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Total No. of Pages : 3

Seat No.	1403

M.Sc. (Part - I) (Semester - I) (CBCS) Examination, November - 2015

STATISTICS (Paper - V)

Statistical Computing

Sub. Code : 59762

Day and Date : Wednesday, 04 - 11 - 2015 Total Marks : 80

Time : 10.30 a.m. to 01.30 p.m.

Instructions : 1) Question No. 1 is compulsory.
2) Attempt any four questions from question No. 2 to 7.
3) Figures to right indicate marks to the questions.

Q1) Answer the following : [16 × 1 = 16]

a) Define Pseudo random numbers.

b) Can you use a coin to generate random numbers from the set {1,2,3,4,5,}? Justify.

c) State result used to generate random numbers from gamma distribution.

d) If UNU (0, 1) then find the distribution of $X = -\log_e (1 - 0)$.

e) What are the constructors in C++?

f) List any four built in data types available in C++.

g) Write a c++ program to calculate 10!

h) Write down the syntax for do-while loop in C++.

i) Write down the syntax of a function in MS-EXCEL to compute sum of squares of all the numbers stored in A1 to A10.

j) How do you compute correlation coefficient in MS-EXCEL?

k) Write down the syntax of a function in MS-EXCEL to compute P(X = 10) where X ~ B (15, 0. 5).

l) How do you enter following matrix in R? $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

m) How do you sort given array in decreasing order using R?

n) What is numerical integration?

P.T.O.

Cr-F – 200

Seat No.	

M.Sc. (Part – I) (Semester – I) Examination, 2011
(Credit System)
STATISTICS (Paper – V)
Statistical Computing
Sub. Code : 42325

Day and Date : Friday, 21-10-2011
Time : 10.30 a.m to 1.30 p.m.

Total Marks : 80

Instructions : 1) Question No. 1 is compulsory.
2) Attempt any 4 questions from No. 2 to 7.
3) Figures to right indicate marks to the sub-question.

1. Answer any eight from the following subquestions. (2×8)

a) What do you mean by pseudo random numbers ?

b) How do you generate observations from a two-point discrete distribution ?

c) Describe procedure of generating observations from a continuous distribution using inversion method.

d) Describe concepts of OOP.

e) Describe looping in C++.

f) Write down MSEXCEL functions from

i) minimum =min( ) ii) mean =mean( )

iii) standard deviation and =stdev( ) iv) random number. =rand( )

g) Describe procedure to obtain scatter plots in MSEXCEL.

h) Illustrate IF-ESLE statement in R.

i) Write an algorithm to generate observations from diserete uniform over {1, 2, 3, 4}.

j) Explain how do you generate random sample using MSEXCEL.

2. a) Describe multiplicative congruential method of generating random numbers. Discuss limitations of the same with suitable example. How would you use it to generate sample from U (0, 1) ?

b) Write an algorithm for generating random samples from

i) Binomial distribution ii) Poisson distribution. (8+8)

P.T.O.

3. a) State and prove the results useful for generating geometric and negative binomial variates.

   b) Write an algorithm to generate 'n' observations from gamma distribution with shape parameter α and scale parameter λ. (8+8)

4. a) State Box-Muller method for generating N (0, 1) variates and prove the related result.

   b) Write an algorithm for generating random sample from
      i) Multinomial distribution
      ii) Bivariate exponential distribution (Marshall Olkin). (8+8)

5. a) Write an OOP to compute $\binom{n}{x}$; $n \geq x$.

   b) Write a program in C++ to compute correlation coefficient for a bivariate data. (8+8)

6. a) Write a program in R to
      i) Compute mean and variance of n numbers.
      ii) Obtain maximum of n numbers.

   b) Describe any four commands in SYSTAT useful for statistical analysis. (8+8)

7. Write short notes on **any four** of the following :
   a) Generation of Hypergeometric variates.
   b) Simulation from mixture of distributions.
   c) Test of independence in 2×2 contingency table using EXCEL.
   d) Graphic in SYSTAT.
   e) Bootstrap method.
   f) Jack-Knife estimator. (4×4)

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Total No. of Pages : 3

Seat No.	2002

M.Sc. (Part - I) (Semester - I) Examination, November - 2015

APPLIED STATISTICS AND INFORMATICS (Paper - V)

Statistical Computing and Numerical Methods (CBCS)

Sub. Code: 61059

Day and Date : Wednesday, 04-11-2015 Total Marks : 80

Time : 10.30 a.m. to 1.30 p.m.

