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**BRAINWARE UNIVERSITY****Term End Examination 2025-2026****Programme – B.Sc.(BT)-Hons-2023****Course Name – Fundamentals of Biostatistics****Course Code - BBT60124****(Semester VI)****LIBRARY**
Brainware University
Barasat, Kolkata -700125**Full Marks : 60****Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A**(Multiple Choice Type Question)****1 x 15=15****1. Choose the correct alternative from the following :**

- (i) Choose the correct representation when you need to classify data into discrete categories.
 - a) Histogram
 - b) Bar Chart
 - c) Scatter Plot
 - d) Line Plot
- (ii) Write the best way to classify data that changes over time, such as stock prices.
 - a) Tabular form
 - b) Matrix representation
 - c) Time series data
 - d) Tree representation
- (iii) Write the correct classification for a dataset where the mean, median, and mode are equal.
 - a) Positively skewed
 - b) Negatively skewed
 - c) Symmetric distribution
 - d) Bimodal distribution
- (iv) Classify the different types of selection affecting genotype frequencies.
 - a) Genetic drift, natural selection, mutation
 - b) Stabilizing, directional, disruptive
 - c) Non-random, gene flow, mutation
 - d) Mutation, recombination, Hardy-Weinberg
- (v) Recommend the best method to detect genetic drift in a small population.
 - a) Pedigree analysis
 - b) Hardy-Weinberg equilibrium test
 - c) DNA sequencing
 - d) Cytogenetic analysis
- (vi) Decide which factor increases genetic variation in a population.
 - a) Mutation
 - b) Genetic drift
 - c) Founder effect
 - d) Inbreeding
- (vii) Recommend a strategy to maintain genetic diversity in endangered species.
 - a) Reduce mutation rates
 - b) Promote inbreeding
 - c) Increase gene flow
 - d) Limit genetic recombination
- (viii) Decide which statistical test should be used to compare means between two independent groups.

- a) t-test
c) Regression analysis
- b) Chi-square test
d) Poisson test
- (ix) Classify the following probability distributions based on their characteristics: Binomial, Poisson, and Normal.
- a) All are discrete
c) All are continuous
- b) Binomial and Poisson are discrete, Normal is continuous
d) Binomial is continuous, Poisson and Normal are discrete
- (x) Classify a dataset containing blood pressure measurements over time.
- a) Discrete random variable
c) Categorical variable
- b) Continuous random variable
d) Nominal variable
- (xi) Recommend a method for assessing whether data follows a normal distribution before applying a t-test.
- a) ANOVA
c) Mann-Whitney U test
- b) Kolmogorov-Smirnov test
d) Poisson test
- (xii) Write an example of a dependent variable in regression.
- a) Blood pressure in a health study
c) Salary in a job market analysis
- b) Height in a plant growth study
d) All
- (xiii) Write the definition of the confidence interval.
- a) A range of values that contains the true population parameter
c) A hypothesis test result
- b) The probability of making a Type I error
d) A standard deviation calculation
- (xiv) Write the degrees of freedom for a t-test with a sample size of 15.
- a) 14
c) 16
- b) 15
d) 13
- (xv) Write the interpretation of a p-value of 0.001.
- a) Strong evidence against null hypothesis
c) Moderate evidence against null hypothesis
- b) No evidence against null hypothesis
d) The test is invalid

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Illustrate the difference between a bar chart and a histogram using a real-world example. (3)
3. Calculate the allele frequencies in a population where 36% of individuals exhibit a recessive trait. (3)
4. Illustrate how environmental factors can alter gene expression. (3)
5. Classify hypothesis testing methods into parametric and nonparametric approaches. (3)
6. Analyze the differences between correlation and regression in the context of medical research. (3)

OR

Analyze the relationship between hypothesis testing and confidence intervals in statistical decision-making. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Illustrate the difference between a bar chart and a histogram using statistical examples. (5)
8. Illustrate the differences between stabilizing, directional, and disruptive selection with examples. (5)
9. Illustrate the concept of heritability in quantitative genetics with an example. (5)
10. Analyze factorial experiment design in biological studies. (5)
11. Analyze how Bayesian inference improves genetic risk prediction. (5)

12. Create a case study explaining the use of the Chi-square test for testing the association between two categorical variables. (5)

OR

Create a step-by-step explanation of how to conduct a hypothesis test using a t-test for small samples. (5)

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