Registration Number:

Date & Session:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU -27

M.Sc. STATISTICS – IV SEMESTER

SEMESTER EXAMINATION: APRIL 2023

(Examination conducted in May 2023)

STDE0420: SURVIVAL ANALYSIS

(For current batch students of only)

Time: 2 ½ Hours **Max Marks: 70**

This paper contains TWO printed pages and TWO parts

PART-A

I. Answer any SIX of the following: $(\mathbf{6 \times 3 = 18})$

1. What is the difference between complete and censored samples in survival analysis? Give examples.
2. Write a note on Increasing Failure Rate (IFR). Illustrate IFR property with an example.
3. Distinguish between type I and type II censoring.
4. Define the Reduced sample method and Actuarial method.
5. Explain accelerated life model.
6. What is the difference between the proportional hazards model and the accelerated life model?
7. Describe log-linear model of parametric regression in survival analysis.
8. What is the cumulative hazard function, and how is it estimated in survival analysis?

PART-B

II. Answer any FOUR of the following: $(\mathbf{4 \times 13 = 52})$

9. a) Derive the likelihood function under type I censoring. Also obtain maximum likelihood estimator of exponential distribution under type I censoring.
   b) Explain random censoring using parametric analysis with an example. (7+6)

10. a) Define Kaplan-Meier estimator, and show that it is generalized Maximum Likelihood Estimator.
    b) Derive Greenwood's formula for variance of Actuarial estimator. (8+5)

11. a) Explain Cox proportional hazard (PH) model when dealing with ties.
    b) Describe inference under Cox PH model. (6+7)

12. a) Describe the Completing Risk model. Discuss the non-parametric estimation of cumulative incidence function.
    b) Explain the estimation procedure for estimating regression parameters in the exponential regression model. (7+6)

13. a) Define Nelson-Aalen estimator.

b) Show that Cox PH model constitutes Lehmann family of alternatives.

c) Discuss regression model for grouped survival data. (5+4+4)

14. a) Define generalized maximum likelihood method of estimation.

b) Describe model checking for accelerate life model.

c) Write a note on the Weibull regression model for survival data. (3+5+5)