

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034



M.Sc. DEGREE EXAMINATION – STATISTICS

FOURTH SEMESTER – APRIL 2023

PST 4503 – BIOSTATISTICS AND SURVIVAL ANALYSIS

Date: 05-05-2023

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

SECTION – A

ANSWER ALL THE QUESTIONS

(10 X 2 = 20)

- 1 State any two uses of Biostatistics
- 2 Explain the testing procedure of proportion of one group.
- 3 Mention the test's used for testing equality of variances
- 4 Explain the use of Kappa Statistic.
- 5 Define S(t) with an example.
- 6 Write the Hazard function for a Weibull distribution.
- 7 Give the layout of clinical life table.
- 8 Define Log-rank statistic and state its uses.
- 9 Explain the proportional hazard assumption
- 10 Explain Hazard ratio.

SECTION – B

ANSWER ANY FIVE QUESTIONS

(5X 8 = 40)

- 11 Explain i) Case Control Study with the help of a diagram. (4)
ii) Clinical Trial with Independent concurrent control with a diagram. (4)
- 12 Obtain Kappa Statistic and provide your conclusion on the strength of agreement between the two diagnostic test procedures, using the following data:
Test Procedure A: +, +, +, -, +, -, +, -, +, -, +, +, -, -, -, +, -, +, +, +
Test Procedure B: -, +, +, -, +, +, -, +, -, -, +, +, -, +, -, +, -, +, +, +
- 13 Determine (i) Sensitivity (ii) specificity (iii) False positive rate (iv) False Negative rate to the following test results.

	Positive test result	Negative test result
Disease Present	75	18
Disease Absent	2	5

- 14 Explain Receiver Operating Characteristic Curve
- 15 Suppose the following remission times are observed from 10 patients with solid tumour Six patients relapse at 3, 6.5, 6.5, 10, 12 and 15 months. One patient is lost to follow up at 8.4 months and three patients are still in remission at the end of the study after 4, 5.7 and 10 months. Estimate the survival function using life table analysis.

- 16 Derive $S(t)$ and $h(t)$ for Gamma Distribution.
17 Obtain the AFT model and the corresponding hazard function for the Weibull model.
18 Explain the stratified Cox model with an example

SECTION – C

ANSWER ANY TWO QUESTIONS

(2 X 20= 40)

- 19 i) What is meant by Protocol in Clinical trials? (4)
ii) What are the questions answered by a Clinical trial protocol? (4)
iii) What are the qualities of a Good Protocol? (4)
iv) Discuss Patient selection in a Clinical trial. (4)
v) Discuss the table of contents of a Clinical Trial Protocol. (4)
- 20 Obtain Kaplan-Meier Survival curves based on the data given below and provide your conclusion:
Treatment A: 6, 6, 6, 7, 10, 13, 16, 22, 23, 6+, 9+, 10+, 11+, 17+, 19+, 20+, 25+, 32+, 32+,
34+, 35+
Treatment B: 1, 1, 2, 2, 3, 4, 4, 5, 5, 8, 8, 8, 8, 11, 11, 12, 12, 15, 17, 22, 23
- 21 a) If the survival time follow the Weibull distribution. Find the survival function and draw the curve for $\lambda = 1$ and $r = 2$ and 4. (10)
b) Explain repeated measure ANOVA with an example (10)
- 22 Explain the different techniques used to find whether the given survival data satisfies PH assumption for a Cox model.
