Exam.Code:0002
Sub. Code: 0143

1059

B.A./B.Sc. (General) Second Semester

Statistics

Paper - 103: Probability Theory and Descriptive Statistics –II

Time allowed: 3 Hours **Max. Marks: 65**

***NOTE:** Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Section.*

x-x-x

1) (a) What is relation between mean and variance of gamma distribution?
(b) State Lindeberg-Levy Central limit theorem.
(c) Write the probability mass function of Hypergeometric distribution.
(d) Define coefficient of determination.
(e) Write down the definition of coefficient of colligation.
(f) Define multiple correlation and write its range. (2x6)
(g) Draw scatter diagram when X and Y are uncorrelated? (1)

SECTION I

2) (a) Define discrete uniform distribution. Also find its mean and variance using moment generating function.
(b) Let X_1, X_2 be independent random variables each having geometric distribution. Show that conditional distribution of X_1 given $X_1 + X_2$ is uniform.
(c) Show that how Poisson distribution is a limiting case of Binomial distribution. (5.5.3)

3) (a) Define Beta distribution of first kind. Also find mean and variance of beta Distribution.
(b) Explain the important properties of normal distribution.
(c) Show that sum of independent exponential distributions follows the gamma distribution. (4.5.4)

4) (a) State weak law of large numbers. Discuss its applications.
(b) The life time of a certain brand of an electric bulb may be considered a random variable with mean 1.200 hours and standard deviation 250 hours. Find the probability, using central limit theorem, that the average life time of 60 bulbs exceed 1.400 hours.
(c) If (X,Y) has bivariate normal distribution with parameters $(\mu_1, \mu_2, \sigma_1, \sigma_2, \rho)$, then find the marginal distribution and conditional distribution of Y and X. (4.4.5)

5) (a) State and Prove Demoiver's Central limit theorem.
(b) Use Chebyshev's inequality to determine how many times a fair coin must be tossed in order that the probability will be at least 0.95 that the ratio of the number of heads to the number of tosses will be between 0.45 and 0.55. (8.5)

P.T.O.

SECTION II

5) (a) Define product moment correlation coefficient and its properties.

(b) Find the correlation coefficient between X and X-a, where X is any random variable and a is constant.

(c) What is a rank correlation coefficient? Deduce Spearman's formula for rank correlation coefficient. How should the formula be modified for tied ranks?

(4.3.6)

7) (a) Define Simple linear regression coefficient with example. State and prove its important properties.

(b) The equations of two regression lines obtained in a correlation analysis are as follows:

$X+2Y=5$, $3Y+2X=8$

Obtain (i) Value of correlation coefficient.

(ii) Mean Values of X and Y.

(iii) Ratio of coefficient of variability of X to that of Y.

(6.7)

8) (a) From the data relating to yield of dry bark (X_1), height (X_2) and girth (X_3) for 18 cinchona plants, the following correlation coefficients were obtained

$r_{12}=0.77$, $r_{23}=0.52$, $r_{31}=0.72$

Find partial correlations $r_{12.3}$, $r_{13.2}$ and multiple correlation $R_{1.23}$ and $R_{2.13}$.

(b) For the following table, give Yule's coefficient of association and coefficient of colligation.

	B	Not B
A	a	b
Not A	c	d

Examine the case when ad=cb. (8.5)

9) (a) For the case of two attributes, define independence and association (positive and negative). What are the different measures of association and what are their properties?

(b) Find if A and B are independent, positively associated or negatively associated for following case

(AB)=294, (α)=570, (A)=490, (αB)=380 (8.5)

x-x-x