



42785

**BRAINWARE UNIVERSITY****Term End Examination 2025-2026****Programme – B.Sc.(BT)-Hons-2024****Course Name – Fundamentals of Biostatistics****Course Code - BBT40109****(Semester IV)****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) State the middle value of an ordered dataset.
 - a) Mean
 - b) Median
 - c) Mode
 - d) Range
- (ii) State the square root of variance.
 - a) Range
 - b) Mean deviation
 - c) Standard deviation
 - d) Median
- (iii) Identify the term used for numerical data.
 - a) Qualitative data
 - b) Categorical data
 - c) Quantitative data
 - d) Nominal data
- (iv) Identify the probability of an impossible event.
 - a) 1
 - b) 0
 - c) 0.5
 - d) -1
- (v) Identify the distribution used for number of rare events.
 - a) Binomial
 - b) Normal
 - c) Poisson
 - d) Uniform
- (vi) Indicate the meaning of a positive z score.
 - a) Value below mean
 - b) At mean
 - c) Outside distribution
 - d) Value greater than mean
- (vii) Identify the error that occurs when a true null hypothesis is rejected.
 - a) Type II error
 - b) Sampling error
 - c) Type I error
 - d) Standard error
- (viii) Identify the distribution used for small sample tests.
 - a) Normal
 - b) Binomial
 - c) Poisson
 - d) t-distribution

- (ix) Choose the conclusion when $p\text{-value} > \alpha$.
- | | |
|----------------------|-------------------------|
| a) Reject H_0 | b) Fail to reject H_0 |
| c) Increase α | d) Change test |
- (x) Indicate the scale of data suitable for chi-square test.
- | | |
|------------|---------------|
| a) Nominal | b) Interval |
| c) Ratio | d) Continuous |
- (xi) Identify the distribution assumed in t-test.
- | | |
|-------------|------------|
| a) Binomial | b) Poisson |
| c) Normal | d) Uniform |
- (xii) Examine the test when distribution is non-normal.
- | | |
|------------------------|-----------|
| a) Z-test | b) t-test |
| c) Non-parametric test | d) ANOVA |
- (xiii) Determine the test for goodness of fit.
- | | |
|-----------|---------------|
| a) t-test | b) Z-test |
| c) ANOVA | d) Chi-square |
- (xiv) Examine which correlation is used in time series data.
- | | |
|------------------------|----------------------------|
| a) Partial correlation | b) Multiple correlation |
| c) Autocorrelation | d) Intra-class correlation |
- (xv) Determine the correct conclusion when $r = -1$.
- | | |
|---------------------------------|-------------------------|
| a) No association | b) Moderate association |
| c) Perfect negative correlation | d) Weak correlation |

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Identify primary data and give one example from biology. (3)
3. Describe cross-sectional data with an example. (3)
4. Explain the importance of binomial distribution in genetic studies. (3)
5. Determine the standard error of the mean when $SD = 5$ and $n = 100$. Interpret the result. (3)
6. Compare simple random sampling and cluster sampling with respect to precision and cost. (3)

OR

Analyze how increasing sample size influences standard error and confidence interval. (3)

Group-C

(Long Answer Type Questions)

5 x 6=30

7. Differentiate between Type I error, Type II error, and power of a study with suitable illustrations. (5)
8. Report how scatter diagrams assist in selecting appropriate correlation or regression methods. (5)
9. Identify the different methods of data collection in biostatistics and examine their importance. (5)
10. Differentiate between mean, median, and mode as measures of central tendency. (5)
11. Analyze variability using mean and standard deviation for grouped enzyme activity data: Class intervals 5–10, 10–15, 15–20; Frequencies 12, 18, 10. (5)
12. In a clinical study, the Pearson's correlation coefficient (r) between fasting blood glucose level and HbA1c percentage was found to be 0.75. Calculate the coefficient of determination (r^2). Interpret r^2 in terms of the percentage of variance explained and explain what the remaining unexplained variance represents biologically. (5)

OR

A microbiologist investigates the relationship between incubation time (in hours) and bacterial population ($\times 10^6$ cells/mL). The regression equation obtained from the study is $Y = 1.5 + 0.8X$, where Y represents bacterial population and X represents incubation time in hours. Using this

equation, predict the bacterial population after 6 hours of incubation. Interpret the regression coefficient (b) biologically and state one limitation of applying this regression equation beyond the observed time range.

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Course Name - Fundamentals of Statistics
Course Code - BUCBAP120
(Semester IV)

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Choose the correct answer after doing the following:

1. State the null hypothesis of an observed square:

- a) $H_0: \mu = \mu_0$
- b) $H_0: \mu \neq \mu_0$

- c) $H_0: \mu = \mu_0$
- d) $H_0: \mu \neq \mu_0$

2. State the square root of variance:

- a) Range
- b) Standard deviation

- c) Mean deviation
- d) Median

3. Identify the continuous variable for numerical data:

- a) Ordinal data
- b) Ratio measure data

- c) Categorical data
- d) Nominal data

4. Identify the probability of an impossible event:

- a) 0
- b) 1

- c) 0
- d) 1

5. Identify the formula used for number of rare events:

- a) λ
- b) λ^2

- c) Normal
- d) Logistic

6. Identify the meaning of a positive value:

- a) At least
- b) More than

- c) At least
- d) More than

7. Identify the value that occurs when a true null hypothesis is rejected:

- a) Type I error
- b) Type II error

- c) Sample size
- d) Standard error

8. Identify the technique used for small sample tests:

- a) t-test
- b) F-test

- c) t-test
- d) F-test