Unit-I

FkeâeF-I

2. (a) Discuss main features of a normal distribution. Show that for normal distribution the mean deviation about mean is $\sigma\sqrt{\frac{2}{\pi}}$, where σ^2 is the variance of the distribution.

ØemeeceevÙe yešve keâ ceKÙe ieCee he j ØekeâeMe [eueÙe~ eoKeeFÙe ekeâ ØemeeceevÙe yešve keâ eueÙe ceeOÙe keâ meehe#e eJeÛeueve $\sigma\sqrt{\frac{2}{\pi}}$ nelee n~ pene σ^2 yešve keâe Øeme j Ce n~

(b) Derive Poisson distribution as a limiting case of binomial distribution. Find its m.g.f., mean and variances.

eÉheo yešve keâ meeceevle ¤he ce hJeeÙemee yešve keâe Øeehle keâeepeÙe~ Fmekeâe DeeleCe pevekeâ keâueve, ceeOÙe leLee Øeme j Ce %eele keâeepeÙe~

A (Printed Pages 8)

Roll No. ____________

S-701

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

(Regular & Exempted)

STATISTICS

Second Paper

(Probability Distribution & Numerical Analysis)

Time Allowed : Three Hours] ***[Maximum Marks : 50***

Note : Answer five questions in all, selecting one question from each Unit and Question No. 1, which is compulsory.

ØeMve me. 1 pee ekeâ DeeveJeeÙe n leLee ØelÙekeâ FkeâeF me Skeâ ØeMve Ûevele nS, keâue heeÛe ØeMvee keâ Gòej oeepeS~

1. (a) The distribution of a variable x is given by the following law :

$$f(x) = \text{constant}.\ e^{-\frac{1}{2}\left(\frac{x-100}{5}\right)^2}, -\infty < x < \infty$$

Find the value of

(i) Constant

(ii) Mean and

(iii) Variance

Skeâ Ûej x keâe yeŠve evecve ØeeeÙekeâlee eveÙece keâ Devle ele n :

$$f(x) = \text{emLejekeâ}.\ e^{-\frac{1}{2}\left(\frac{x-100}{5}\right)^2}, -\infty < x < \infty$$

lee

(i) emLejekeâ

(ii) ceeOÙe leLee

(iii) ØemejCe keâe ceeve yeleeFÙe~

(b) Under what condition Binomial distribution tends to Normal distribution?

ekeâve MeleeX hej eÉheo yeŠve, meeceevÙe yeŠve keâe Deej De«emej ne peelee n?

(c) Define negative binomial distribution.

$e+CeelcekeâeÉheo yeŠve keâe heejYeee<ele keâeepeS~

(d) Show that t-distribution becomes Cauchy distribution for n = 1.

eoKeeFÙe ekeâ n = 1 keâ eueÙe t-yeŠve, keâeMee yeŠve ne peelee n~

(e) What is χ^2 -variant? Write down its probability density function.

χ^2 Ûej keÙee n? Fmekeâe ØeeeÙekeâlee levelJe Heâueve eueeKeÙe~

(f) Define F-statistic and give its p.d.f.

F- ØeeleoMepe keâe heejYee<ee oeepeÙe leLee Fmekeâe ØeeeÙekeâlee levelJe Heâueve eueeKeÙe~

(g) Define interpolation and write down the fundamental assumptions for interpolation.

DevleJeMeve keâe heejYee<ee oeepeÙe leLee DevleJeMeve ce ceue keâuheveeDee keâe eueeKeÙe~

(h) Explain Δ and E operators and prove that

$E \equiv 1 + \Delta$.

Δ leLee E keâejkeâe keâe mecePeeFÙe Deej emeæ keâeepeÙe ekeâ

$E \equiv 1 + \Delta$.

(i) State fundamental assumptions of numerical analysis procedures.

