Exam.Code:0440
Sub. Code: 3497

2054

M.Sc. (Bio-Informatics) Second Semester
MBIN-8007: Statistics and Probability

Time allowed: 3 Hours **Max. Marks: 60**

NOTE: *Attempt five questions in all, including Question No. 1 which is compulsory and selecting atleast one question from each Unit. Use of simple calculator is allowed.*

1. Answer the following:-

   i) Differentiate between interval and ratio scales of measurement with suitable example.
   ii) Write the properties of mean.
   iii) Define mutually-exclusive events with example.
   iv) Define the spearman's rank correlation coefficient and also write its formula.
   v) Show graphically the positions of mean, median and mode in a positively and negatively skewed series.
   vi) Define the Poisson distribution and write the mean and standard deviation of it.
   vii) Differentiate between discrete and continuous random variables.
   viii) Write ANOVA table for one-way classification. $\left(8 \times 1\frac{1}{2}\right)$

Unit-I

2(a). Discuss the various measurement scales used in data collection, highlighting their differences and providing real-world examples for each scale.

(b). Explain the construction and interpretation of various methods for representing data, including histograms, frequency polygons and ogives. (6, 6)

3(a). Discuss skewness and kurtosis as measures of the shape of a distribution. How do these measures help in understanding the symmetry and peakedness of a dataset?

(b). Find median, mode, quartile deviation and standard deviation of the following data:

Class:	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency:	10	14	16	23	20	12	8

(6, 6)

P.T.O.

Unit-II

4(a). Define the followings:

i) Scatter diagram,
ii) Conditional probability with examples,
iii) Probability mass function, and
iv) Probability density function.

(b). A husband and wife appear in an interview for two vacancies of the same post. The probability of Husband's selection is 1/7 and that of wife's selection is 1/5. What is the probability that
i) both of them will be selected,
ii) only one of them will be selected, and
iii) none of them will be selected. (6, 6)

5(a). Describe linear regression and its properties. How is linear regression used to model the relationship between two variables, and how are the parameters of the regression model estimated?

(b). Find the Karl Pearson's coefficient of correlation of the following data:

X:	40	42	46	45	48	41	44
Y:	42	39	48	43	46	47	41

(6, 6)

Unit-III

6(a). Define binomial distribution and find its mean and variance. Under what conditions it can be approximated to a normal distribution.

(b). Below are given the gain in weights (in kgs.) of pigs fed on two diets A and B.

Gain in weight

Diet A : 25, 32, 30, 34, 24. 14. 32, 24, 30. 31, 35, 25

Diet-B : 44, 34, 22, 10, 47, 31, 40, 30, 32, 35, 18, 21, 35, 29, 22

Test. if the two diets differ significantly as regards their effect on increase in weight (Given $\alpha = 5\%$). (6, 6)

7(a). Explain Mann Whitney test for testing a non-parametric problem.

(b). Explain one-way and two-way analysis of variance (ANOVA). What are the differences between these two methods, and when is each used? (6, 6)

x-x-x