ØeeleoMe keâe u(0,1) me ›eâecele ØeeleoMepe n~ y_1, y_5 keâe leveleJe Heâueve evekeâeeueS~

(j) Describe test of randomness of a given sample.

Skeâ eoÙe nÙe ØeeleoMe keâ eueS Skeâ ÙeeÂeÛÚkeâle heje#eCe keâe JeCeve keâeepeS~

Unit - I

FkeâeF - I

2. If $\underline{X} \sim N_p(\underline{\mu}, \Sigma)$, find the moment generating function of $\underline{X}$ Hence show that $Z = D_{q \times p}\underline{X}$ $(q \le p)$ follows multivariate normal distribution.

Ùeeo $\underline{X} \sim N_p(\underline{\mu}, \Sigma)$, lee $\underline{X}$ keâe DeeleCepeevele Heâueve %eele keâeepeS~ Fmekeâe meneÙelee me emeæ keâeepeS ekeâ $Z = D_{q \times p}\underline{X}$ $(q \le p)$ keâe yeŠve Yee yenÛejeÙe ØemeeceevÙe neiee~

3. Find the M.L.E. of $\underline{\mu}$ and Σ in $N_p(\underline{\mu}, \Sigma)$.

$N_p(\underline{\mu}, \Sigma)$ ce $\underline{\mu}$ SJe Σ keâe DeeOekeâlece meYeeeJekeâlee Deekeâuekeâ evekeâeeueS~

A (Printed Pages 8)

Roll No. ____________

S-706

B.Sc. (Part-III) Examination, 2015

STATISTICS

First Paper

(Non-parametric Inference & Regression Analysis)

Time Allowed : Three Hours] ***[Maximum Marks : 75***

Note : Attempt total five questions taking one from each unit and Question No. 1, which is compulsory.

ØelÙekeâ FkeâeF me Skeâ ØeMve uekeâj ØeMve me. 1 pee ekeâ DeeveJeeÙe n, meenle keâue heeÛe ØeMve keâeepeS~

1. (a) Write probability density function of multivariate normal distribution.

yenÛejeÙe ØemeeceevÙe yeŠve keâe ØeeeÙekeâlee leveleJe Heâueve eueeKeÙe~

(b) What are the assumptions in general linear model?

meeceevÙe jeKekeâ cee[ue keâe keâuhevees keÙee n?

(c) When are the Sign test, Sukhatme test & Kolmogorov-Smirnov test used?

eÛevn hej e#eCe, meKeelce keâe hej e#eCe SJe keâeuceeiee jeJe emej veeJe keâe hej e#eCe keâye ØeÙeeie ekeâÙee peelee n?

(d) Define elementary coverages.

meeOeej Ce JÙeehleÙee keâe hee j Yee<ee oeepeS~

(e) Let x_1, x_2, x_3 be independent random variables with p.d.f.

$f(x) = e^{-(x-\theta)}, x \geq \theta$

Determine the constant $c = c(\theta)$

for which

$P[\theta < x_{(3)} < c] = 0.96$

Ùeeo x_1, x_2, x_3 mJelev$e ÙeeÂeÛÚkeâ Ûej n epevekeâe ØeeeÙekeâlee levelJe Heâueve

$f(x) = e^{-(x-\theta)}, x \geq \theta$

ne lee emLej ekeâ $c = c(\theta)$ keâe ceeve evekeâeeueS peyeekeâ :

$P[\theta < x_{(3)} < c] = 0.96$

(f) Explain the consequences of violation of assumptions in linear model.

j eKekeâ Øeele e¤he ce uee ieÙee keâuheveeDee keâ DemelÙe neve keâ hee j Ceece mecePeeFÙe~

(g) Let $f(x,y) = k$; $0 \leq x \leq y \leq 1$

0 ; otherwise

Find (i) k (ii) fx(x) (iii) fy(y)

Ùeeo $f(x,y) = k$; $0 \leq x \leq y \leq 1$

0 ; DevÙe$e

lee Øeehle keâeepeS (i) k (ii) fx(x) (iii) fy(y)

(h) What are goodness of fit tests?

Deemepeve mee‰lee keâ hej e#eCe keÙee n?

