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Abstract of the Thesis

INFERENTIAL STUDY OF SOME EXTENDED LIFE TIME MODELS

There are six chapters in the thesis. The Chapter 1, starts with definitions of reliability and its characteristics, some reliability models, some important lifetime and extended lifetime models. Various forms of censoring and joint censoring scheme, some inferential statistical techniques, advanced Bayesian techniques and some mathematical and graphical model fitting techniques are discussed. Finally, literature review of the concerned areas have been given.

Chapter 2, deals with the estimation of the parameters of Modified Weibull distribution under Type-II hybrid censoring scheme. We provide maximum likelihood estimates of the parameters, reliability and hazard rate functions, along with their standard errors. The confidence intervals along with their widths, have also been obtained. Moreover, Bayes estimates of the reliability parameters along with posterior errors and highest posterior density credible intervals are obtained. Moreover, a simulation study is conducted. Finally, a real data analysis is performed.

In Chapter 3, we consider a multi-component load-sharing parallel system model and analyze the load-sharing tendency among the system's components. The failure time distribution of each component is assumed as Modified Weibull. The maximum likelihood estimators along with their standard errors are computed. Different confidence intervals for the parameters are also constructed. Further, Bayesian estimation is carried out. Moreover, a simulation study is conducted. Finally, we analysed two real datasets.

In chapter 4, we discuss the estimation of $R=P(Y<X)$ under progressive Type-II censoring scheme when X and Y are independent modified Weibull distributed random variables with different scale but same shape and acceleration parameters. The estimation of R is carried out both in case of known and unknown shape and acceleration parameters. For unknown model parameters, we derive maximum likelihood and Bayes estimators of R. Further, for known model parameters, we determine exact sampling distribution of the maximum likelihood estimator of R, and exact confidence interval for R. The uniformly minimum variance unbiased estimator and Lindley approximate Bayes estimator of R have also been derived. Thereafter, a simulation study is performed. Finally, a real data analysis is provided.

The study in chapter 5, focuses on the competing risk analysis of the system. Here, we propose Type-II hybrid censored competing risk analysis with masked system failure time data. It is assumed that the lifetime distribution of competing causes of failures follow Lindley

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distribution. We derive maximum likelihood and Bayes estimates of the model parameters. We also provide different confidence intervals of the model parameters. A simulation study is conducted for theoretical developments. A masked competing risk real dataset is also analysed.

In chapter 6, we propose classical and Bayesian point estimation of two independent Rayleigh populations under joint generalized Type-I hybrid censoring scheme. In classical estimation, first the conditional maximum likelihood estimates of the model parameters are derived. Thereafter, we obtain moment generating functions of the conditional maximum likelihood estimates. In Bayesian setup, we use different types of loss functions for deriving different Bayes estimates of the unknown parameters with their corresponding risks. Moreover, a simulation study is carried out. Finally, a real data analysis is provided.

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