**SLR-EC-1**

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# M.Sc. (Semester – I) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Basic Bioinformatics (MSC27101)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q. No. 3 to Q. No. 7.
3) Figure to the right indicate full marks.

**Q.1 A) Fill in the blanks by choosing correct alternative.** **10**

1) _____ is a powerful approach in finding evolution of current day species.
a) Phylum b) Phylogeny
c) Phylogenetics d) Phylo tree

2) DDBJ data is exchanged on _____ basis.
a) Daily b) Weekly
c) Monthly d) every two month

3) _____ is a highly annotated protein database.
a) BLAST b) BLOCK
c) Swiss-Prot d) CDD

4) Support Vector Machine is a _____ learning algorithms.
a) Supervised b) unsupervised
c) Clustering d) Density

5) The two sequences are descended from a common ancestor, they are said to_____.
a) Similarity b) Identity
c) Homologous d) paralogous

6) _____ is a protein family database.
a) TrEMBL b) PRINTS
c) Pfam d) NRL-3D

7) Database searching tool in DDBJ is _____.
a) ENTREZ b) Webin
c) SRS d) getentry

8) T-coffee is used for _____ sequence sequence alignment.
a) Single b) global
c) Multiple d) motif

9) Maximum likelihood is _____ based method for phylogenetic tree construction.
a) Distance b) Character
c) Number d) evolutionary time

10) _____ is a database that uses multiple alignments derived from the most conserved, ungapped regions of homologous protein sequences.
a) Emotif b) Blocks
c) Smart d) Cath

**B) Fill in the blanks.** **06**

1) UPGMA method is used for _____.
2) INSDC is _____.
3) _____ tool is used as search engine ENA database.
4) _____ indicate genetic change in phylogenetic tree.
5) _____ Genetics Computer Group.
6) _____ is a statistical model that was first proposed by Baum L.E. and uses a Markov process that contains hidden and unknown parameters.

**Q.2 Answer the following.** **16**

**a)** Write a note on Phylogenetic software.
**b)** Write a note on Algorithms.
**c)** Explain in detail about PAM and BLOSUM.
**d)** Describe Application of BLAST and FASTA.

**Q.3 Answer the following.**

**a)** Explain the NRL- 3D, PRINTS and Pfam database. **10**
**b)** Explain dot plot in detail. **06**

**Q.4 Answer the following.**

**a)** Explain types of machine learning methods with advantages. **10**
**b)** Describe different Sequence file formats. **06**

**Q.5 Answer the following.**

**a)** Explain literature database PubMed and PMC. **10**
**b)** Write a note on NCBI. **06**

**Q.6 Answer the following.**

**a)** Explain Types of Phylogenetics tree. **10**
**b)** What is conserved sequence? Explain Domain, Motifs and Patterns. **06**

**Q.7 Answer the following.**

**a)** Explain Nucleic acid databases. **10**
**b)** Write a note on SVM with their applications. **06**

**SLR-EC-2**

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**Set P**

# M.Sc. (Semester - I) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Cell Biology and Genetics (MSC27102)

Day & Date: Sunday, 07-01-2024 Max. Marks: 80
Time: 03:00 AM To 06:00 PM

**Instructions:** 1) Q. Nos.1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

**Q.1 A) Choose correct alternative.** **10**

1) _____ is not an example secondary messenger molecule.
   a) ATP b) cAMP
   c) IP3 d) Ca++

2) _____ a type of mutation in which one nucleotide is replaced by a different nucleotide.
   a) Transcription b) Polymerase
   c) Substitution d) Addition

3) _____ of the following process in an exception of Mendel Law.
   a) Mutation b) Variation
   c) Linkage d) Cloning

4) In crossing a homozygous recessive with a heterozygote, _____ is the chance of getting an offspring with the homozygous recessive phenotype.
   a) 75% b) 25%
   c) 50% d) 100%

5) _____ removes positive super coils ahead of replication fork.
   a) Helicase b) SSBP
   c) Gyrase d) Ligase

6) Microfilaments are composed of a protein called _____.
   a) Tubulin b) Actin
   c) Myosin d) Chitin

7) Lysosomes are known as “suicidal bags” because of _____.
   a) Parasitic activity b) Presence of food vacuole
   c) Hydrolytic activity d) Catalytic activity

8) _____ are somatic plant cells which lack cell walls.
   a) Tonoplast b) Protoplast
   c) Symplast d) Apoplast

9) _____ cell organelle plays important role in programmed cell death.
   a) Lysosome b) ER
   c) Golgi d) Mitochondria

10) During mitosis, centrosome is responsible for _____.
   a) Formation of spindle fibers b) Osmoregulation
   c) Secretion d) Protein synthesis

**B) Fill in the blanks.** **06**

1) Reactive oxygen species detoxification is one the function of _____.
2) The ____ is a complex composed of cyt c, apoptotic protease activating factor-1(Apaf-1) and dATP.
3) _____ is the highly repetitive DNA consisting of short sequences repeated a large number of times
4) ____ is an essential bacterial enzyme that catalyzes the ATP-dependent negative super-coiling of double-stranded closed-circular DNA.
5) _____ is responsible for poly A tail formation during mRNA processing.
6) *Xeroderma pigmentosum* is caused due to defective ____ repair pathway.

**Q.2 Answer the following.** **16**

**a)** Describe post-translational modifications of proteins.
**b)** Explain mechanism of Extra-chromosomal inheritance with suitable example.
**c)** Give molecular events in cell cycle and regulation.
**d)** Explain process of cell signaling by hormones.

