

This question paper contains 3 printed pages]

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S. No. of Question Paper : 8093

Unique Paper Code : 2373010013

Name of the Paper : Statistical Computing and Basic Data Mining

Name of the Course : B.Sc. (H) Statistics

Semester : VI (NEP-UGCF)

Duration : 3 Hours

Maximum Marks : 90

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. 1 is compulsory.

Attempt *five* more questions from the remaining questions.

Use of non-programming scientific calculator is allowed.

1. Attempt any *three* parts :

- (a) Write an algorithm for generating a random sample of size n from Uniform $[0, a]$ distribution.
- (b) Explain the 'Composition Method' for generating discrete random variables.
- (c) Suppose that $X_1, X_2, \dots, X_n$ is a random sample of size n from a continuous distribution with c.d.f. F . Explain suitable methods to generate the minimum order statistic.

P.T.O.

(d) Distinguish between random numbers and pseudo-random numbers. 5,5,5

2. (a) Explain in detail, the inverse transform method of random variable generation. How is this method used to generate exponential random variables with mean λ ?

(b) Use inverse transform method to generate 5 exponential random variables with mean 2 given the random numbers :

0.45, 0.82, 0.21, 0.63, 0.97. 8,7

3. (a) What do you understand by 'Acceptance Rejection Method' of random variable generation. What are its key constituents ?

(b) Use acceptance rejection method to generate a random sample of size n from the pdf

$$f(x) = \begin{cases} 2x & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases} \quad 8,7$$

4. (a) Explain the 'Markov Chain Monte Carlo' technique.

(b) Explain in detail, the Metropolis-Hastings algorithm. 5,10

5. Explain the suitable algorithm to generate a homogeneous Poisson process defining clearly its underlying process. 15

6. Write detailed notes on :

(a) 'Data Pre-processing'.

(b) What do you understand by naïve Bayes classifier ? 8,7

7. (a) Explain suitable methods to generate Binomial (n, p) random variables. Write clearly the steps involved.
- (b) Generate two Binomial (2, 0.5) random variates using any suitable method. Use the following uniform random numbers :

0.3687, 0.5254, 0.1432, 0.9647, 0.6912.

Write all the steps used.

8,7