STATISTICS – III SEMESTER

Paper – II (Statistics)

Unit – I & II

(1) State and prove the properties of correlation coefficient
(2) Derive the Spearman's rank correlation coefficient.
(3) Obtain the limits for rank correlation coefficient.
(4) Some problems on correlation and regression.
(5) State and prove the properties of regression coefficients.
(6). Obtain the two regression lines.
(7). Straight line, parabola, Exponential & power curves normal Equations by using principle of least square.
(8). consistency conditions for 2 & 3 Attributes.
(9) Define the 'Q' and 'Y' and Establish the relationship b/w Q and Y. i.e $Q = \frac{2Y}{1+Y^2}$

(10).

Short questions

(10). Correlation V/S Regression.
(11). partial correlation and multiple correlation with examples
(12). Angle b/w two regression lines.
(13). Correlation Ratio and Scatter diagram.
(14). Tied (Repeated) Ranks.
(15) What do you mean by independence of attributes? Give a criterion of independence for attributes A and B.

Unit - 1

Problems

① Regression equations of two variables x and y are as follows
$8x - 10y = 64$, and $40x - 18y = 320$
find (i) The Means (ii) Regression coefficients. (iii) $r(x,y)$.

②. In two sets of variables x and y with 50 observations each the following data were observed. $\bar{x} = 10$, $\sigma_x = 3$, $\bar{y} = 6$, $\sigma_y = 2$ and $r(x,y) = 0.3$. But on subsequent verification it was found that one value of $x (=10)$ and $y (=6)$ were inaccurate and hence weeded out. with the remaining 49 pairs of values, how is the original value of 'r' affected ?

③. In a partially destroyed laboratory record of an analysis of correlation data, the following results only are legible.
~~The~~ variance of $x = 9$. Regression equations $8x - 10y + 66 = 0$, $40x - 18y = 214$. what are (i) $\bar{x}$ and $\bar{y}$ (ii) $r(x,y)$. (iii) S.D of y.?

(4). From the following particulars find, whether blindness and baldness are associated.

Total population	=	1,62,64,000
No. of baldheaded	=	24,441
No. of blind	=	7,263
No. of baldheaded blind	=	221.

⑤. Show that the coefficient of correlation 'r' is independent of change of origin and scale of variables. Also prove that for two independent variables $r = 0$. Show by an example that the converse is not true.

Unit - III & IV

(1). Define χ^2- distn. State its properties and applications.

(2). Define t- distn. State its properties and applications.

(3). Define F- distn. State its properties and applications.

(4). Explain the Method of Maximum likelihood estimation (MLE)

(5). Define a Sufficient Statistic. Explain the Method of finding sufficient estimater. If $(x_1, x_2 \dots x_n)$ is random Sample from a distn. $f(x,p) = p^x(1-p)^{1-x}$; $x = 0,1$ and $0 \le p \le 1$. find the sufficient estimater of P.

(6). Define Efficiency. X_1, X_2, and X_3 is a random Sample of size '3' from a popn. with Mean value 'μ' and variance 'σ^2'. T_1, T_2, T_3 are the estimaters used to estimate Mean value μ, where $T_1 = X_1 + X_2 - X_3$, $T_2 = 2X_1 + 3X_3 - 4X_2$ & $T_3 = \frac{1}{3}(\lambda X_1 + X_2 + X_3)$

(i) Are T_1 and T_2 unbiased estimaters?

(ii) find the value of 'λ' such that 'T_3' is unbiased estimater of 'μ'

(iii) with this value of 'λ' is T_3 is a consistent estimater?

(iv) which is the best estimater?

(7). State and prove the Invariance property of consistent Estimaters.

(8). Let $x_1, x_2 \dots x_n$ be a random variable from a uniform popn. on $[0, \theta]$ find a Sufficient estimater for θ.

Short Questions.

(9). Method of moments. (10). factorization Theorem.

(11). Relation b/w χ^2 and F.

(12). Interval Estimation and point Estimation.

(13). Define unbiasedness and consistency of estimaters. Explain with '2' Examples each.

(14) Explain criteria for good estimator.

(15) Sampling distribution.

(16). Show that for 'n' attributes $A_1, A_2 \ldots A_n$

$$(A_1 A_2 \ldots\ldots A_n) \geq (A_1) + (A_2) + \ldots\ldots + (A_n) - (n-1)N$$

where 'N' is the population size.