

Roll No. ....

Total Pages : 02

BT-4/M-23

44233

BAYESIAN DATA ANALYSIS  
BS-AIDS-202A

Time : Three Hours]

[Maximum Marks : 75

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

**Unit I**

1. (a) Design a Bayesian Data Analysis framework and discuss the working steps of Bayesian Data Analysis. 10
- (b) What is discrete probability ? Explain with an example. 5
2. Discuss various infinite models, such as hierarchical models and non-parametric models, in detail. 15

**Unit II**

3. (a) Discuss the role of posterior predictive checking of models in applied Bayesian statistics. 8
- (b) Describe Bayesian decision theory in different contexts. 7

4. (a) Discuss information criteria and cross-validation  
Model comparison based on predictive performance. 8
- (b) Write a short note on hierarchical decision analysis  
for radon measurement. 7

### Unit III

5. (a) What is Markov chain simulation? Explain with an  
example. 8
- (b) What is Gibbs sampling? Give an example in R. 7
6. Discuss the following in detail : 15
- (i) Hamiltonian Monte Carlo
  - (ii) Distributional approximations
  - (iii) Approximating conditional and marginal posterior  
densities.

### Unit IV

7. (a) Discuss the goals of regression analysis. 7
- (b) Explain the logistic regression model in detail. 8
8. Explain nonlinear and nonparametric models such as  
parametric nonlinear models, Gaussian process models,  
and Dirichlet process models. 15