**Q.3 Answer the following.** **16**

**a)** Explain Griffith experiment with neat labeled diagram.
**b)** Describe structure of mitochondria with diagram.
**c)** Comment on the role of Golgi complex in the process of cell secretion.

**Q.4 Answer the following.** **16**

**a)** Describe structure of typical eukaryotic genes.
**b)** Explain process of meiosis with neat labeled diagram.

**Q.5 Answer the following.** **16**

**a)** Describe properties of characteristics of cancer cell.
**b)** Explain in detail the process of cell senescence.

**Q.6 Answer the following.** **16**

**a)** Explain base and nucleotide excision repair pathway.
**b)** Discuss the process of DNA replication in prokaryotes.

**Q.7 Answer the following.** **16**

**a)** Explain the operon concept with suitable example.
**b)** Describe mechanism of apoptosis with neat labeled diagram.

**SLR-EC-3**

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**Set P**

# M.Sc. (Semester - I) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Introduction to HTML & Biostatistics (MSC27103)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Choose correct alternative. (MCQ)** **10**

1) _____ is a statistical test used to compare observed results with expected results.
   a) z-test b) Mean
   c) t-test d) chi-square test

2) _____ tag is used to display text along with a scrolling effect.
   a)  b) <scroll>
   c) <Marquee> d) <br>

3) Nationality is an example of _____ level of measurement.
   a) Ordinal b) Nominal
   c) Ratio d) Interval

4) HTML tags are enclosed within _____.
   a) { } b) <>
   c) !! d) ()

5) _____ tag is used to render an image on a webpage.
   a) img b) src
   c) image d) pic

6) The identification of drugs through the genomic study is called _____.
   a) Genomics b) Pharmacogenomics
   c) Pharmacogenetics d) cheminformatics

7) _____ is the HTML documents root tag.
   a) <head> b) <body>
   c) <title> d) <html>

8) _____ arrtibute is used for data binding.
   a) datasrc b) mayscript
   c) name d) datafld

9) In HTML, how do we insert an image using _____.
   a) <imgsrc = “jtp.png” /> b) <imghref = “jtp.png” />
   c) <img link = “jtp.png” /> d) <imgurl = “jtp.png” />

10) _____tag is used in the options present in the drop-down selection lists.
   a) <list> b) <option>
   c) <dropdown> d) <select>

**B) Fill in the blanks OR Write true/false.** **06**

1) The technique ANOVA was developed by _____.
2) In HTML the <hr> tag is used for _____.
3) The average which is useful for measuring the relative growth of the population is _____.
4) The most frequently occurring observation in a data is called _____.
5) The abbreviation of HTML stands for _____.
6) _____ in HTML documents is surrounded by an angular bracket which has a specific meaning.

**Q.2 Answer the following.** **16**

**a)** What is the use of a span tag? Give example.
**b)** Write a note on the difference between XML and HTML.
**c)** What is Marquee?
**d)** Distinguish between census and sample method.

**Q.3 Answer the following.**

**a)** What is the difference between HTML elements and tags. Explain **10**
**b)** Describe the test for the significance of the population correlation coefficient. **06**

**Q.4 Answer the following.**

**a)** Define student t-test. Write a note on its application. **10**
**b)** How to create a nested webpage in HTML? **06**

**Q.5 Answer the following.**

**a)** Write a note on the graphical presentation of data. **10**
**b)** Which tag is used for representing the results of a calculation? Explain its attributes. **06**

**Q.6 Answer the following.**

**a)** Write a note on tags and attributes in HTML. **10**
**b)** Explain the random sample and sampling technique. **06**

**Q.7 Answer the following.**

**a)** Write a note on MATLAB and its application. **10**
**b)** Describe the test for significance of population correlation co efficient. **06**

**SLR-EC-4**

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# M.Sc. (Semester - I) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Introduction to Programming Languages & Programming Through C & C++ (MSC27108)

Day & Date: Thursday, 11-01-2024 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Multiple Choice Questions.** **10**

1) The _____ of programming language specifies the structure of programs.
   a) Goal b) Nature
   c) Type d) Syntax

2) C is a very _____ programming language.
   a) Robust b) easy
   c) Tough d) Critical

3) Compilers and _____ are relative concepts.
   a) Programmer b) interpreter
   c) Syntax d) Semantics

4) _____ is a set of instructions to complete a particular task.
   a) Data b) Program
   c) Information d) Concept

5) C language has been designed and written by _____.
   a) R.A. Fisher b) Charles Babbage
   c) Dennis Ritchie d) Newton

6) An array of characters is a _____.
   a) String b) Program
   c) Object d) Query

7) _____ is a set of logical procedure steps to solve the problem.
   a) Flowchart b) technique
   c) Algorithm d) solution

8) Float data type having _____ memory size requirement.
   a) 1 Bit b) 2 Byte
   c) 4 Byte d) 8 Bit

9) To make the selected text underline, the shortcut key is _____.
   a) Ctrl + I b) Ctrl + Alt + K
   c) Ctrl + J d) Ctrl + U

10) _____ is the chief of Microsoft.
   a) Babbage b) Bill Gates
   c) Bill Clinton d) W. Buffet

**B) Fill in the blanks.** **06**

1) HTTP stands for _____.
2) C language was developed to be used in ____ operating system.
3) The _____ function is used for input in C.
4) The _____ in C language is a variable which stores the address of another variable.
5) A _____ is a name of the memory location.
6) If we create two or more members having the same name but different in number or type of parameter, it is known as C++ _____.

