17 SEP 2019

PAPER CODE : 21863

B. Sc Semester- VI

STAT -CC- 603 [**Mathematical Statistics -V**]

TIME: $2\frac{1}{2}$ Hours Marks: 70

INSTRUCTIONS: 1) There are 5 compulsory questions in this question paper.
2) Use of Scientific calculator is allowed.
3) graph paper will be provided on request.

1. **(a)** Drive the probability mass function of Negative Binomial distribution. (8)
   (b) Show that deduction of Moment of Negative Binomial Distribution from those of Binomial Distribution. (6)

OR

1. **(a)** Obtain MGF and CGF of Negative Binomial distribution. Show that $\mu_4 = K_4 + 2K_2^2$ and also obtain γ_1 and γ_2 (8)
   (b) Prove that Poisson distribution as limiting case of the Negative Binomial Distribution. (6)
2. **(a)** Obtain Marginal probability density function of random variable X for bi-variate Normal Distribution. (8)
   (b) Obtain constants of bi-variate Normal Distribution. (6)

OR

2. **(a)** Obtain Conditional probability density function of random variable Y given $X = x$ for Binvariate Normal Distribution. (8)
   (b) Obtain MGF of bi-variate Normal Distribution. (6)
3. **(a)** Obtain the equation of the plane of regression of X_1 on X_2 and X_3 . (8)
   (b) Write properties of residuals and prove any one. (6)

OR

3. **(a)** In usual notation prove that $\frac{\Delta_{33}}{\sigma_3}x_3 + \frac{\Delta_{31}}{\sigma_1}x_1 + \frac{\Delta_{32}}{\sigma_2}x_2 = 0$. (8)
   (b) In usual notation prove that $\sigma_{1.23} = \sigma_1^2 \frac{\Delta}{\Delta_{11}}$. (6)
4. **(a)** In usual notation prove that $R^2_{1.23} = \frac{r_{13}^2 + r_{12}^2 - 2r_{12}r_{23}r_{13}}{1-r_{23}^2}$. (8)
   (b) Prove that if $r_{12} = r_{32} = r_{31} = \rho$ then $r_{31.2} = \frac{\rho}{1+\rho}$. (6)

OR

4. **(a)** Prove that $r_{12.3}\frac{\sigma_{1.3}}{\sigma_{2.3}} = -\frac{\sigma_1}{\sigma_2}\left[\frac{r_{23}r_{31}-r_{12}}{1-r_{23}^2}\right] = b_{12.3}$ (8)
   (b) Prove that if $r_{13} = r_{23} = r_{12} = r$ then $R_{3.12} = \frac{\sqrt{2}r}{\sqrt{1+r}}$ (6)

5. **(a)** Discuss Linear Orthogonal Transformation (8)

(b) A correlation coefficient of 0.72 is obtained from a sample of 29 pairs of observations. Can the sample be regarded as drawn from a bi-variate normal population in which true correlation coefficient is 0.8? $[Z_{0.05} = 1.96]$ (6)

OR

5. **(a)** State the properties of Linear Orthogonal transformation (8)

(b) Test of significant between two correlation differences for the following information. (6)

$$n_1 = 12, n_2 = 16, r_1 = 0.56, r_2 = 0.87$$

$[Z_{0.05} = 1.96]$