Instructions : 1) Question No. 1 is compulsory.

2) Attempt any four questions from question No. 2 to 7.

3) Figures to right indicate marks to the questions.

Q1) Answer the following : [16 × 1 = 16]

a) What do you mean by random number generator?

b) Give an example of true random number generator.

c) State the transformation used to generate random sample from Binomial distribution.

d) How do you generate random numbers from t-distribution.

e) How do you generate random sample from the distribution with p.d.f.

$$f_x(x)=\begin{cases}\frac{x}{2}, & 0<x<2\\ 0 & o.w.\end{cases}$$

f) Write down the syntax of the MSEXCEL function to compute p.m.f. of binomial distribution.

g) How do you calculate first quartile of a data in MSEXCEL.

h) Write down the syntax of the MSEXCEL function to compute c.d.f. of normal distribution.

i) Explain table() command in R.

j) Write an R programme to calculate factorial of given number.

k) What is the output of following R-command rep(c(1, 2), 2).

l) What do you mean by root of an equation $f(x) = 0$.

P.T.O.

m) To approximate the root of equation $f(x) = x^2 - 6x + 9 = 0$ with the bisection method, check whether starting internal [1, 2] is valid or not.

n) Comment on the sentence "Newton-Raphson method always converges".

o) What do you mean by numerical integration?

p) Using Jacobi method solve the following system of equations maximum upto 3 iterations

$$x + y = 2$$

$$x - y = 0$$

Q2) a) State and prove the result used to generate random observations from the poisson distribution with parameter λ using sequence of i.i.d U(0,1) observations. [8]

b) Discuss the methods for generation of random numbers from bivariate normal distribution and bivariate exponential distribution. [8]

Q3) a) Explain following functions in MSEXCEL. [8]

i) IF( ) ii) AVERAGE( )

iii) BINOMDIST( ) iv) COUNT( )

b) State Newton-Raphson formulae to find a root an equation $f(x) = 0$, suppose $f(x) = x^2 - 6x + 9$. Write an algorithm to find root of an equation $f(x) = 0$ using Newton Raphson formulae. [8]

Q4) a) Explain high level and low level plotting functions in R with suitable examples. [8]

b) Explain Gauss-Seidel method for approximating solution of the linear equations. [8]

Q5) a) Let x~ N(5, 1). Write an algorithm to compute $p(X \leq 4)$, using Simpson's $\frac{3}{8}$ rule. [8]

b) Explain adaptive quadrature method to approximate $\int_a^b f(x)dx$. [8]

Q6) a) Explain read.CSV( ) & write.CSV( ) functions in R.

b) Discuss the procedure of drawing histogram in MSEXCEL.

c) Discuss the procedure of generating observation from the distribution function F, which is convex combination of two distribution functions F_1 & F_2.

[6+4+6]

Q7) Write short notes on the following. [4 × 4 = 16]

a) MSEXCEL for statistical Analysis.

b) Congruential Random number generator.

c) Bisection method.

d) Gauss integration.

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Rupali P. Sargar.

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Total No. of Pages : 3

Seat No. 01957

M.Sc. (Part - I) (Semester - I) Examination, November - 2014

APPLIED STATISTICS AND INFORMATION (Paper - V) (CBCS)

Statistical Computing and Numerical Methods

Sub. Code: 61059

Day and Date : Wednesday, 19-11-2014 Total Marks : 80

Time : 10.30 a.m. to 1.30 p.m.

Instructions : 1) Question No. 1 is compulsory.

2) Attempt Any Four questions from question No. 2 to 7

3) Figures to right indicate marks to the questions

Q1) Answer the following [16]

a) Define pseudo random number

b) Give a function in MSEXCEL to compute harmonic mean.

c) Write down the result used to generate random numbers from negative Binomial distribution

d) Write the output of R-Command :

matrix (c (rep (1,2), rep (2,1)), nrow = 2).