**Q.2 Answer the following.** **16**

**a)** Describe in detail operating system.
**b)** Define 'computer' also explain its type.
**c)** Write short note on features of C language.
**d)** Write structure of C and explain its data types.

**Q.3 Answer the following.** **16**

**a)** Write brief account on OOP.
**b)** Explain in detail Operators and its types in C.

**Q.4 Answer the following.** **16**

**a)** Write brief account on history of C.
**b)** Describe in detail operator overloading.

**Q.5 Answer the following**. **16**

**a)** Explain in detail number systems.
**b)** Write and explain applications of programming languages in Bioinformatics.

**Q.6 Answer the following**. **16**

**a)** Write and explain data types in C++.
**b)** Write brief account on looping statements in C.

**Q.7 Answer the following**. **16**

**a)** Write Short note on functions in C++.
**b)** Write and Explain difference between C and C++.

**SLR-EC-6**

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# M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Advanced Bioinformatics (MSC27201)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Multiple Choice Questions.** **10**

1) _____ is a fundamental, functional and three dimensional unit of a protein.
   a) Profile b) Pattern
   c) Motif d) Domain

2) _____ describes a motif using quantitative information captured in a position specific scoring matrix.
   a) Beta sheet b) Pattern
   c) Profile d) Alpha helix

3) BLOSUM was discovered in 1992 by _____.
   a) Henikoff b) Margaret Dayhoff
   c) David lipman d) Pauling colin

4) _____ database is produced and curated at the Johns Hopkins University of Medicine.
   a) SNP b) OMIM
   c) SAGE d) Uniprot

5) _____ microarray is a collection of microscopic protein spots attached to a solid surface.
   a) DNA b) Protein
   c) Oligomeric d) Lipid

6) _____ is a microarray database.
   a) MEO b) BART
   c) BASE d) GEO

7) _____ is not a molecular model validation tool.
   a) Protein check b) PROCHECK
   c) verfy3D d) SAVES

8) SCOP sorts the proteins _____ into classes, folds and superfamilies.
   a) architecture b) domains
   c) topology d) homologous

9) _____ describes the *E. Coli* genome and provides a molecular and functional catalog.
   a) Brenda b) EcoCyc
   c) Ecogenome d) MetaCyc

10) Big data is a combination of _____.
a) structured b) semistructured
c) unstructured d) All of these

**B) Fill in the blanks.** **06**

1) _____ is enzymes and metabolic pathways database.
2) _____ is Primary protein structure prediction tool.
3) Instability index values higher than _____ number denote a potentially unstable protein.
4) Agricola is a _____ database.
5) STRING is a _____ database.

**Q.2 Answer the following.** **16**

**a)** Write a note on tools for prediction of sequence pattern and profiles.
**b)** Give an account on SNP database.
**c)** Describe different protein model validation tools.
**d)** Give an account on techniques used in data mining.

**Q.3 Answer the following.** **16**

**a)** Give a detailed account on various types of pattern representations.
**b)** Write a note on human genome projects.

**Q.4 Answer the following.** **16**

**a)** Explain in detail identification of disease gene. Add a note on OMIM database.
**b)** Explain DNA microarray data analysis tools.

**Q.5 Answer the following**. **16**

**a)** Explain in detail the plant databases.
**b)** Explain EMP metabolic pathway database.

**Q.6 Answer the following**. **16**

**a)** Explain in detail the protein interaction network.
**b)** Describe applications of system biology.

**Q.7 Answer the following**. **16**

**a)** Describe the benefits Big data analytics.
**b)** Describe the steps to create a scalable big data analytics pipeline.

**SLR-EC-7**

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# M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Microbiology and Immunology (MSC27202)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

**Q.1 A) Choose the correct alternatives from the options.** **10**

1) *Chlorobium* sp. is belongs to _____.
   a) Purple Sulphur Bacteria b) Purple Non-sulphur Bacteria
   c) Green Sulphur bacteria d) Green Non-sulphur bacteria

2) _____ recognizes CD8 T cells in immune response.
   a) MHC I b) MHC II
   c) MHC III d) HLA-C

3) Bacteria growing in mine drainage at pH 1 to 2 are probably _____.
   a) Alkalophile b) Neutrophile
   c) Acidophile d) Barophile

4) _____ type of antibody can pass through placenta.
   a) IgD b) IgE
   c) IgM d) IgG

5) In Gram's staining, staining material of gram positive bacterium is _____.
   a) Fast green b) Haematoxylon
   c) Crystal violet d) Lactophenol blue

6) ATCC is_____.
   a) Animal Type Cell Culture
   b) All Type Culture Collection
   c) American Type Culture Collection
   d) American Type Cell Culture

7) _____ is considered as multipotent cell.
   a) T-cell b) B-cell
   c) HSC d) Monocytes

8) Agar powder used in preparation of media is obtained form _____.
   a) Brown algae b) Red algae
   c) Green algae d) Blue-green algae

9) _____ is the part of processed antigen that binds to the MHC molecule and recognized by T- cells.
   a) Immunoglobulin b) Agretope
   c) Epitope d) Chaperone

10) _____ is group of pattern recognition molecules which functions exclusively as a signaling receptor.
a) CRP b) Toll-like receptor
c) MBL d) LPS

**B) Fill in the blanks** **06**

1) Cytokines secreted by monocytes is known as_____.
2) An antiseptic is an antimicrobial substance or compound that is applied to living tissue to reduce the possibility of sepsis, infection or putrefaction.
3) An antigen is any substance that causes your immune system to produce antibodies against it
4) Bacterial conjugation is the transfer of genetic material between bacterial cells by direct cell-to-cell contact
5) Superbugs are strains of bacteria that are resistant to several types of antibiotics.
6) Type II, immune or gamma interferon (IFN-gamma) is mainly secreted by T cells, natural killer (NK) cells and macrophages.

