Printed Page:- 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 (2021 - 2022)

Subject: Structural and Computational Biology

Time: 3 Hours Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.
2. Section A - Question No- 1 is 1 mark each & Question No- 2 carries 2 mark each.
3. Section B - Question No-3 is based on external choice carrying 6 marks each.
4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.
5. 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. The process by which DNA makes a copy of itself during cell division is called as? (CO1) 1

(a) Transcription
(b) Translation
(c) Reverse Transcription
(d) Replication

1-b. Which is called as start codon? (CO1) 1

(a) AUG
(b) AAC
(c) AUU
(d) CAU

1-c. During centrifugation, separation of analyte is based on…..... (CO2) 1

(a) Size
(b) Shape
(c) Density
(d) All

1-d. The….....database aims to provide a detailed and comprehensive description of the structural and evolutionary relationships between all proteins whose structure is known. (CO2) 1

(a) SCOP
(b) CATH
(c) Both (a) & (b)
(d) Niether (a) nor (b)

1-e. …..... radiations carry enough energy to ionize atoms and disrupt molecular bonds? (CO3) 1

(a) Visible radiation
(b) Infrared radiation
(c) UV radiation
(d) X-rays

1-f. Investigations of protein-protein and protein-nucleic acid interactions is an application of …..... (CO3) 1

(a) XFEL
(b) Circular Dichroism

(c) EPR
(d) X-ray crystallography

1-g. Aptamers are…… (CO4) 1

(a) short, ssDNA or ssRNA
(b) long, ssDNA or ssRNA
(c) short, dsDNA or dsRNA
(d) long, dsDNA or dsRNA

1-h. Nucleoside contains…..... (CO4) 1

(a) Nitrogenous Base
(b) Sugar
(c) Phosphate group
(d) Only (a) & (b)

1-i. The study of genome starts with the analysis of ……. (CO5) 1

(a) Nucleosides
(b) Nucleotides
(c) Chromosomes
(d) All

1-j. Turner syndrome is characterized by……. (CO5) 1

(a) X0
(b) XX
(c) XY
(d) XXY

2. Attempt all parts:-

2.a. Explain the major difference between glycoproteins and proteoglycans? (CO1) 2

2.b. What is difference between soluble and membrane proteins? (CO2) 2

2.c. What is the full form of FRET and why we use this? (CO3) 2

2.d. What is SELEX? (CO4) 2

2.e. Which compound is used for visualization of DNA bands in Gel doc? (CO5) 2

SECTION B 30

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

3-a. Discuss the role of chaperons in protein folding? (CO1) 6

3-b. Explain the G-protein coupled receptors (GPCRs) protein families. (CO1) 6

3-c. What is NMR? Describe the method to prepare sample for NMR Spectroscopy? (CO2) 6

3-d. Explain the significance of Ramachandran Plot in 3D structure validation of generated protein model. (CO2) 6

3.e. What are the various applications of circular dichroism (CD) in structural biology? (CO3) 6

3.f. Write down various types of RNA and also explain their function? (CO4) 6

3.g. Write notes on (a) Surface Plasmon Resonance (b) Fluorescence quenching (c) Fluorescence Resonance Energy Transfer. (CO5) 6

SECTION C 50

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

4-a. Explain the importance of α-helix, β-pleated sheet and turn in protein structure. (CO1) 10

4-b. What do you understand by sequence alignment? What type of approaches you will follow to align the sequences? Explain with a sequence alignment problem. (CO1) 10

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

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

5-b.	Why we perform SDS-PAGE and Western Blot technique. Explain. (CO2)	10
6. Answer any one of the following:-		
6-a.	Write notes on (a) Circular Dichroism (b) Electron Paramagnetic Resonance spectroscopy (c) Single molecule fluorescence. (CO3)	10
6-b.	Explain Electron Paramagnetic Resonance (EPR) spectroscopy. How EPR works? Explain the different ways by which EPR shows similarity with NMR. (CO3)	10
7. Answer any one of the following:-		
7-a.	Why aptamers are widely used in nanotechnology? Discuss. (CO4)	10
7-b.	What do you understand by isomer, epimer and anomer? Explain with suitable examples. (CO4)	10
8. Answer any one of the following:-		
8-a.	Discuss the dynamics of Protein-RNA complexes. (CO5)	10
8-b.	Describe the solution methods and enzymatic approaches to measure the kinetics of RNA-protein interactions. (CO5)	10