1059

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. I which is compulsory and selecting atleast one question from each Unit.*

x-x-x

1. Answer the following:
   (i) Distinguish between absolute and relative measures of dispersion.
   (ii) Distinguish between 'raw' and 'central' moments.
   (iii) Write any two disadvantages of arithmetic mean as a measure of central tendency.
   (iv) Define Expectation of a random variable.
   (v) If the correlation coefficient between variables X and Y is 0.5, what would be the correlation between 5X and -3Y?
   (vi) Write any two properties of regression coefficients.
   (vii) What is meant by probability mass function of a discrete random variable? Write this function for Poisson distribution.
   (viii) Explain the terms (i) Critical Region (ii) Type-II error. (1.5X8 = 12)

UNIT-I

2. (a) Draw a blank table i.e. a table without any entries/observations to represent the distribution of personnel in a manufacturing concern according to (i) Sex: male and female; (ii) Three grades of salary per day: below Rs. 300, Rs. 300 and under Rs. 500, Rs. 500 and over; Two periods: 2010 and 2011; Three age groups: below 25, 25 and under 40, 40 and over.

   (b) What is a frequency distribution? What considerations should be given in selecting the class-intervals while preparing a frequency distribution?

   (c) The average marks obtained in an examination by two groups of students were found to be 75 and 85 respectively. Determine the ratio of students in the two groups, if the average marks for all the students were 80. (4,4,4)

3. (a) Explain why the standard deviation is regarded as superior to other measures of dispersion. The standard deviation calculated from a set of 32 observations is 5. If the sum of the observations is 80, what is the sum of squares of these observations?

   (b) Explain the terms 'Skewness' and 'Kurtosis' used in frequency distribution of a continuous variable. Give the measures of skewness and kurtosis. (6,6)

UNIT-II

4 (a) There is a 50-50 chance that a contractor's firm A will bid for the construction of a multi storied building. Another firm B submits a bid and the probability is 3/4 that it will get the job, provided firm A does not bid. If firm A submits a bid, the probability that firm B will get the job is 1/3. What is the probability that firm B will get the job?

(b) If events A and B are independent, show that the complements of events A and B are also independent.

(c) Define the cumulative distribution function of a random variable X and state its properties. (4,4,4)

5 (a) If random variables X and Y are related by $Y = a X + b$, where a and b are known constants, show that $E(Y) = a E(X) + b$, where the symbol E represents the expectation.

(b) In a contest, two judges ranked eight candidates A, B, C, D, E, F, G and H in order of their preference, as shown in the following table. Find the rank correlation coefficient.

	A	B	C	D	E	F	G	H
First Judge	5	2	8	1	4	6	3	7
Second Judge	4	5	7	3	2	8	1	6

(6,6)

UNIT-III

6 (a) The over-all percentage of failures in a certain examination is 40. Using a probability distribution find the probability that out of a group of 6 candidates at least 5 passed the examination.

(b) Write down the important properties of Normal distribution.

(c) State any Central Limit Theorem. (5,5,2)

7 (a) Describe the technique of analysis of variance in one-way classified data, stating clearly the mathematical model and assumptions you make, by giving analysis of variance table.

(b) Nine patients to whom a certain drug was administered, registered the following increase/ decrease in blood pressure: 3, 7, 4, -1, -3, 6, -4, 1, 5. Test the hypothesis that the drug does not change the blood pressure at $\alpha = 0.01$ (Given Critical Value = 2.896).

(c) Distinguish between parametric and nonparametric test. (5,4,3)

x-x-x