Printed Page:- 04 **Subject Code**:- **ABT0403**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: IV - THEORY EXAMINATION (2022-2023 **)**

Subject: Structural and Computational Biology

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **20**

1. Attempt all parts:-

1-a. Which of these two are commonly present in turns? (CO1) 1

(a) Glycine and Lysine

(b) Glycine and Pyrrolysine

(c) Glycine and Leucine

(d) Glycine and Proline

1-b. DNA strand backbone is made up of.....?(CO1) 1

(a) Sugar and Nitrogenous Base

(b) Sugar and Phosphate groups

(c) Nitrogenous Bases and Phosphate groups

(d) Both (a) & (b)

1-c. UniProtKB-Swiss-Prot contains.....(CO2) 1

(a) unreviewed, automatically annotated entries

(b) unreviewed, manually annotated entries

(c) reviewed, manually annotated entries

(d) reviewed, automatically annotated entries

1-d. ..... describe relationships between proteins using a hierarchy of classifications that reflect similarities in the spatial organization of secondary structure elements.(CO2) 1

(a) SCOP

(b) CATH

(c) Both (a) & (b)

(d) Niether (a) nor (b)

1-e. EPR alone yields inconvertible evidence of ..... and has the unique power of identifying the ..... species. (CO3) 1

(a) free radicals and diamagnetism

(b) free radicals and paramagnetic

(c) proton and diamagnetism

(d) proton and paramagnetic

1-f. Electron Paramagnetic Resonance spectroscopic technique detect species that have..... (CO3) 1

(a) Paired electrons

(b) Unpaired electrons

(c) Both (a) and (b)

(d) Neither (a) nor (b)

1-g. Linoleic acid is.....and palmitic acid is.....(CO4) 1

(a) saturated fatty acids and saturated fatty acids.

(b) unsaturated fatty acids and unsaturated fatty acids.

(c) unsaturated fatty acids and saturated fatty acids.

(d) saturated fatty acids and unsaturated fatty acids.

1-h. Amylose contains glucose.....units. (CO4) 1

(a) 100-200

(b) 200-300

(c) 300-400

(d) 400-500

1-i. A karyotype shows the complete diploid set of chromosomes grouped together in pairs, arranged in order of..... (CO5) 1

(a) increasing size

(b) decreasing size

(c) equal size

(d) none

1-j. A ..... shows the complete .....set of chromosomes grouped together in pairs, arranged in order of ..... size.(CO5) 1

(a) karyotype, haploid & increasing

(b) karyotype, diploid & decreasing

(c) karyotype, diploid & increasing

(d) karyotype, haploid & decreasing

2. Attempt all parts:-

2.a. What is motif? (CO1) 2

2.b. What are the different ways of homogenization of cells? (CO2) 2

2.c. Write the principal of FRET. (CO3) 2

2.d. What type of linkage exist in amylose? (CO4) 2

2.e. Explain the classification of approaches used to measure the dynamics of RNA-protein interactions in cells based on RNAs bound to proteins. (CO5) 2

SECTION B **30**

3. Answer any <u>five</u> of the following:-

3-a. What are the differences between diastereomers and enantiomers? (CO1) 6

3-b. Why it is important to align biological sequences for the study? What type of information you will get after aligning the sequences?(CO1) 6

3-c. Describe Dubochet's vitrification method and Frank's image analysis for 3D structures of proteins. (CO2) 6

3-d. Describe salting-in and salting-out effect on protein solution? Explain with proper graphical representation. (CO2) 6

3.e. Explain X-Ray Free-Electron Laser (XFEL)? (CO3) 6

3.f. What do you understand by simple and complex carbohydrates. Explain. (CO4) 6

3.g. Explain single molecule fluorescence technique used for measuring the kinetics of RNA-protein interactions. (CO5) 6

SECTION C **50**

4. Answer any <u>one</u> of the following:-

4-a. Explain the mechanism of action performed by bacterial chaperonins? (CO1) 10

4-b. Explain the application of bioinformatics. (CO1) 10

5. Answer any one of the following:-

5-a. Explain SCOP and CATH? (CO2) 10

5-b. Write the different approach to validate the target proteins? (CO2) 10

6. Answer any one of the following:-

6-a. Is there any differences between steady-state fluorescence spectroscopy and time-resolved fluorescence spectroscopy? Explain NMR spectroscopy. (CO3) 10

6-b. Explain the working principal of FRET. Whether it is different from single molecule fluorescence? Explain. (CO3) 10

7. Answer any one of the following:-

7-a. Whether starch, glycogen, cellulose, and chitin are simple carbohydrates or complex carbohydrates? Explain. (CO4) 10

7-b. Draw the Fischer projection of galactose and mannose. (a) Is galactose a D-sugar or an L-sugar? (b) Is mannose a D-sugar or an L-sugar? (c) Are these two carbohydrates enantiomers? If not, in how many places do they differ? (CO4) 10

8. Answer any one of the following:-

8-a. Explain the enzymatic approaches and solution methods to measure the kinetics of RNA-protein interactions. (CO5) 10

8-b. Describe the mechanisms of DNA replication, repair, and recombination, and their roles in maintaining genome stability. Discuss how mutations and chromosomal abnormalities can arise, and how these can contribute to disease states. (CO5) 10