



QP CODE: 26019312



Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION, MARCH 2026

Fourth Semester

M Sc BIOSTATISTICS

**Core Courses - ST020401 - SAS PROGRAMMING, BAYESIAN INFERENCE AND
MCMC METHODS**

2019 Admission Onwards

E917AECD

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Define variable? Give examples of SAS variables.
2. Explain the role of DROP and KEEP statements in SAS.
3. Explain FREQ and KEEP statements in SAS.
4. Define conditional probability. State and prove multiplication rule on probability.
5. Define sensitivity and specificity of a test. Also define predictive values.
6. Describe a convex loss function.
7. Describe Bayesian testing.
8. Explain Jeffry's paradox.
9. Explain acceptance rejection method for generating random variables.
10. Define stationary distribution of a Markov Chain

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. Write down the SAS program for generating 100 random numbers from normal $N(\mu, \sigma^2)$ where $\mu = 150, \sigma = 5$





12. Write a SAS program for finding the regression lines when a bivariate data is given.
13. Derive the posterior distribution of θ in an exponential population with mean $\frac{1}{\theta}$, using a suitable prior distribution.
14. Show that the one parameter exponential distribution is a conjugate prior family.
15. Describe LINEX loss function and derive the expression for Bayes estimator.
16. Derive the Bayes estimator for μ in $N(\mu, \sigma^2)$ where σ^2 is known under absolute error loss function using a suitable prior distribution.
17. Explain how you can estimate $\int_A g(x)dx$ using Monte Carlo simulation. How will you estimate the precision of the estimate obtained?
18. Distinguish between bootstrap and Jackknife methods.

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. (a) Describe how will you simulate 1000 random observations from binomial population with $n=50$ and $p=0.4$.
(b) Explain how to draw a histogram and frequency curve in SAS.
(c) Explain how to apply SAS program to demonstrate the limiting of binomial to normal distribution.
20. a) Explain how you will find the posterior distribution for the parameter θ in a binomial population using the non informative prior.
b) Find the posterior distribution of σ in $N(\mu, \sigma^2)$ when μ is known.
21. a) Distinguish between confidence intervals and credible intervals.
b) Derive the credible interval for μ in $N(\mu, \sigma^2)$ when σ is known.
22. a) Explain Gibbs sampling. Describe using an example.
b) Discuss on bootstrap method, with an illustrative example.

(2×5=10 weightage)

