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(20425) Roll No. .
B.Sc. (Bio-Tech.)-I Year

3461
B.Sc. (Bio-Tech.)
Examination, April-2025
Bio-Mathematics and Bio-Statistics
(B-107)
B.Sc. (Bio-Tech.)

Time : Three Hours / [Maximum Marks : 50

Note : Attempt any **five** questions. Each question carries equal marks.

1. For the set $A = \{3, 4, 5, 6, 7, 9, 11\}$,
Set $B = \{1, 2, 4, 8, 10, 11\}$ and given
universal set $\mu = \{1, 2, 3, \dots, 11\}$
determine: 5×2=10
- (i) $A \cap \bar{B}$
 - (ii) $A \cup \bar{B}$
 - (iii) $(A - B) \cup (B - A)$
 - (iv) Check Whether A and B are equal sets or equivalent set?
 - (v) Check if $\overline{(A \cup B)} = \bar{A} \cap \bar{B}$
2. (a) What do you mean by subsets of a set? Explain them with the help of examples. 5

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- (b) Determine the value of $(0.85)^{11}$ upto the fifth coefficient. 5
3. (a) Show that neither of the following limits exists. 2.5×2=5
- (i) $\lim_{(x,y) \rightarrow (0,0)} \frac{2xy}{3x^2 + y^2}$
 - (ii) $\lim_{(x,y) \rightarrow (0,0)} \frac{4xy^2}{x^2 + 3y^2}$
- (b) Describe the properties of logarithms and evaluate the value of the following logarithm $\log_b x^m y^n$ 5
4. (a) The duration of time from first exposure to HIV infection to AIDS diagnosis is called incubation period. The incubation periods of a random sample of 7 HIV infected individuals is given below (in years): 5
- | | |
|------|------|
| 12 | 10.5 |
| 9.5 | 6.3 |
| 13.5 | 12.5 |
| 7.2 | |
- (i) Calculate the sample mean
 - (ii) Calculate the sample median
 - (iii) Calculate the sample standard deviation

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- (b) Define different types of errors. Show by example (s) how to determine at least three types errors from your taken data. 5
5. (a) Define the sample space, equally likely and mutually exclusive events. Prove that. 5

$$P(A) = P(E_1)P(A/E_1) + P(E_2)P(A/E_2) + \dots + P(E_n)P(A/E_n).$$
- (b) Determine the probability that how many times a "Double" does not come up when throwing two dices. Note double means (x, x) , $x \in \{1, 2, 3, 4, 5, 6\}$ 5
6. (a) What do you mean by algebraic function? Explain with example how different types of algebraic functions are solved? 5
- (b) How statistical data is visualized? Explain and describe various pictorial visualization methods on the data of your choice. 5
7. (a) The mean of 5 observations is 4.4 and their variance is 8.24. If 3 of the observations are 1, 2 and 6 find the other two observations. 5

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- (b) For the following two samples of human males yielding the following results: 5

	Sample 1	Sample 2
Age	25 years	11 years
Mean weight	145 pounds	80 pounds
Standard deviation	10 pounds	10 pounds

Find out which is more variable, the weights of the 25 year olds or the weights of 11 years olds.

8. What do you mean by Hypotheses? Describe various kinds of hypotheses. with example of each. How Hypothesis Testing is done? 10
9. Calculate the coefficient of covariance for the following data: 10
- | | | | | | | |
|---|---|----|----|----|----|----|
| x | 2 | 8 | 18 | 20 | 28 | 30 |
| y | 5 | 12 | 18 | 23 | 45 | 50 |
10. Write short notes on any **four** : 10
- Probability distributions
 - Significance and applications of integration and differentiation
 - Properties of Binomial coefficients
 - Data analytics and its business applications
 - Sampling types along with their properties

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