**Q.2 Answer the following.** **16**

**a)** Write a note on secondary immune response
**b)** Write a note on Prions
**c)** Write a note on Bergey's Manual
**d)** Give any two examples of autoimmune diseases.

**Q.3 Answer the following.** **16**

**a)** Describe any two examples of recombinant vaccines.
**b)** Describe structure of T4 bacteriophage

**Q.4 Answer the following.** **16**

**a)** Describe process of Immunodiffusion Technique
**b)** Describe the principle, procedure, observation and application of Gram's staining

**Q.5 Answer the following.** **16**

**a)** Explain molecular adaptations of Halophilic bacteria with suitable example.
**b)** Write a note Griffith's Experiment

**Q.6 Answer the following.** **16**

**a)** Give a detailed account of methods for preservation of microorganisms.
**b)** Describe Hypersensitivity & its different types.

**Q.7 Answer the following.** **16**

**a)** Explain structure of MHC and antigen presentation mechanism of MHC.
**b)** Describe structure & types of antibodies.

**SLR-EC-8**

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# M.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Biochemistry and Biotechnology (MSC27206)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Choose correct alternative.** **10**

1) _____ is reduction potential.
   a) The molecule loses an electron
   b) An molecule gains an electron
   c) Reducing the power of an electron
   d) Oxidation power of an electron

2) _____ is the factor which is not responsible for the actual change in free energy.
   a) Temperature
   b) Pressure
   c) The initial concentration of reactant and products
   d) pH

3) The simplest amino acid is _____.
   a) Glycine b) Alanine
   c) Asparagine d) Tyrosine

4) Amino acid are mostly synthesised from _____.
   a) Fatty acid b) Mineral salt
   c) a-ketoglutaric acid d) Volatile acids

5) Maltose is a disaccharide consists of _____.
   a) Glucose and fructose b) Glucose and galactose
   c) Glucose and sucrose d) Glucose and glucose

6) Sucrose is _____.
   a) Monosaccharide b) Disaccharide
   c) Polysaccharide d) Triose

7) The pair of hormones required for a callus to differentiate are _____.
   a) Ethylene and auxin b) Auxin and cytokinin
   c) Auxin Abscisic acid d) Cytokinin and gibberellin

8) The pH indicator in animal cell culture medium is _____.
   a) HEPES b) Phenol red
   c) FBS d) L-Glutamine

9) _____ created the first rDNA molecule.
   a) Nathan, Arber and Smith b) Watson, Crick and Wilkins
   c) Boyer and Cohen d) Paul Berg

10) The DNA molecule to which the gene of insert is integrated for cloning is called _____.

a) Carrier b) Transformer
c) Vector d) Mediator

**B) Write true/false.** **06**

1) Reducing agent of the molecule which donates its electrons.
2) Cysteine amino acids must be supplemented in the diet.
3) Glucose is a reducing sugar.
4) Plants are exposed to gamma rays for somaclonal variations appearance.
5) Monolayer culture is a type of animal cell culture technique.
6) Restriction enzymes are also called as biological scissors.

**Q.2 Answer the following.** **16**

**a)** Define Bioenergetics and mention application of thermodynamics.
**b)** Write a note on the factors involved in controlling of enzyme activity.
**c)** Write a note on any two metabolic disorders.
**d)** Write the difference between the cloning and expression vectors.

**Q.3 Answer the following.** **16**

**a)** Describe in detail molecular genetic analysis of human disease.
**b)** Explain the role of ATP as source of free energy in biological systems.

**Q.4 Answer the following.** **16**

**a)** Explain the mechanism of action of enzymes and add a note on types of enzyme inhibitors.
**b)** Discuss the nucleic acid structure, diversity, and its function.

**Q.5 Answer the following**. **16**

**a)** Describe in detail different enzymes used in rDNA technology and applications of rDNA technology.
**b)** Illustrate the crop and livestock improvement using rDNA technology.

**Q.6 Answer the following**. **16**

**a)** Discuss the structure conformation and function relationship of enzymes.
**b)** Describe the vitamins and their general classification and importance.

**Q.7 Answer the following**. **16**

**a)** Write a note on Bacterial artificial chromosomes and Yeast artificial chromosomes.
**b)** Explain the principle of Vaccines and its types and applications.

**SLR-EC-10**

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# M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Biological Database Management System (MSC27301)

Day & Date: Friday, 05-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

**Instructions:** 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

**Q.1 A) Multiple Choice Questions** **10**

1) SGA stands for_____.
   a) System global Application b) Security Global Area
   c) System Global Area d) Serial Group Area.

