D3AST2204 (2 Pages) **Name.....**
Reg.No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2023
(Regular)
STATISTICS
FMST3E15 - LIFE TIME DATA ANALYSIS

Time: Three Hours **Maximum Weightage: 30**

Part A: Answer any *four* questions. Each carries *two* weightage.

1. Define discrete time hazard function. Give the expression for the survivor function in terms of hazard functions in discrete case.
2. What is meant by mean residual life function (MRLF)? Show that it uniquely determines the distribution.
3. Explain progressive type II censoring.
4. Explain briefly the inference procedures for exponentially distributed lifetimes based on large sample theory.
5. Why cox likelihood is called a partial likelihood?
6. Explain accelerated failure time model.
7. What are the methods for estimating the survivor function for a left truncated data?

(4 × 2 = 8 weightage)

Part B: Answer any *four* questions. Each carries *three* weightage.

8. Obtain the survival function and hazard function of log-logistic distribution and examine its monotone behaviours.
9. Find the MLE of λ under the type I censoring, when the lifetimes T_i follows exponential with mean $\frac{1}{\lambda}$.
10. Define Kaplan Meier estimate. Show that it can be derived as a non-parametric MLE of the survival function.
11. Explain in detail the Quantile- Quantile Plot.
12. Develop standard inference procedures for censored and uncensored data when the lifetime data follows gamma distribution.
13. Explain how regression models can be used for comparing or testing the equality of two distributions.
14. Explain the inference procedures for Weibull distribution with threshold parameters.

(4 × 3 = 12 weightage)

(P.T.O.)

Part C: Answer any *two* questions. Each carries *five* weightage.

15. Explain type I censoring, type II censoring and Progressive type II censoring. Derive the likelihood function in each case.

16. Describe likelihood based methods for location and log-location scale distributions under censored samples.

17. For the data on remission times (in days) given below, obtain Kaplan-Meier estimator of survival function S(t) at t= 1, 10, 29 and 60.

    1, 1, 2, 4, 4, 6, 6, 6, 7, 8, 9, 9, 10, 12, 13, 14, 18, 19, 24*, 26, 29, 31*, 42, 45*, 50*, 57, 60, 71*, 83*, 91. (Here * denote the censored observations).

18. Describe the basic characteristics and model specification of multiple failure mode problems.

(2 × 5 = 10 weightage)