



QP CODE: 25024580



25024580

Reg No : .....

Name : .....

**M.Sc DEGREE (CSS) EXAMINATION, APRIL 2025**

**Fourth Semester**

M Sc BIostatistics

**CORE - ST020402 - SURVIVAL ANALYSIS AND LIFETIME MODELING**

2019 ADMISSION ONWARDS

5EE1A0D9

Time: 3 Hours

Weightage: 30

**Part A (Short Answer Questions)**

*Answer any **eight** questions.*

*Weight 1 each.*

1. What is meant by survival time?
2. Explain the difference between a censored observation versus an observation in which an actual event time is observed. For a single subject, how will his/her censoring time compare to his/her actual, unobserved event time?
3. Define Peto's method for the estimation of standard error in the case of  $S(t)$ .
4. Define Peto and Peto's Generalized Wilcoxon test.
5. What is the application of Mantel Haenzel test in survival analysis?
6. Define likelihood ratio test.
7. Write a note on AFT.
8. Write a note on Wald test.
9. Define Peto- Prentice test.
10. How to identify significant covariates?

(8×1=8 weightage)

**Part B (Short Essay/Problems)**

*Answer any **six** questions.*

*Weight 2 each.*

11. Explain the actuarial method of estimating survival function.
12. Define hazard rate. Show that hazard rate determines the survival function uniquely.
13. Derive the relationship between hazard ratio, relative risk and odds ratio.





14. Consider the survival times in months of 11 patients following initial pulmonary metastasis from osteogenic sarcoma considered by Burdette and Gehan (1970). The data were 11, 13, 13, 13, 13, 13, 14, 14, 15, 15, and 17. Suppose that the two-parameter exponential distribution is selected. Estimate the guarantee time and hazard rate. Also find the probability of surviving 18 months or longer.
15. Describe Cox Snell Residuals and its applications.
16. How to devise a new prognostic index?
17. What are the different methods to check proportional hazard assumption?
18. Explain the likelihood ratio test for comparing two Gamma survival distributions and explain the test procedure.

(6×2=12 weightage)

### **Part C (Essay Type Questions)**

*Answer any **two** questions.*

*Weight 5 each.*

19. In an experiment comparing two treatments (A and B) for solid tumor, suppose that the question is whether treatment B is better than treatment A. Six mice are assigned to treatment A and six to treatment B. The experiment is terminated after 30 days. The following survival times in days are recorded. Do the data provide sufficient evidence that treatment B is more effective than treatment A?

**Treatment A:** 8, 8, 10, 12, 12, 13

**Treatment B:** 9, 12, 15, 20, 30+, 30+

20. A) Write a note on two parameter exponential distribution. B) How will you estimate the parameters for data with and without censored data in exponential distribution?
21. How to evaluate proportional hazard assumption? Describe in detail.
22. What is accelerated failure time Model? Compare accelerated failure time model with proportional hazard model.

(2×5=10 weightage)