2) _____ is the set of values of the same data type.
   a) Summary b) Domain
   c) Variable d) Float

3) Every row of a relation is called as _____.
   a) model b) tuple
   c) rank d) Stub

4) Operations which take two relations as input are _____ operations.
   a) Unary b) Tertiary
   c) Sum d) Binary

5) KNIME stands for _____.
   a) Korus Information Miner
   b) Konstanz Introduction Mine
   c) Konstanz Information Miner
   d) Konstanz Information Majority

6) DBMS stands for _____.
   a) Database Merge System
   b) Database Management System
   c) Database Management Section
   d) Developed Management System

7) WWW stands for _____.
   a) World Wide Web b) World West Web
   c) World Working Web d) Watch Wide Web

8) The operation of eliminating columns in a table done by _____operation.
   a) Restrict b) Project
   c) Union d) Divide

9) A functional dependency is a relationship between or among _____.
   a) Tables b) rows
   c) relations d) attributes

10) Oracle manages the storage space in the data files of a database in units called _____.
   a) data blocks b) file manager
   c) memory d) dictionary

**B) Fill in the blanks:** **06**

1) LAN stands for _____.
2) _____ formats data is stored in the database management system.
3) The ability to query data, as well as insert, delete, and alter tuples, is offered by _____.
4) In SQL, _____ command is used to make permanent changes made by statements issue since the beginning of a transaction.
5) Parents and children are tied together by links called _____.
6) Network model supports _____ relationships.

**Q.2 Answer the following.** **16**

**a)** Describe in detail Data Model.
**b)** Define 'domains 'also explain its type.
**c)** Write types programming Languages with examples.
**d)** Write structure of SQL and explain its data types.

**Q.3 Answer the following.** **16**

**a)** Write brief account on ExPASy tools.
**b)** Explain in detail data model and its types.

**Q.4 Answer the following.** **16**

**a)** Write brief account on Matlab Applications in Bioinformatics.
**b)** Describe in detail Oracle language.

**Q.5 Answer the following.** **16**

**a)** Explain in detail Data Normalization.
**b)** Write and explain database development and management.

**Q.6 Answer the following.** **16**

**a)** Write history of RDBMS.
**b)** Write brief account on PL-SQL.

**Q.7 Answer the following.** **16**

**a)** Write Short note on Data Mining.
**b)** Write and Explain Actors on the scene and Workers behind the scene.

**SLR-EC-11**

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# M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Advanced Biophysical Techniques (MSC27302)

Day & Date: Sunday,07-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Choose the correct alternative (MCQ)** **10**

1) Beer Lambert's law states that the amount of light absorbed by a material is directly Proportional to the _____.
   a) Intensity of light b) Conc. Of the material
   c) Thickness of the medium d) All of the above

2) A laser beam is used for carrying out surgery because _____.
   a) it is highly monochromatic b) it is highly coherent
   c) it is highly directional d) it can be Sharply focused

3) _____ is not a component needed for the X-ray crystallography of proteins.
   a) Protein crystal b) Source of X-rays
   c) Detector d) Monochromator

4) The wavelength range corresponding to UV-VIS region is _____.
   a) $400 - 800$ b) $200 - 800$
   c) $25\mu m - 2.5\mu m$ d) $2.5\mu m - 1mm$

5) A _____bond is formed by two atoms sharing a pair of electrons
   a) Electrovalent b) Covalent
   c) Coordination d) Metallic

6) Fluorochromes absorb light energy of a specific wavelength and re-emit at _____ wavelength
   a) Longer b) Shorter
   c) Same d) different

7) Mercury and Xenon are used as the light source in _____ microscopy.
   a) Fluorescence b) Confocal
   c) SEM d) TEM

8) Study of spins of atomic nuclei are used in _____ spectroscopic method.
   a) FACS b) Visible
   c) NMR d) ESR

9) Fluorescence microscopy is based on _____ phenomenon.
   a) Emission b) Adsorption
   c) Transmission d) Atomic phase

10) The inert standard salt plates are used in _____ spectroscopy.
   a) UV b) IR
   c) NMR d) CD

**B) Write true or false** **06**

1) s-orbital is spherical with the nucleus at its centre.
2) FACS is a specialized type of flow cytometry.
3) Ultra structure of biological specimens can be observed by using Electron microscopes.
4) The lasing medium of lasers can be solid, liquid or gas.
5) Spins of atomic nuclei are studied in ESR.
6) Radiation therapy is used for treatment of cancer.

**Q.2 Answer the following.** **16**

**a)** Write a short note on electrovalent bond.
**b)** Write the significance of Fluorochrome in Flow Cytometry (FACS).
**c)** What is Raman Microscopy used for?
**d)** What is the fingerprint region of IR spectroscopy?

**Q.3 Answer the following.**

**a)** Give the basic principle involved in MALDI-TOF. **08**
**b)** What is metallic bond write its properties? **08**

**Q.4 Answer the following.**

**a)** Discuss in detail the process of instrumentation of LASER generation. **08**
**b)** Write a note on the Electromagnetic spectrum of radiations. **08**

**Q.5 Answer the following.**

**a)** Write a note on Infra Red Microscopy. **08**
**b)** Write the principle, theory and instrumentation of ESR. **08**

**Q.6 Answer the following.**

**a)** Describe the principle, instrumentation and working of UV-VIS spectrophotometer. **10**
**b)** Write the principle and working of a Mass spectrophotometer. **06**

**Q.7 Answer the following.**

**a)** Describe principle, working and applications of Scanning electron microscopy. **10**
**b)** Why do crystals diffract X-rays? **06**

**SLR-EC-12**

| Set No. | | Set | P |
|---|---|---|---|

# M.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Computational Structure Biology and Drug Designing (MSC27306)

Day & Date: Tuesday, 09-01-2024 Max. Marks: 80
Time: 11:00 AM To 02:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Choose the correct alternative.** **10**

1) _____is a web application that identifies proteins from their amino acid composition.
   a) AACompIdent b) TagIdent
   c) PepIdent d) All of above

2) _____ fixed three-dimensional structure, but do not form any regular structures but connect $\beta$ -sheets and $\alpha$ -helices.
   a) Turns b) Loops
   c) Bends d) All of above

