



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – STATISTICS

FOURTH SEMESTER – APRIL 2016

ST 4815 - BIO-STATISTICS

Date: 21-04-2016
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

PART – A

Answer all the questions

(10x2=20 Marks)

1. Define Specificity of a Diagnostic Test
2. Write the survival function of Weibull distribution
3. Define Hazard function
4. Define Kappa statistic
5. Explain the term censored data
6. Explain the proportional hazard assumption
7. Explain how you would choose a better model given two parametric models
8. Define Infant Mortality rate
9. Explain Log-rank statistic
10. Explain double blinded trial

PART – B

Answer any FIVE questions

(5x8=40 Marks)

11. A study was conducted to determine the ability of Ultrasound(US) to diagnose appendicitis and the following table obtained for 283 children

	Appendicitis	
	Present	Absent
US (+ve)	94	9
US(-ve)	15	165

Obtain i)Sensitivity ii)Specificity iii)Positive predictive value iv)Negative predictive value
v) DLR^+ vi) DLR^-

12. Explain McNemar test with an example
13. Explain Accelerated failure time model using Lognormal distribution
14. Explain case-control and Cohort study
15. Explain how you would find whether the given survival data is from a) Lognormal b)Weibull c)Log-logistic d) Exponential
16. Obtain the Kaplan Meier curves for the following data on two treatments
Treatment I: 6, 6, 7, 10, 13, 16, 22, 23, 9+, 10+
Treatment II: 3, 4, 5, 5, 8, 8, 11, 12, 17, 22
17. Explain Cox model with time dependent variable

18. Write the Cox likelihood for the following data

Patient_no	Survival time	Status	Smoke	Drinker	Age
1	15	1	1	1	45
2	20	0	0	1	50
3	25	1	1	0	52
4	30	1	0	1	48
5	35	0	1	0	50

* Status : 1- event , 0- censored , Drinker: 1-drinker, 0 – non-drinker

Smoke: 1 –smoker, 0-non-smoker

PART – C

Answer any TWO questions

(2x20=40 Marks)

19. a) Explain the three phases of a clinical trial.

b) Explain the different types of censoring in detail.

(12 + 8)

20. a) Explain Hazard ratio. Show that hazard need not be constant by an example.

b) Explain the $-\log(-\log S(t))$ plots and Goodness of fit method for PH assumption.

c) Explain the stratified Cox model.

(6+8+6)

21. a) Explain the Lo-logistic parametric model in detail.

b) Obtain the MLE of the parametric model for the exponential distribution using type II censoring data and progressive censoring data.

(10 + 10)

22. a) Explain Mann-Whitney U test in detail. When do we prefer this test to t-test?

b) Explain the method of constructing a clinical life table.

(10+10)