Deeekeâkeâ eJeJeÛevee heæeleÙee keâe ceueYele heejkeâuheveeS yeleeFÙe~

(j) Find the value of $\log_e 7$ using Simpson's 1/3 rule.

emechemeve keâ leleeÙeeMe eveÙece me $\log_e 7$ keâe ceeve evekeâeeueÙe~

Unit-IV

FkeâeF-IV

8. (a) Describe the method of numerical integration and obtain the general quadrature formula.

Deeekeâkeâ meceekeâueve keâe JeCeve keâeepeÙe leLee meeceevÙe #e$ekeâueve me$e %eele keâeepeÙe~

(b) Describe the Trapezoidal rule for numerical integration.

Deeekeâkeâ meceekeâueve keâe eueÙe šhepeeF[ue eveÙece keâe JeCeve keâeepeÙe~

9. (a) Explain Simpson's 3/8 rule for numerical integration.

Deeekeâkeâ meceekeâueve keâe eueÙe emechemeve keâe 3/8Je eveÙece keâe mecePeeFÙe~

(b) Derive Weddel's rule of numerical integration.

Deeekeâkeâ meceekeâueve keâe eueÙe Je[ue keâe me$e keâe %eele keâeepeÙe~

3. (a) Define Exponential distribution and obtain its mean and variance.

leeleeÙe yeŠve keâe heejYee<ee oeepeÙe leLee Fmekeâe ceeOÙe SJe Øeme jCe %eele keâeepeÙe~

(b) For the rectangular distribution :

$$f(x)=\frac{1}{2a}\ ;\ -a \le x \le a$$

Show that $\mu_{2n}=\dfrac{a^{2n}}{(2n+1)}$.

DeeÙeleekeâej yeŠve :

$$f(x)=\frac{1}{2a}\ ;\ -a \le x \le a$$

keâ eueÙe eoKeeFÙe ekeâ $\mu_{2n}=\dfrac{a^{2n}}{(2n+1)}$.

Unit-II

FkeâeF-II

4. (a) Show that square of t-variable with n degrees of freedom is distributed as F with I and n degrees of freedom.

eoKeeFÙe ekeâ Skeâ t-Ûej keâe Jeie epemekeâe mJeele$Ùe keâeeš n n, F keâe lejn yeešle n~ epemekeâe mJeele$Ùe keâeeš l Deej n n~

(b) Define Bivariat normal distribution. Find the marginal and conditional p.d.f. of this distribution.

eÉhe© Øemeeceev Ùe yešve keâe heejYee<ee oeepeÙe~ Fme yešve keâ eueÙe meeceevle leLee Øeeleyev Oee ØeeeÙekeâlee levelJe Heâueve %eele keâeeepeÙe~

5. (a) Define t-distribution and show that as $n \to \infty$, t distribution tends to normal distribution.

t- yešve keâe heejYee<ee oeepeÙe leLee eoKeeFÙe ekeâ peme ne $n \to \infty$, t yešve Øemeeceev Ùe yešve keâe Deej De«emej nelee n~

(b) State and prove the additive property of χ^2-distribution.

keâeF-Jeie yešve keâ Ùeeie ieCe keâe eueeKeÙe leLee emeæ keâeepeÙe~

Unit-III

FkeâeF-III

6. State and prove Lagrange's interpolation formula. Use this formula to prove that :

$y_3 = 0.05\ (y_0 + y_6) - 0.3\ (y_1 + y_5) + 0.75(y_2 + y_4)$

ue«eepe keâe Devle eJeMeve me$e eueeKeÙe leLee emeæ keâeepeÙe~ Fme me$e keâe GheÙeeie keâjkeâ emeæ keâeepeÙe ekeâ

$y_3 = 0.05\ (y_0 + y_6) - 0.3\ (y_1 + y_5) + 0.75(y_2 + y_4)$

7. (a) State and prove Newton's forward formula for interpolation.

vÙešve keâ Devle eJeMeve keâ Dee«ece me$e keâe eueeKeÙe leLee emeæ keâeepeÙe~

(b) State and prove Gauss's central difference formula.

ieeme keâe keâvõeÙe Devlej Devle eJeMeve me$e eueeKeÙe leLee emeæ keâeepeÙe~