



QP CODE: 26019334



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Reg No :

Name :

M.Sc DEGREE (CSS) EXAMINATION MARCH 2026

Fourth Semester

M Sc STATISTICS

ELECTIVE - ST800403 - ADVANCED BAYESIAN COMPUTING WITH R

2019 Admission Onwards

7AE0B0BE

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

Weight 1 each.

1. Define exponential family of distributions.
2. What is meant by an non-informative prior?
3. Define discrete prior. Give an example for discrete prior.
4. Derive Jefrey's prior for θ in Bernoulli (θ).
5. Describe multinomial model for categorical data.
6. Briefly explain beta-binomial model.
7. Explain the application of MCMC methods in Bayesian Analysis.
8. Explain MCMC method.
9. Explain posterior predictive checks.
10. Explain prior and posterior odds ratio.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

Weight 2 each.

11. State and prove Bayes theorem. Show that posterior is proportional to prior multiplied by likelihood.
12. Distinguish between prior and posterior distributions.
13. Describe different methods for selecting prior distribution in Bayesian analysis.





14. Obtain Posterior distribution of the mean vector μ for Multivariate normal model with known variance.
15. Explain Monte-Carlo method of estimation of the integral of a function, when the integral exists finitely.
16. Explain the rejection sampling algorithm for generating simulated sample.
17. Explain Hierarchical model using example.
18. Obtain the posterior distribution of the regression parameter in the linear regression model using
 - a) conjugate prior
 - b) non informative prior

(6×2=12 weightage)

Part C (Essay Type Questions)

Answer any **two** questions.

Weight 5 each.

19. Explain the brute-force algorithm of posterior computation for a histogram prior.
20. Define bioassay experiment and describe the analysis.
21. Explain random walk Metropolis-Hastings algorithm and Independence Metropolis Algorithm.
22. Derive the Bayes estimate of μ and σ^2 in $N(\mu, \sigma^2)$ based on a sample of size n assuming a normal prior for μ and an inverse Gamma prior for σ^2 .

(2×5=10 weightage)

