

M.Phil Science Examination

Paper-II : Statistics

May-2017

Time : 3 Hours]

[Max. Marks : 70

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Instruction: 1. All questions carry equal marks.

2. Use of scientific calculator and statistical tables is permitted.

Q-1 Define Truncated Bivariate Normal distribution. Obtain mean and variance of Doubly Truncated Bivariate Normal distribution (when the range of variable x is truncated from both sides and $-\infty < y < \infty$). Hence or otherwise obtain the mean and variance of Singly Truncated Bivariate Normal distribution for the following cases .

(i) $h < x < \infty, -\infty < y < \infty$ (ii) $-\infty < x < k, -\infty < y < \infty$.

OR

Q-1 (a) Define Truncated Trivariate Normal distribution. Obtain mean and variance of this distribution.

(b) Write a short note on Truncated Multivariate Normal distribution.

Q- 2(a) Define Negative Multinomial distribution. Show that the pdf of Negative Multinomial distribution is the general term in the expansion of probability generating function of Negative Multinomial distribution.

(b) State and prove important properties of Negative Multinomial Distribution.

OR

Q-2 (a) State different methods for estimating the parameters of a mixture Distribution and point out their merits and demerits.

(b) Using Rider's method obtain the estimate of the parameters of a mixture distribution with density $f(x) = p_1 \mu_1^{-1} \exp(-x/\mu_1) + p_2 \mu_2^{-1} \exp(-x/\mu_2)$ where $x > 0, \mu_i > 0 (i=1,2), p_1 + p_2 = 1$.

Q-3 (a) For the mixture of two univariate normal distributions derive system of equations for estimating the parameters of the distribution. Discuss important applications of this distribution.

(b) For the mixture of two Binomial distributions, obtain moment estimates of the parameters.

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- Q-3 (a) Describe Kabir's method of estimating the parameters of a mixture distribution. Point out their merits and demerits.
- (b) State and prove necessary and sufficient conditions for identifiability of a class of mixture Distributions.

Q-4 (a) Define Intervened Geometric distribution. Write its applications to real life Situations. Obtain its probability density function.

(b) Define Gumble's bivariate exponential distribution . Obtain $\text{Var}(y/X=x)$ for this distribution.

OR

Q-4 (a) Let $x \sim N(\mu, \sigma^2)$. If x_1, x_2, \dots, x_n is a random sample form $N(\mu, \sigma^2)$, obtain probability density function of $Z = \sum_{i=1}^n x_i^2$.

(b) For Intervened Geometric distribution show that $\text{Mean} = \frac{1 - \rho q^2}{(1 - q)(1 - \rho q)}$ and

$\text{Variance} = \frac{q}{(1 - q)^2} + \frac{\rho q}{(1 - \rho q)^2}$. Obtain mle's of the parameters of this distribution.

Q-5 Write brief notes (any two).

- Mixture of two Piosson Distributions.
- Dirichlet distribution.
- Write a brief note on Wishart distribution.
- Intervened Poisson Distribution