RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous Degree College with P.G. Section under University of Calcutta)

B.A./B.SC. SECOND SEMESTER EXAMINATION, MAY 2011

FIRST YEAR

STATISTICS (General)

Date : 28/05/2011

Time : 11 am – 1 pm

Paper : II

Full Marks : 50

Group - A

1. **Answer <u>any three</u> questions:**

a) Derive the regression line of y on x on the basis of given bivariate data (x_i, y_i), i = i(1)n. State your assumptions clearly. [5]

b) Show that the correlation coefficient between observed values and predicted values through the linear regression cannot be negative. [5]

c) Show that Spearman's rank correlation takes the value +1 in case of perfect agreement and –1 in case of perfect disagreement. [5]

d) Explain the following measures of association :
(i) odds ratio (ii) γ-measure (Gamma) [2½×2]

e) Show that Kendall's rank correlation coefficient can be derived as a product moment correlation coefficient. [4+1]

f) If X_1, X_2 and X_3 are uncorrelated variables each having same standard deviation, obtain the correlation coefficient between $X_1 + X_2$ and $X_2 + X_3$. [5]

2. **Answer <u>any one</u> question :**

a) Define multiple correlation coefficient of X_1 on X_2 and X_3. Obtain an expression for it and find its limits. [2+6+2]

b) Define partial correlation coefficient $r_{12.3}$ and write down its expression in terms of different pairwise correlation coefficients. Show that $r_{12}^2 + r_{13}^2 + r_{23}^2 - 2r_{12}r_{13}r_{23} \le 1$ [2+2+6]

Group - B

3. **Answer <u>any three</u> questions:**

a) Let $f(x,y) = 6x^2y,\ 0 \le x \le 1,\ 0 \le y \le 1$. Find $P(X \le 0{\cdot}5 \mid Y = 0{\cdot}25)$ and $E(Y \mid X = 0{\cdot}5)$ [2½×2]

b) Show that for two jointly distributed random variables X and Y, E(X+Y) = E(X) + E(Y) [5]

c) For a normal distribution with mean μ and variance σ^2, show that $\mu_{2r} = 1.3.5...(2r-1)\sigma^{2r}$, where μ_r is the rth order central moment of the distribution. [5]

d) Obtain the mean and variance of Beta distribution (first kind) with parameters m, n. [2+3]

e) Find the mean and variance of a uniform distribution over (a, b). [2+3]

f) Explain the terms :
(i) convergence in probability (ii) convergence in distribution with examples. [2½×2]

4. **Answer <u>any one</u> question :**

a) State and prove Chebyshev's inequality and use it to find a bound of $P\left(\left|x - \frac{1}{2}\right| \le \frac{1}{2}\right)$ where X is a continuous random variable having p.d.f. $f(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$ [4+6]

b) i) Write down the density function of a Bi-variate normal distribution and mention its important properties.
ii) State and prove Markov inequality. [5+5]