
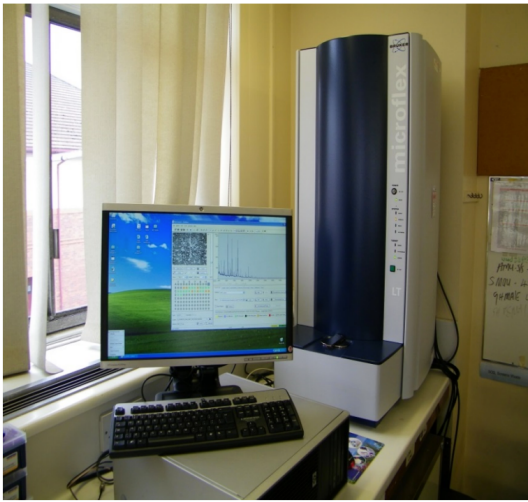


<b>Name:</b>			
<b>Enrolment No:</b>			
<b>UPES</b> <b>End Semester Examination, December 2023</b>			
<b>Course: B.Tech Structural Biology</b>		<b>Semester : V</b>	
<b>Program: Biotechnology</b>		<b>Duration : 3 Hours</b>	
<b>Course Code: HSBT 3006</b>		<b>Max. Marks: 100</b>	
<b>Instructions:</b>			
<b>S. No.</b>	<b>Section A</b> <b>Short answer questions/ MCQ/T&amp;F</b> <b>(20Qx1.5M= 30 Marks)</b>	<b>Marks</b>	<b>COs</b>
<b>Q 1</b>	<b>Which of the following is a non-essential amino acid?</b> a) Methionine b) Threonine c) Cysteine d) Lysine	<b>1.5</b>	<b>CO1</b>
<b>Q 2</b>	<b>Which of the following is not an aromatic amino acid?</b> a) Phenylalanine b) Tyrosine c) Leucine d) Tryptophan	<b>1.5</b>	<b>CO1</b>
<b>Q 3</b>	<b>Which of the following is not a type of amino acid-</b> a) Aliphatic & Aromatic b) Basic & Acidic, Hydroxylic c) Sulfur-containing d) Amidic or the one with the amide group e) None of them	<b>1.5</b>	<b>CO2</b>
<b>Q 4</b>	<b>Which of the following statements is true related to amino acid solubility?</b> a) Mostly soluble in water and insoluble in organic solvents b) They are only water-soluble c) They are only soluble in organic solvents d) Mostly soluble in organic solvents and insoluble in water	<b>1.5</b>	<b>CO1</b>
<b>Q 5</b>	<b>where does the amino acid and imino acid group differ</b> a) Bonding of carbonyl group with the amide group b) Bonding of nitrogen in the amide group c) Bonding of nitrogen in the carbonyl group d) Presence of covalent bond between amide and carbonyl group	<b>1.5</b>	<b>CO2</b>
<b>Q 6</b>	<b>Which of the following is an example of imino acid?</b>	<b>1.5</b>	<b>CO1</b>

	<ul style="list-style-type: none"> <li>a. Alanine</li> <li>b. Glycine</li> <li>c. Proline</li> <li>d. Serine</li> </ul>		
<b>Q 7</b>	<p><b>Which amino acid is both glucogenic and ketogenic?</b></p> <ul style="list-style-type: none"> <li>a. Leucine</li> <li>b. Lysine</li> <li>c. Isoleucine</li> <li>d. histidine</li> </ul>	<b>1.5</b>	<b>CO4</b>
<b>Q 8</b>	<p><b>Proteomics stands for _____.</b></p> <ul style="list-style-type: none"> <li>(a) Set of proteins in a specific region of the cell</li> <li>(b) Biomolecules</li> <li>(c) Set of proteins</li> <li>(d) The entire set of expressed proteins in the cell</li> </ul>	<b>1.5</b>	<b>CO3</b>
<b>Q 9</b>	<p><b>Which of the following are not the application of bioinformatics?</b></p> <ul style="list-style-type: none"> <li>(a) Drug designing</li> <li>(b) Data storage and management</li> <li>(c) Understand the relationships between organisms</li> <li>(d) None of the above</li> </ul>	<b>1.5</b>	<b>CO2</b>
<b>Q 10</b>	<p><b>The human genome contains approximately_____.</b></p> <ul style="list-style-type: none"> <li>(a) 6 billion base pairs</li> <li>(b) 5 billion base pairs</li> <li>(c) 3 billion base pairs</li> <li>(d) 4 billion base pairs</li> </ul>	<b>1.5</b>	<b>CO1</b>
<b>Q 11</b>	<p><b>The lab where scientists work using computers and in association with web-based online analysis mostly, will be referred as _____.</b></p> <ul style="list-style-type: none"> <li>(a) In silico</li> <li>(b) Dry lab</li> <li>(c) Wet lab</li> <li>(d) All of the above</li> </ul>	<b>1.5</b>	<b>CO1+ CO2</b>
<b>Q 12</b>	<p><b>Which of the following is a perfect model for Homology and similarity-based tool?</b></p> <ul style="list-style-type: none"> <li>(a) BLAST</li> <li>(b) RasMol</li> <li>(c) EMBOSS</li> <li>(d) PROSPECT</li> </ul>	<b>1.5</b>	<b>CO2</b>
<b>Q 13</b>	<p><b>The mRNA from which of the following would contain a poly-A tail?</b></p> <ul style="list-style-type: none"> <li>a) A restriction endonuclease from E. coli</li> <li>b) Bacterial alpha-amylase</li> <li>c) Human insulin</li> <li>d) Bacteriophage DNA ligase</li> </ul>	<b>1.5</b>	<b>CO1</b>
<b>Q 14</b>	<p><b>Which of the following is a function of messenger RNA?</b></p> <ul style="list-style-type: none"> <li>1. It carries amino acids</li> </ul>	<b>1.5</b>	<b>CO1</b>

