M.Sc. Statistics(Sem. –II) EXAMINATION – 06-NOV-2017

Distribution Theory :PARER 2 , Sub Code-2753

TIME : 2.30 Two Hours. TOTAL MARKS:70

Note: (i) All Questions are Compulsory

(ii) All Full Questions carry equal marks.

1. (a) Let $f(x,y) = \begin{cases} 2, if\ 0 \le X \le Y \le 1 \\ 0, \quad elsewhere \end{cases}$ then derive **8**

(i) Marginal density of x.

(ii) Marginal density of y.

(iii) Conditional density of x given y.

(iv) $E(X|Y = y)$

(b) Let X ~ Poisson (λ) then derive characteristic function of X. Hence obtain its mean and variance. **6**

OR

1. (a) Let the joint pdf of X and Y be given by: **6**

$f_{x,y}(x,y) = \frac{1}{2\pi\sqrt{1-\rho^2}} exp\left[-\frac{x^2-2pxy+y^2}{2(1-\rho^2)}\right]$ where |ρ|<1. Find the marginal pdf of X and Y

(b) Let the joint pdf be given by $f(x,y)=\lambda_1\lambda_2 e^{-(\lambda_1 x+\lambda_2 y)}$ **8**

$0< x < \infty$, $0< y < \infty$ obtain the marginal density of X and Y also obtain the joint distribution function of X and Y.Are X and Y independent?

2. (a) Define power series distribution. Show that first two cumulants uniquely determine the power series distribution. **8**

(b) Define NTA distributions. Define probability generating functions of it ..Hence obtain its pdf **6**

OR

2. (a) Define NTA and NTB distributions. Define probability generating functions of both distributions. **8**

(b) Derive recurrence relation for moments in the case of Poisson-Poisson distribution. **6**

3. (a) State and prove Fisher-Cochran Theorem. **8**

(b) In usual notation ,prove following result
G3(z)=G1(G2(z)

OR

3 (a) Define non-central chi-square random variable and obtain its probability distribution. **8**

(b) **6**
Define singular and non-singular multinomial distribution.
Find mean , variance – covariance matrix of Multinomial Distribution

4. (a) State the p.d.f of a Weibull distribution. If X has W(X, σ ,p)then derive the distribution of x^p. **6**

(b) Derive joint p.d.f. of rth & sth order statistics. **8**

OR

4. (a) Derive Standard Error of r-th sample moment stating the necessary condition. **8**

(b) Derive p.d.f. of rth order statistics. **6**

5.

(a) State and prove two Property of non-central χ^2 distribution **8**

(b) Let $X \sim N(\mu, \sigma^2) and\ Y \sim N\sigma^2 X^2(n)$ be two independent rv's. then derive the p.d.f. of $T=X/(Y/n)^{1/2}$.Give the name of the Statistic. **6**

OR

5 (a) Derive the pdf of the rth order statistics based on the random sample of size n from exponential distribution with meanθ. **8**

(b) Write a short note on non-central F-distribution. **6**