Abstract

This thesis deals with the estimation of reliability and hazard rate for exponential distribution from a decision theoretic point of view. In **Chapter 1**, we give a detailed review of the existing literature on the following problems : (*i*) estimation of the reliability function, (*ii*) estimating the hazard rate function, (*iii*) estimation of reliability in stress strength models, and (*iv*) estimation of reliability and hazard rate function of a selected component. In **Chapter 2**, some basic definitions and results of decision theory are discussed. These are useful in subsequent chapters.

In **Chapter 3**, we investigate the problem of estimation of reliability of a series system when the life times of individual components are exponentially distributed with unknown scale parameters. The loss function is taken to be log squared error. A general inadmissibility result is obtained for scale equivariant estimators. A generalized Bayes estimator is derived and shown to be admissible. Further, we consider the estimation of system reliability when the life times are exponentially distributed with a common unknown location and unknown scale parameters. The uniformly minimum variance unbiased estimator (UMVUE) and a modified maximum likelihood estimator (MMLE) are obtained. The mean squared errors of these estimators are compared.

In **Chapter 4**, we study the component wise and simultaneous estimation of hazard rates when the individual life times are exponentially distributed with a common location. Several inadmissibility results are proved. Further we investigate the estimation of the common hazard rate of several exponential populations with different location parameters. Improvement over the best affine equivariant estimator is obtained.

In **Chapters 5 and 6**, we study the estimation of hazard rate and reliability of a selected exponential population. The hazard rate estimation is studied for negative exponential distribution in **Chapter 5**. A generalized Bayes estimator is shown to be minimax. In **Chapter 6**, we investigate the estimation of the reliability function when the life times are exponentially distributed with unknown location and known scale parameters. An improved estimator is obtained through a differential inequality approach.

Keywords: Reliability, hazard rate, inadmissibility, UMVUE, MLE, minimax, differential inequality, scale equivariant estimator.