	<ol style="list-style-type: none"> <li>2. It is a component of the ribosomes</li> <li>3. It is a direct copy of a gene</li> <li>4. It is the genetic material of some organisms</li> </ol>		
<b>Q 15</b>	<p><b>During the Synthesis of RNA, the DNA template transcribes into RNA, if the DNA has sequence <u>5'Tp Ap Gp Cp 3'</u>, what would the RNA be?</b></p> <ol style="list-style-type: none"> <li>1. 5'-Ap Tp Cp Gp-3'</li> <li>2. 5'-Gp Cp Up Ap-3'</li> <li>3. 5'-Gp Cp Tp Ap-3'</li> <li>4. 5'-Ap Up Cp Gp-3'</li> </ol>	<b>1.5</b>	<b>CO2</b>
<b>Q 16</b>	<p><b>In RNA, uracil pairs with</b></p> <ol style="list-style-type: none"> <li>1. adenine</li> <li>2. cytosine</li> <li>3. thymine</li> <li>4. guanine</li> </ol>	<b>1.5</b>	<b>CO1</b>
<b>Q 17</b>	<p><b>The genetic material of the HIV virus (retrovirus family) is</b></p> <ol style="list-style-type: none"> <li>1. DNA</li> <li>2. RNA</li> <li>3. protein</li> <li>4. all of these</li> </ol>	<b>1.5</b>	<b>CO3</b>
<b>Q 18</b>	<p><b>Which is the smallest RNA in the following?</b></p> <ol style="list-style-type: none"> <li>1. Messenger RNA</li> <li>2. Transfer RNAs</li> <li>3. Ribosomal RNAs</li> <li>4. All of these</li> </ol>	<b>1.5</b>	<b>CO1</b>
<b>Q 19</b>	<p><b>DNA is chemically less reactive and more stable structurally than RNA, why?</b></p> <ol style="list-style-type: none"> <li>a) DNA has evolved from RNA</li> <li>b) RNA can directly code for proteins</li> <li>c) DNA is better genetic material than RNA</li> <li>d) The protein synthesizing machinery has evolved around RNA</li> </ol>	<b>1.5</b>	<b>CO3</b>
<b>Q 20</b>	<p><b>Retroviruses replicate via _____ intermediate</b></p> <ol style="list-style-type: none"> <li>1. RNA</li> <li>2. DNA</li> <li>3. mRNA</li> <li>4. rDNA</li> </ol>	<b>1.5</b>	<b>CO4</b>
<p><b>Section B</b> <b>(4Qx5M=20 Marks)</b></p>			
<b>Q 1</b>	Explain any two databases that are used for protein structure sequence determination and structure characterization.	<b>5</b>	<b>CO3</b>
<b>Q 2</b>	Write a short note on nucleosomes and provide its major roles.	<b>5</b>	<b>CO2</b>

<b>Q 3</b>	Draw the structure of $\alpha$ -helix and $\beta$ -pleated sheet structure of proteins.	<b>5</b>	<b>CO1</b>
<b>Q 4</b>	Distinguish DNA and RNA creating a table and justify your points with appropriate examples.	<b>5</b>	<b>CO3</b>
<b>Section C</b> <b>(2Qx15M=30 Marks)</b>			
<b>Q 1</b>	What are chaperones and how do these assist in protein production and folding? Explain with diagrammatic representation.	<b>15</b> <b>(5+5+5)</b>	<b>CO4</b>
<b>Q 2</b>	Identify the following figure/technique and write down the a) Principle, b) Instrumentations and c) Applications.  	<b>15</b> <b>(5+5+5)</b>	<b>CO3</b>
<b>Section D</b> <b>(2Qx10M=20 Marks)</b>			
<b>Q 1</b>	What is an Aptamer? Explain the SELEX aptamer selection process in detail.	<b>10 (5+5)</b>	<b>CO2</b>
<b>Q 2</b>	Nucleic acid structures are frequently divided into four different levels, why? Explain them in detail with scenic pictorial view.	<b>10(5+5)</b>	<b>CO1+4</b>