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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) Under what condition binomial distribution approximate to poisson distribution?
    (b) Define weak law of large number.
    (c) If X and Y are negatively correlated then what is range of correlation coefficient?
    (d) Write probability density function of bivariate normal distribution.
    (e) Define the term regression with one example.
    (f) Define partial correlation.
    (e) Define the term "lack of memory".   (2.2.1.2.2.2.2)

SECTION I

2) (a) Define poisson distribution with probability mass function. Also find its mean. variance and moment generating function.
    (b) Obtain mean and variance of hypergeometric distribution.   (7,6)

3) (a) Write the probability density function of Gamma distribution and obtain its mean and variance. How exponential distribution is related with gamma distribution?
    (b) Obtain moment generating function of normal distribution.
    (c) Show geometric distribution has lack of memory property.   (5,4,4)

4) (a) If X is the number scored in a throw of a fair die, show that the chebychev's inequality gives $P[|X-\mu|>2.5] < 0.47$ Where μ is mean of X.
    (b) State and Prove De-Moivre's-Laplace central limit theorem.   (6,7)

5) (a) Define negative binomial distribution. Write its applications. Also calculate mean and variance.
    (b) State applications of Chebyshev's inequality.   (8,5)

SECTION II

6) (a) Calculate the correlation coefficient for the following heights of father (X) and their sons(Y)

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

    (b) Define Rank correlation coefficient. Explain the difference between product moment correlation coefficient and rank correlation coefficient.   (7,6)

P.T.o .

7) (a) Given two lines of regression $X = 4Y+5$ and $Y = (X/16)+ 4$ of X on Y and Y on X respectively. Find the means of variables and correlation coefficient.

(b) Prove that for two independent variables, correlation coefficient is zero.

(6,7)

8) (a) In trivariate distribution $r_{12}=0.7$, $r_{23}=0.5$, $r_{31}=0.5$. Find partial correlations $r_{12.3}$, $r_{23.1}$ and multiple correlation $R_{1.23}$.

(b) Show that coefficient of correlation r is independent of change of scale and origin of variables.

(8,5)

9) (a) Define Yule's coefficient of association and coefficient of colligation. Establish the following relation between coefficient of association Q and coefficient of colligation Y:

$$Q = \frac{2Y}{1+Y^2}$$

(b) What do you mean by independence of attributes. Given that $N=1000$, $(A)=470$, $(B)=620$, $(AB)=320$. Check whether A and B are independent, positively associated or negatively associated.

(7,6)

x-x-x