3) Homology modeling, also known as _____ of protein.
   a) comparative modeling b) prediction
   c) assumption d) above all

4) Scoring functions for Docking, alternatively uses constraints based on _____ interaction.
   a) protein-DNA b) protein-protein
   c) protein-ligand d) Above all

5) _____ products have been the source of most of the active ingredients of medicines.
   a) Natural b) Synthetic
   c) Semi-synthetic d) All of these

6) _____ models predict the activities of new chemicals.
   a) QSRRs b) QSPR
   c) QSAR d) above all

7) _____is a suite of automated docking tools that predicts how small molecules, such as substrates or drug candidates, bind to a receptor of known 3D structure.
   a) Osguthorpe b) AutoDock
   c) Autochek d) above all

8) Ramachandran plot is used for _____.
   a) identifying errors in the backbone conformation
   b) analyzing the quality of protein structures
   c) show values of $\phi$ & $\psi$ angles
   d) All of the above

9) ADMET, which constitutes the pharmacokinetic profile of a drug molecule, is very essential in evaluating its _____ activities.
   a) pharmacodynamic b) toxicity
   c) kinetic d) dritribution

10) _____ directly predict the real value on ASA [accessible surface area] based on evolutionary information.
   a) FASTA
   b) Position specific scoring matrix (PSSM)
   c) both
   d) Above all

**B) Write true /false** **06**

1) Tight turns and loose, flexible loops link the more “regular” secondary protein structure elements.
2) Used in conjunction with molecular dynamics simulations, homology models can also generate hypotheses about the kinetics and dynamics of a protein.
3) PROCHECK is a suite of programs that checks the stereochemical quality of protein structures.
4) Metalloproteins are proteins that include a metal ion as part of their structure or they contain a metal cofactor.
5) SST classification: SST [Secondary STructure] is a Bayesian method to assign secondary structure to protein coordinate data.
6) Transmembrane domains (TMD) may consist of one or several alpha-helices or a transmembrane beta barrel.

**Q.2 Answer the following.** **16**

**a)** Write on short note on Statistical methods of protein folding.
**b)** Write on short note on Model generation in Homology Modelling.
**c)** Write a note on protein-protein interaction.
**d)** Write on short note on tool used in identification and characterization of Protein.

**Q.3 Answer the following.**

**a)** Write about PDBeChem. **10**
**b)** Write a note on GOR method in protein structure prediction. **06**

**Q.4 Answer the following.**

**a)** Write in detail on Clinical trials. **10**
**b)** Write note on Ramachandran plot. **06**

**Q.5 Answer the following.**

**a)** Importance of $3_{10}$ helix and loops in Structure Prediction Methods. **10**
**b)** Write a note on Prediction of solvent accessibility regions. **06**

**Q.6 Answer the following.**

**a)** Write a note on pharmacodynamics and pharmacokinetic & *in silico* ADMET properties. **10**
**b)** Write note on Natural products in Drug Discovery and Drug designing. **06**

**Q.7 Answer the following.**

**a)** Write a note on Docking approaches and Mechanics of docking. **10**
**b)** Write a note on Metalloproteins and Protein-Ligand interaction. **06**

**SLR-EC-14**

| Set No. | | Set | P |
|---|---|---|---|

# M.Sc. (Semester - IV) (New) (CBCS)Examination: Oct/Nov-2023
## BIOINFORMATICS
## Biological Simulation and Modeling (MSC27401)

Day & Date: Monday, 18-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Choose the correct alternative.** **10**

1) Lists are _____.
   a) Programmable b) Mutable
   c) Inverse d) Capable

2) _____ is a block of organized, reusable code that is used to perform a single, related action.
   a) Calculation b) Presentation
   c) Partition d) Function

3) IDLE stands for _____.
   a) Independent Development Environment
   b) Invented Development Environment
   c) Integrated Development Environment
   d) Ideal Development Environment

4) _____ is an event, which occurs during the execution of a program that disrupts the normal flow of the program's instructions.
   a) Encapsulation b) Abstraction
   c) Exception d) Looping

5) CGI standard for _____.
   a) Common Graphic Interface
   b) Center Gateway Interchange
   c) Common Gateway Interface
   d) Common Gateway Information

6) _____ is not the biological model of simulation.
   a) Epidemic model b) Population model
   c) Plant model d) Aerobics

7) Potential energy is defined as _____ energy.
   a) stored b) moving
   c) shared d) transferred

8) _____ is the first step in simulation.
   a) Analysis b) Interpretation
   c) Model building d) Calibration

9) Bond angle is represented by _____ in molecular mechanics.
   a) bend b) stretch
   c) twist d) turn

10) The first protein simulated was _____.
a) Insulin b) Trypsin inhibitor
c) Polymerase d) Protease

**B) Fill in the blanks.** **06**

1) _____ keyword is used for function in Python language.
2) Common editor for all programming language is _____.
3) CPU stands for _____.
4) The important parameter in studying any event is _____.
5) Simulation is the study of _____ of system.
6) An example of tool for the study of molecular interaction is _____.

**Q.2 Answer the following.** **16**

**a)** What is Python? What are the benefits of using Python?
**b)** Write libraries of python? Explain in detail.
**c)** Add a note on simulation with applications.
**d)** Write a note on energy minimization.

