal absorption of drug occurred to patients? Explain in the context of structural influence. (CO2, K4)

Or

(b) Evaluate the significance of comparative genomics in drug designing research. (CO2, K2)

18. (a) Personalized medicine is need of society why? Elaborate. (CO3, K6)

Or

(b) Illustrate the Pharmacokinetics and Pharmacodynamics parameters calculated during the drug development process. (CO3, K3)

19. (a) NGS become backbone of Pharmacogenomics; explain the applications of NGS in genomic and pharmacogenomics studies. (CO4, K5)

Or

(b) Compare and relate the types of microarray in gene expression analysis. (CO4, K3)

20. (a) Propose your opinion on the need of personalized medicine in Cancer management. (CO5, K6)

Or

(b) Justify the role of copy number variation in cancer prognosis and its detection using computational methods. (CO5, K2)

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R0218	Sub. Code 502508

M.Sc. DEGREE EXAMINATION, NOVEMBER – 2023

Third Semester

Bioinformatics

Elective : PROGRAMMING IN C AND C++

(CBCS – 2022 onwards)

Time : 3 Hours Maximum : 75 Marks

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

Answer **all** the following objective questions by choosing the correct options.

1. In C, which operator is used to access the value stored at the address of a pointer variable? (CO1, K2)

   (a) * (b) &

   (c) -> (d) $

2. Which of the following is a valid way to comment a single line in C? (CO1, K2)

   (a) /* This is a comment*/

   (b) # This is a comment

   (c) // This is a comment

   (d) ′ This is a comment

3. Which operator is used to allocate memory dynamically in C? (CO2, K3)

   (a) malloc() (b) allocate()

   (c) new (d) allocate_memory()

4. What is the purpose of the break statement in a switch statement in C? (CO2, K3)

(a) To exit the entire program

(b) To exit the current iteration of a loop

(c) To exit the switch statement and continue with the next case

(d) To exit the switch statement and return to the calling function

5. How do you access a member variable of a structure in C? (CO1, K2)

(a) Using the dot operator (.)

(b) Using the arrow operator (->)

(c) Using the percent (%) symbol

(d) Using the exclamation mark (!)

6. What is the size of a union in C? (CO1, K2)

(a) The size of the largest member variable

(b) The sum of the sizes of all member variables

(c) The size of the smallest member variable

(d) It depends on the compiler

7. What is the purpose of the c in object in C++? (CO1, K2)

(a) To display output on the console

(b) To read input from the keyboard

(c) To perform mathematical calculations

(d) To define classes

8. Which of the following operators is used for memory allocation in C++? (CO2, K3)

(a) malloc() (b) allocate()

(c) new (d) memory()

9. What is the purpose of dynamic memory allocation in C++ using pointers? (CO2, K2)

(a) To allocate memory on the stack

(b) To allocate memory at compile time

(c) To allocate memory on the heap

(d) To allocate memory for global variables

10. What is the purpose of the constructor in a C++ class? (CO2, K2)

(a) To destruct objects

(b) To initialize objects

(c) To return a value

(d) To perform mathematical calculations

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

Answer **all** the questions not more than 500 words each.

11. (a) Illustrate the structure of C. (CO1, K2)

Or

(b) Classify the data types in C. (CO1, K2)

12. (a) Elaborate 1D array with example. (CO2, K3)

Or

(b) How to allocate memory? Explain. (CO5, K5)

13. (a) Compare Structure and Union in C. (CO5, K5)

Or

(b) Discuss briefly about file operation modes. (CO4, K4)

14. (a) Illustrate the feature in C++. (CO1, K2)

Or

(b) Compare Break and Continue Statement. (CO5, K5)

15. (a) Construct the class in C++ with example. (CO2, K3)

Or

(b) Discuss briefly about 'this' pointer. (CO4, K2)

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

Answer **all** questions not more than 1000 words each.

16. (a) Explain in detail about operators with example. (CO1, K2)

Or

(b) Construct branching statement in C. (CO2, K2)

17. (a) Discuss about storage classes in C. (CO4, K2)

Or

(b) Elaborate about C preprocessor. (CO4, K2)

18. (a) Construct structure with suitable example. (CO2, K3)

Or

(b) Discuss various input operations in file. (CO4, K2)

19. (a) Explain in detail about OOPs Concept. (CO1, K2)

Or

(b) Create a C++ program using For loop. (CO4, K3)

20. (a) Compare call by value and call by reference with example. (CO5, K4)

Or

(b) Discuss about templates in detail. (CO4, K2)