2 2

e) Write down the output of R-Commands :

x < – c (1, 2, 2, 3); [1] 1 2 2 3

y < – mode (x); numeric

f) What is the need of numerical integration

g) State the draw backs of Newton-Raphson method

h) What is the need of adaptive quadrature algorithms

i) Write down the syntax of R-function to import data stored in an MSEXCEL file

j) Write down the syntax of R-function to export a dataframe D to MSEXCEL

k) Write down the Box-Muller formula to generate random numbers from normal distribution

l) Write down the syntax of a function in MSEXCEL to compute sum of all the numbers stored in A1 to A10 which are greater than 10

m) What is the use of MSEXCEL function : F.TEST

n) Write down the syntax of MSEXCEL function to compute probabilities according to hypergeometric distribution

o) Comment as the convergence properties of Jacobi method

p) Sate the use of Gauss-Siedel method

Q2) a) Define simulation. Explain the congruential method of generating uniform variates.

b) Write down a method to generate random numbers from the following distribution :

$$P[x = -c] = \frac{1}{20^2} = P[x = c] \;\&$$

$$P[x = 0] = 1 - \frac{1}{\theta^2},\ \theta^2 > 1$$

[8+8 = 16]

Q3) a) State and prove the result used to generate random numbers from poisson distribution.

b) Write an R-program to generate random numbers from multinomial distribution.

[8+8 = 16]

Q4) a) Explain the construction of the following using MSEXCEL

i) Frequency distribution.

ii) Histogram

b) State and prove the result used to generate random numbers from Exponential distribution. Also write down an algorithm for the same.

[8+8 = 16]

Q5) a) Explain Newton-Raphson method and bisection method in detail.

b) Write an algorithm to compute square root of a number using Newton-Raphson method. Also provide an R-program for the same.

[8+8 = 16]

Q6) a) State and prove the result used to generate random numbers from chi-square distribution.

b) Write down an algorithm to generate random numbers from mixture of three distributions.

c) Explain the analysis of contingency tables using MSEXCEL.

[6+5+5 = 16]

Q7) Write short notes on the following : [4 × 4 = 16]

a) Integration by interpolation.

b) ANOVA and t-test in MSEXCEL.

c) High level graphics in R.

d) Jacobi-Method.

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Total No. of Pages : 2

Seat No.	

M.Sc. (Part - I) (Semester - I) Examination, Nov. - 2013

APPLIED STATISTICS AND INFORMATICS (Paper - V)

Statistical Computing and Numerical Methods

Sub. Code : 61059

Day and Date : Friday, 22 - 11 - 2013 Total Marks : 80

Time : 10.30 a.m to 1.30 p.m.

Instructions : 1) Question No. 1 is compulsory.
2) Attempt any four questions from question No. 2 to 7
3) Figures to the right indicate full makrs.

Q1) Attempt the following : [16 × 1 = 16]

a) Explain how do you generate random numbers from chi-square distribution using MS EXCEL.

b) What do you mean by Pseudo random number? Explain.

c) Write down R command to compute 50th percentile.

d) Illustrate 'while' statement in R.

e) Write an algorithm to generate random sample from the distribution with PMF

$P[x = -1] = \theta^2$
$P[x = 0] = \theta(1 - \theta)$
$P[x = 1] = 1 - \theta; \theta \in [0, 1]$.

f) Describe a procedure to constuct Box plot in MS EXCEL.

g) State the transformation used to generate random sample from poisson distribution.

h) Explain mixed congruntial method of generating uniform random nuimbers.

i) Explain the need of numerical integration.

j) Explain convergence analysis of Jacobi method.

k) Write down the syntax of the MS EXCEL function to compute inverse tangent function of a real number.

l) Write down the syntax of R-function to import text file from a specified location.

P.T.O

m) Write down the Box-Muller formula.
n) Give and application of the Box-Muller formula.
o) Explain the use of central limit theorem in random number generation.
p) Give one application of Gauss-sidel method.

Q2) a) Write an algorithm to generate radam numbers from
i) Binomial distribution.
ii) Exponential distribution. [8]
b) State and prove the result used to generate random numbers from geometric distribution. Hence, give a procedure to generate random numbers from Negative binomial distribution. [8]

Q3) a) Write a R program to compute factorial of an integer. [8]
b) Explain Graphics in R. [8]

Q4) a) Explain in detail adaptive quadrature and Gauss methods for numerical integration. [8]
b) Explain a procedure to perform analysis of contingency tables in MS EXCEL. [8]

Q5) a) Write down the algorithm for
i) Bisection method.
ii) Newton-Raphson method. [8]
b) Explain the use IF statement and conditional IF statement in MS EXCEL. Give illustrations. [8]

Q6) a) Describe multiplicative congruential method of generating random numbers. Discuss its drawbacks using examples. [6]
b) White an algorithm to generate random numbers from Bivariate Normal distribution. [4]
c) Explain Gauss-Sidel method and its convergence. [6]

Q7) Write short notes on the following : [4 × 4 = 16]
a) Simulation from multinomial distribution.
b) Integration by interpolation.
c) Construction of histogram in MS EXCEL.
d) Matrix algebra in R.