CHAPTER V

CONCLUSION

This study extends Bayesian analysis to wrapped distributions, specifically illustrating the posterior wrapped exponential distribution. By examining both uninformative and gamma prior distributions, closed-form expressions for key statistical measures including the moment generating function (MGF), mean, variance, skewness, and kurtosis are derived in terms of the Hurwitz Zeta function. Graphical representations further elucidate these properties, enhancing practical interpretability. Additionally, the study investigates essential loss functions such as the Squared Error Loss Function (SEL function) and the Precautionary Loss Function (PL function), alongside Bayesian estimators and risk minimization techniques for parameter estimation.

The applicability of the posterior wrapped distribution is demonstrated through real-world scenarios where periodicity and non-constant failure rates are prominent. The wrapped exponential distribution with an uninformative prior effectively models failure patterns in hard disk drives (HDDs), while the gamma prior variant captures cyclical service time distributions in queueing networks within interactive computing systems. These applications underscore the model's flexibility in representing periodic stochastic processes.

Future research may extend this framework by exploring alternative prior distributions tailored to specific applications. Additionally, other loss functions such as Absolute Error Loss, Linex Loss, and Hinge Loss could be investigated to refine Bayesian estimation techniques and improve model robustness in diverse settings.