MODEL QUESTION PAPER

Fourth Semester M. Sc. Degree (CSS)

ST4 E05: STATISTICAL DECISION THEORY

Time: 3 Hours   **Max. Weights: 30**

Part A

(Answer any 5 questions. Each question carries 1weight)

- Define a decision rule and R-better decision rule.

- What is 0-1 loss function? Give a situation where it is employed.

- Examine the equivalence of the normal and extensive forms of analysis in decision theory.

- What are the various approaches in the subjective determination of the prior density ?

- Show that under squared-error loss, the Bayes rule is the mean of the posterior distribution.

- Define conjugate priors? Give an example of such priors.

- What is meant by improper priors? How is the analysis done using such priors in obtaining the posterior distribution?

- Explain mini-max principle.

Part B

(Answer any 5 questions. Each question carries 2 weights)

- Explain the basic elements of a statistical decision problem?
10   Describe the construction of utility functions?
11. Describe the standard loss functions used in decision theory and indicate the relevance of their applications?
12. Explain the extensive form of analysis of decision problem

13. Find the Bayes estimate of in a Poisson process based on sample of

    size n, choosing an appropriate prior distribution

14. Using the data translated method find the improper prior

    in $N(\mu, \sigma^2)$, μ known, σ unknown.   Also find the posterior density.

15. Explain how the problems of point estimation and hypothesis testing fit

    in with the general theory of decisions.

16. Discuss the meaning and calculation of the posterior distribution

    in Bayesian analysis Give an example to illustrate the procedure.

Part C

(Answer any 3 questions. Each question carries 5 weights)

17**.** Suppose X has uniform distribution on (0 ,) where   has prior

    density g( ) =   0 and   = 0 otherwise

- Find the posterior distribution of   .

- Find the Bayes estimate of   with respect to squared error loss
function.

18. Describe Jeffres rule and use it to find the improperprior in N (μ ,σ^2)

    when μ is unknown and σ known. Find the posterior density and

    the Bayes estimate in this case.

19. Explain the prior and posterior analysis of Bernoulli process Find

    the Bayes estimate of parameter p in a Bernoulli process.

20. Decribe the finite action decision problem and bring out the relationship

    of the Bayesian tests with the classical hypothesis tests .

 21. State and prove minimax theorem.

22. What are the basic elements of game theory ? Explain a method for

    solving an game.