LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **STATISTICS**

FOURTH SEMESTER – APRIL 2017

ST 4815- BIO-STATISTICS

Date: 25-04-2017 Dept. No. Max. : 100 Marks
09:00-12:00

PART – A

Answer all the questions **10 x 2=20**

1. What is a Censored data?
2. State any two advantages of Clinical trials.
3. Explain Infant Mortality rate.
4. Write the Statistic used for testing equality of two proportions.
5. Write the Hazard function for a Weibull distribution.
6. Explain Hazard ratio.
7. What is the use of Sign test?
8. Write the Likelihood for r complete observations and $(n-r)$ censored observations in a type -II censoring model.
9. Define Kappa Statistic.
10. How do you find whether a given Survival time data follows a Weibull distribution?

Part - B

Answer any 5 questions **5 x 8=40**

11. Explain Mcnemar test
12. Explain Wilcoxon Man Whitney test.
13. Define $h(t), f(t), S(t), H(t)$ and explain how to estimate them.
14. Explain Accelerated failure time model in detail.
15. Explain the Lognormal regression model in detail.
16. Obtain the Kaplan Meier Estimate for $S(t)$ from the following data and compare

Group 1	23	20	18+	20+	22	24+	19	21	18	19+
Group 2	15	18	19	19	20	17	18	20	16	21

17. Explain Log rank test.

18.Explain the following

i. Nelson-Aalen Estimator

ii. Estimating $h_o(t)$ in a Cox model.

PART- C

Answer any 2 questions **2 x 20=40**

19. a) Explain Observational studies in detail. (10 marks)

b) In an Urban Public hospital it is noted that stroke related to recreational drug use was occurring more frequently in young people. The following data is obtained is

	Stroke	No Stroke
Drug Abuse	73	18
No Drug Abuse	141	196

Obtain i) Odds ratio

ii) Experimental event rate.

iii) Control Event rate.

iv) Absolute risk reduction.

v) Relative risk reduction.

vi) Number needed to treat.

vii) Relative risk. (10 marks)

20. a) Explain Log logistic regression model in detail. (10 marks)

b) Obtain the MLE of the parameters in a Weibull distribution assuming the data is Progressively censored. (10 marks)

21. a) Explain Stratified Cox model in detail. (10 marks)

b) Consider the output of a Cox regression model with the variable platelets at diagnosis (normal =1, abnormal=0), Survival time , Age, Sex (Male=1, Female=0) of 65 Myeloma Patients.

Model-1

Variable	Co-efficient	Standard error	P –value
Platelets	0.47	2.854	0.869
Age	0.000	0.037	0.998
Sex	0.183	0.725	0.801
Platelets * Age	-0.008	0.041	0.851
Platelets * Sex	-0.503	0.804	0.532
Log-likelihood = - 153.040			

Model -2

Variable	Co-efficient	Standard error	P-value
Platelets	- 0.725	0.401	0.071
Age	-0.005	0.016	0.740
Sex	-0.221	0.311	0.478
Log-likelihood = - 153.253			

i. For Model 1, give an expression for the effect of platelet variable adjusted for Age and Sex.

ii. Compute the Hazard ratio for platelets for a 40 year old Male, Hazard ratio for a 50 year Female.

iii. Should we include both the interaction terms in the model? Justify.

iv. Which one is a better model?

v. Obtain the Hazard ratio for the variable platelet in both the models keeping the other things fixed. (10 marks)

22. Explain the Clinical trials in detail. (20 marks)

$$$$$$$$