**Q.3 Answer the following.** **16**

**a)** Explain a detail account on testing and debugging in python.
**b)** Explain python data types in detail.

**Q.4 Answer the following.** **16**

**a)** Write a brief account on Bio-python.
**b)** What are the key features of Python?

**Q.5 Answer the following.** **16**

**a)** Write a note on History of python, packages and versions in detail.
**b)** Define molecular mechanics. Add a note on applications in biology.

**Q.6 Answer the following.** **16**

**a)** Write a note on geometry optimization with applications.
**b)** Add a note on biological models in simulations.

**Q.7 Answer the following.**

**a)** Write a note on molecular dynamics with examples. **16**
**b)** Write a note on of conformational search with applications.

**SLR-EC-15**

| Set No. | | Set | P |
|---|---|---|---|

# M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov2023
## BIOINFORMATICS
## Clinical Bioinformatics (MSC27402)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Q. Nos. 1 and. 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7
3) Figure to right indicate full marks.

**Q.1 A) Choose the correct alternative.** **10**

1) Volume 2 is _____ index in International classification of disease.
   a) alphabetical b) allopathy
   c) automatic d) tabular

2) The transcriptome is the set of all _____ transcripts, including coding and non-coding, in an individual or a population of cells.
   a) rna b) proton
   c) neutron d) electron

3) Galaxy is open source and browser based, it can be accessed by anyone and is free of charge for creation of _____.
   a) working b) workflows
   c) programme d) functions

4) Neurodegeneration is the progressive _____ of structure or function of neurons, including death of neurons
   a) gain b) loss
   c) maximum d) minimum

5) In _____, one organism benefits at the expense of the other
   a) community b) communication
   c) endtoxins d) parasitism

6) The _____ Informatics focuses on the management and analysis of clinical and research pathology data using modern computing, communications and digital imaging techniques.
   a) Protein b) Python
   c) Pathology d) Pathway

7) The biomics systems analysis is study of total _____.
   a) biome b) biology
   c) barrier d) chemical

8) The Human Genome Project (HGP) was an _____ scientific research project with the goal of determining the base pairs that make up human DNA.
   a) national b) regional
   c) state d) international

9) _____ immunoprecipitation (ChIP) technology with DNA microarrays, termed ChIP-Chip
   a) Chromatin b) Cystsine
   c) Chroma d) Cell

10) _____ to prepare a standardized “bill” for services given to a patient.
a) Payment b) Bill
c) Quotation d) Provider

**B) Fill in the blanks OR Write true / false.** **06**

1) Metabolomics is an analytical profiling technique for measuring and comparing large numbers of metabolites present in biological samples.
2) The study of ADRs is the concern of the field known as pharmacovigilance.
3) Pathogen-host protein interactions are fundamental for pathogens to manipulate host signaling pathways and subvert host immune defense.
4) Illumina offers a comprehensive, end-to-end solution for every step of the NGS sequencing workflow, from library preparation to final data analysis.
5) DNA microarrays to measure the expression levels of large numbers of genes simultaneously or to genotype multiple regions of a genome.
6) Protein quatarnary structure is the linear sequence of amino acids in a peptide or protein.

**Q.2 Answer the following.** **16**

**a)** Give a detailed note on International Council for Harmonization guidelines.
**b)** Write a note on pharmacological classes of drugs?
**c)** Explain the comparative genome analysis with example?
**d)** How to design CRF in clinical research?

**Q.3 Answer the following.**

**a)** Explain the computation study of host pathogen interactions in detail? **08**
**b)** Give a detail account on Quality control tools for NGS data analysis? **08**

**Q.4 Answer the following.**

**a)** Explain the pharmcogenomics and its applications in drug designing. **08**
**b)** Give a detail account on Human genome project with its ELSI. **08**

**Q.5 Answer the following.**

**a)** Explain the causes and available treatment for neurodegenerative disease. **08**
**b)** Give a detailed note on Ensembl and map viewer database. **08**

**Q.6 Answer the following.**

**a)** What is medical coding and add note on steps of medical coding? **10**
**b)** Write a note on genetic disease and its available treatment for genetic disease? **06**

**Q.7 Answer the following.**

**a)** Give a detailed account on Next generation sequence and its platforms with process and applications. **10**
**b)** Write a note on guidelines for good clinical practices. **06**

**SLR-EC-16**

| Seat No. | | Set | P |
|---|---|---|---|

# M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Research Methodology and IPR in Bioinformatics (MSC27403)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Question no. 1 and 2 are compulsory.
2) Attempt any three questions from Q. No. 3 to Q. No. 7.
3) Figure to right indicate full marks.

**Q.1 A) Multiple choice questions.** **10**

1) A question which requires a solution is _____.
   a) Observation b) Problem
   c) Data d) Experiment

2) Hypothesis explains relationship between two variables is _____.
   a) Causal b) Relational
   c) Descriptive d) Tentative

3) Data related to human beings are called _____.
   a) Territorial data b) Organizational data
   c) Peripheral data d) Demographic data

4) It is in this section that you fully interpret & evaluate your results _____.
   a) Introduction b) Method
   c) Results d) Discussion

5) _____ is used to test the goodness of fit.
   a) T-test b) Chi- Square test
   c) Z-test d) ANOVA

6) Copyright law applies to all the forms of expression except _____.
   a) Song lyrics and musical compositions
   b) Sculptures and paintings
   c) Dramatic and literary works
   d) Nano car

7) A trademark is represented by several key characteristics _____of the following is one of them.
   a) A trademark identifies a product's origin
   b) Slogans are not covered under trademark law
   c) Trademarks are never an indicator of quality
   d) Trademarks are "short hand" for retailers to use in determining pricing strategy

