ST. JOSEPH'S UNIVERSITY, BENGALURU -27
B. Sc. BIOTECHNOLOGY III SEMESTER
SEMESTER EXAMINATION: OCTOBER 2023
(Examination conducted in November /December 2023)
BT322 – BIOMOLECULES AND BIOSTATISTICS

(For current batch students only)

Time: 2 Hours   **Max Marks: 60**
This paper contains TWO printed pages and THREE parts

PART-A

Answer any TEN of the following questions   **10x2=20 marks**

1. Differentiate between the ratio and interval scales of data.
2. Why is it important to consider a random sample while conducting an experiment?
3. Why is variance a less preferred measure of dispersion while dealing with biological variables? How does standard deviation overcome the major drawback of variance?
4. Represent normal distribution graphically, and mention the percentage of observations expected within 1 and 2 standard deviations from the mean.
5. What can you infer from the value of correlation coefficient? What are the minimum and maximum possible values of correlation coefficient for positive correlation?
6. Explain what a 'p value' of 0.05 indicates.
7. How are biologically important macromolecules formed from their monomeric subunits?
8. Define pKa. Name and draw the structure of the amino acid having a physiological buffer range.
9. Amino acids are known to exist as zwitterions at certain pH values. How does the concept of zwitterions relate to the isoelectric pH of amino acids?
10. Give the chemical composition of a nucleotide and draw the structure of the sugar present in DNA.
11. What is acid number? Write its significance.
12. Why are lipids called amphipathic molecules? Name the major lipid found in biological membranes.

PART-B
Answer any FOUR of the following questions   **4x5=20 marks**

13. Briefly explain the 'least squares method' of fitting a linear curve to data-points, using simple graphical representation.
14. The shoot lengths of a plant species were found to be normally distributed, with $\mu=65$ mm and $\sigma = 25$ mm. What percentage of the population is greater than 85 mm? (Consider the table value of Z to be 0.7881).
15. Describe the common secondary conformations found in proteins.
16. Discuss the properties of different classes of lipids with examples.
17. Differentiate between epimers and anomers giving examples for each.

18. Describe the Watson and Crick model of DNA.

PART-C

Answer any TWO of the following questions   **2x10=20 marks**

19. The following data represents root lengths.

Root length in cm (X)	3	4	5	6	7	8	9
Frequency (f)	2	3	6	8	7	2	1

   (i) Calculate the value of mean and standard deviation.   (3+4 m)
   (ii) Represent the given data as a bar diagram. Show the mean, and indicate the standard deviation through an error bar.   (3 m)

20. (i) In a cross between black and white coat coloured mice, the F2 individuals segregated into 787 black and 277 white coat coloured pups. Test whether these observations agree with the expected ratio of 3:1 (Consider the table value of Chi square to be 3.81).   (8 m)
   (ii) Briefly explain the systematic and stratified sampling methods of random sampling.   (2 m)

21. Classify the enzymes based on the type of reaction catalyzed. Discuss the enzyme specificity at the active site.