

Term End External Examination 1<sup>ST</sup> Semester (Session-Feb 2025)

Subject: Bioinformatics

Course No and Title: BIM122M/ Foundations of Bioinformatics I

Time: 2.15 hours

Max Marks:100

Min. Marks:40

Section A: Objective Type Questions

Q1. Choose the appropriate Answer: (8x1.5=12)

- i. At a pH below the isoelectric point, an amino acid exists as
 

|               |                          |
|---------------|--------------------------|
| A Zwitter ion | B Anion                  |
| C Cation      | D Undissociated molecule |
- ii. Which of the following is NOT an aromatic amino acid?
 

|              |                 |
|--------------|-----------------|
| A Arginine   | B Phynylalanine |
| C Tryptophan | D Tyrosine      |
- iii. Which of the following is an aldopentose sugar?
 

|           |             |
|-----------|-------------|
| A Glucose | B Galactose |
| C Sucrose | D Ribose    |
- iv. Sucrose consists of
 

|                       |                      |
|-----------------------|----------------------|
| A Glucose + glucose   | B Glucose + fructose |
| C Glucose + galactose | D Glucose + mannose  |
- v. Which of the following non-coding DNA regions contain tandem repeats?
 

|                 |             |
|-----------------|-------------|
| A Introns       | B Exons     |
| C Satellite DNA | D Promoters |
- vi. Which enzymatic activity of DNA polymerase enzyme is primarily responsible for proofreading function during DNA replication?
 

|                              |                              |
|------------------------------|------------------------------|
| A 5'-3' polymerase activity  | B 3'-5' exonuclease activity |
| C 5'-3' exonuclease activity | D Endonuclease activity      |
- vii. Sigma and Rho factors are required during
 

|               |                 |
|---------------|-----------------|
| A Replication | B Transcription |
| C Translation | D All of these  |
- viii. In biosynthesis of proteins the chain terminating codons are
 

|                 |                 |
|-----------------|-----------------|
| A UAA, UAG, UGA | B UGG, UUG, AGU |
| C AAU, AAG, GAU | D GGG, GUU, GCU |

Section-B: Descriptive Type Questions (Short Type)

Q2: Answer all the Questions (8 x 4 =32)

- i. How do you define pH and pI?
- ii. Which amino acid is responsible for forming disulfide bonds in proteins and how these bonds can be broken?
- iii. Give two examples each of reducing and non-reducing sugars
- iv. What are the components that make up a triglyceride?
- v. Define palindromic DNA
- vi. What are transposable elements? Give an example
- vii. Name the various RNA polymerase enzymes that transcribe eukaryotic DNA
- viii. What is the function of enhancers and silencers in transcription?

Section – C: Descriptive Type Questions (Medium Type)

Answer all the questions: (4 x 7=28)

- Q3. What are buffers? Explain how impaired buffer system can impact protein structure and function?  
**OR**  
Draw general structure of an amino acid and show the formation of peptide bond between two amino acids
- Q4. What are storage polysaccharides? Explain the structure of any one polysaccharide.  
**OR**  
Differentiate between saturated and unsaturated fatty acids in terms of their chemical structure and properties
- Q5. Explain the structural features of DNA.  
**OR**  
What are the functions of nucleic acids? Differentiate between DNA and RNA.
- Q6. Explain the general characteristics of genetic code.  
**OR**  
What are the different types of RNAs? Explain the role of tRNA in translation.

**Section – D: Descriptive Type Questions (Long Type)**

**Answer any two of the following: (2 x 14=28)**

- Q7. What do you mean by primary and secondary structure of proteins?  
Discuss alpha helical structure of proteins in detail
- Q8. Discuss the classification of carbohydrates. Explain the structural differences of monosaccharides and disaccharides by providing examples of each
- Q9. Discuss the process of replication of DNA in prokaryotes.
- Q10. Give a general overview of transcription process in prokaryotes.