8) First UPOV act was drafted in the year _____.
   a) 1930 b) 1995
   c) 1942 d) 1961

9) Breeders can use protected varieties as initial source to create new varieties on the basis of a _____.
   a) Breeder's exemption b) Breeder's privilege
   c) IPR infringement d) Self execution

10) The _____ system is the stand alone system to provide protection for plant variety.
   a) privilege  b) sovereignty
   c) TRIPS  d) Sui Generis

**B) Write true or false.** **06**

1) The starting point in any research project is to estimate the cost.
2) A seminar discusses in a small group on original research.
3) Among-group variation is considered to be random error.
4) Intellectual property is intangible property.
5) PBR will lead to compulsion to purchase fresh seed every year.
6) The Patent Cooperation Treaty *(PCT)* assists applicants in seeking patent by filing one international patent application under the PCT.

**Q.2 Answer the following.** **16**

**a)** Explain the steps in research.
**b)** Describe the correlation coefficient.
**c)** Write a note on poster presentation for conferences.
**d)** Describe non-patentable materials.

**Q.3 Answer the following.**

**a)** Explain in detail the fundamental and applied research. **08**
**b)** Explain the key steps to writing a literature review. **08**

**Q.4 Answer the following.**

**a)** Describe sampling theory in detail and add a note on the difference between population and sample. **08**
**b)** Describe the Chi-square test of independence and goodness of fit. **08**

**Q.5 Answer the following.**

**a)** What is a research publication? Add a note on the criteria for publication. **08**
**b)** Write a note on search engines used for retrieval of the literature. **08**

**Q.6 Answer the following.**

**a)** Explain the steps involved in PCT application for international patent. **08**
**b)** Discuss in detail the patent case study with respect to Basmati. **08**

**Q.7 Answer the following.**

**a)** Explain the requirements of material for DUS testing. **08**
**b)** Why protect new plant variety? How are new plant varieties benefit society? **08**

**SLR-EC-17**

| Seat No. | | Set | P |
|---|---|---|---|

# M.Sc. (Semester - IV) (New) (CBCS) Examination: Oct/Nov-2023
## BIOINFORMATICS
## Emerging Areas of Bioinformatics (MSC27406)

Day & Date: Thursday, 21-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Q. Nos. 1 and 2 are compulsory.
2) Attempt any Three questions from Q.No.3 to Q.No.7.
3) Figures to the right indicate full marks.

**Q.1 A) Choose the correct alternatives.** **10**

1) _____ compounds are delimited by lines consisting of four dollars signs ($$$$).
   a) Multiple b) One
   c) Zero d) Single

2) Immunoinformatics is a branch of _____.
   a) System biology b) Structural biology
   c) Evolutionary biology d) Inheritance biology

3) The Encyclopedia of _____ is a free, online collaborative encyclopedia intended to document all of the 1.9 million living species known to science.
   a) Lamp b) Light
   c) Life d) Last

4) The type of immunity possessed by birth is called _____.
   a) Adaptive b) Acquired
   c) Innate d) Primate

5) The term _____ was defined in its application to drug discovery, for instance, by F.K. Brown in 1998.
   a) chemoinformatics b) biodiversity
   c) biology d) computer

6) _____ is one of the resources of Immunoinformatics.
   a) NCBI b) DDBJ
   c) Brenda d) IMGT

7) Conservation within the natural habitat is _____ conservation.
   a) ex situ b) in vivo
   c) ex vivo d) in situ

8) dbSNP is a _____ database from the National Center for Biotechnology Information (NCBI).
   a) Domain b) Snp
   c) Carbohydrate d) Chemical

9) The size of nanoparticles ranges from _____.
   a) 1-1000cm b) 1-1000mm
   c) 1-1000um d) 1-1000nm

10) Missense - _____ change in the base results in change in amino acid of protein and its malfunction which leads to disease.
   a) multiple b) haplotype
   c) phenotype d) single

**B) Write true or false.** **06**

1) PubChem is a database of chemical molecules and their activities against biological assays. The system is maintained by EBI.
2) dbSNP is database maintained by European molecular biology laboratory.
3) Species 2000 is a federation of database organizations across the world that compiles the *Catalogue of life*.
4) Polyphen is a offline tool for prediction the mutation in SNP analysis.
5) Epitome database is used for the prediction of epitopes.
6) The size of nanoparticles is measured in micrometers.

**Q.2 Answer the following.** **16**

**a)** Explain the SDF file format in detail.
**b)** Write a note of dbSNP database and submission details.
**c)** Write a note on Molecular data types in Molecular phylogenetics.
**d)** Write a note on importance of Immunoinformatics.

**Q.3 Answer the following.**

**a)** Write Pubchem and Drug bank chemical database in detail. **08**
**b)** Give a detail account Substructure based searching. **08**

**Q.4 Answer the following.**

**a)** What is polymorphism and how to take clinical decision for personalized medicine? **08**
**b)** Define IMGT. Add a note on its databases. **08**

**Q.5 Answer the following.**

**a)** Write a detail account on TDWG and its standards and protocols. **08**
**b)** Add a note on methods of synthesis of nanoparticles. **08**

**Q.6 Answer the following.**

**a)** Give a detail account on Chemoinformatics and application of Chemoinformatics in different field. **10**
**b)** Write a detailed note on applications of Immunoinformatics. **06**

**Q.7 Answer the following.**

**a)** Give a detailed account Botanical Library BRIT and BGBM database with its standards. **10**
**b)** Explain the Genetic testing with applications in personalized medicine. **06**