(i) Let $y_1 < y_2 < y_3 < y_4 < y_5$ denote the order statistics of a random sample of size 5 from u(0,1), Find the p.d.f. of y_1 & y_5.

ceevee $y_1 < y_2 < y_3 < y_4 < y_5$ Deekeâej 5 keâ

Unit-IV

FkeâeF-IV

8. Obtain the least square estimate of $\underset{\sim}{\beta}$ in the model $\underset{\sim}{Y}_{n\times1} = \underset{\sim}{x}_{n\times k}\,\underset{\sim}{\beta}_{k\times1} + \underset{\sim}{u}_{n\times1}$ and discuss its properties.

cee[ue $\underset{\sim}{Y}_{n\times1} = \underset{\sim}{x}_{n\times k}\,\underset{\sim}{\beta}_{k\times1} + \underset{\sim}{u}_{n\times1}$ ce $\underset{\sim}{\beta}$ keâe vÙevelece Jeie eJeeOe me Deekeâuekeâ evekeâeeueS Deej Fmekeâ ieCee keâe JÙeeKÙee keâeepeS~

9. Present a detailed account of tests of hypothesis concering $\underset{\sim}{\beta}$ in the model :

$$\underset{\sim}{y} = x\underset{\sim}{\beta} + \underset{\sim}{u}$$

under the normality assumption.

ØeeleØhe : $\underset{\sim}{y} = x\underset{\sim}{\beta} + \underset{\sim}{u}$

ce $\underset{\sim}{\beta}$ me mecyeevOele keâuheveeDee keâ hejeeCee keâe JÙeeKÙee keâeepeS peyeekeâ ØemeeceevÙeleee keâe ØeeleyevOe ceeve eueÙee ieÙee ne~

Unit-II

FkeâeF-II

4. Find the distribution of sample median for a sample $x_1, x_2, \ldots.. x_n$ when :

   (i) n is even

   (ii) n is odd.

ØeeleoMe $x_1, x_2, \ldots.. x_n$ keâ eueS ceeeOÙekeâe keâe yeŠve evekeâeeueS peyeekeâ :

   (i) n mece n

   (ii) n eJe<ece n~

5. (a) Let $x_{(1)}, x_{(2)}, \ldots.. x_{(n)}$ be the set of order statistics of random variables $x_{(1)}, x_{(2)}, \ldots x_{(n)}$ with common p.d.f.

$$f(x) = \begin{cases} \beta e^{-x\beta} & , \text{ if } x \ge 0 \\ 0 & , \text{ otherwise} \end{cases}$$

(i) Show that $x_{(r)}$ and $x_{(s)} - x_{(r)}$ are independent for any s > r.

(ii) Find the p.d.f. of $x_{(r+1)} - x_{(r)}$.

(b) Let the joint p.d.f. of x and y be

$$f(x,y)=\begin{cases}\frac{12}{7}x(x+y) & ; \quad 0<x,y<1\\ 0 & ; \quad \text{otherwise}\end{cases}$$

Let u = Min (x,y), v = Max (x,y).

Find the joints p.d.f. of u & v.

(a) ceevee ekeâ Ûeje $x_{(1)}, x_{(2)}, \ldots.. x_{(n)}$ epevekeâe hee.[e.SHeâ.,

$$f(x)=\begin{cases}\beta e^{-x\beta} & , \quad x \geq 0 \text{ n ,}\\ 0 & , \quad \text{DevÙeLee}\end{cases}$$

keâ ›eâecele ØeeleoMepe $x_{(1)}, x_{(2)}, \ldots x_{(n)}$ n~

(i) oMeeFÙe ekeâ $x_{(r)}$ Deej $x_{(s)} - x_{(r)}$ mJele$e Ûej n, peyeekeâ s > r

(ii) $x_{(r+1)} - x_{(r)}$ keâe hee.[e.SHeâ. %eele keâeepeS~

(b) ceevee keâe x Deej y keâe meÙeòeâ yeŠve,

$$f(x,y)=\begin{cases}\frac{12}{7}x(x+y) & ; \quad 0<x,y<1\\ 0 & ; \quad \text{DevÙeLee}\end{cases}$$

ceevee u = vÙevelece (x,y), v = DeeOekeâlece (x,y),

lee u Deej v keâe meÙeòeâ yeŠve %eele keâeepeS~

Unit-III

FkeâeF-III

6. (a) Explain a non-parametric test for testing that median of a continuous distribution is m_0 (given).

melele yeŠve ce ceeeOÙekeâe m_0 (eoÙee) n, Fmekeâ hejeerCe nle DeØeeÛeue hejeerCe mecePeeFÙe~

(b) Describe Mann-Whitney test.

ceve-eJnšvee hejeerCe mecePeeFÙe~

7. Give a detailed comparison of parametric with non-parametric test.

ØeeÛeue leLee iej-ØeeÛeue hejeerCe ce Devlej keâe keâeepeS~