



# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

## M.Sc. DEGREE EXAMINATION – STATISTICS

FOURTH SEMESTER – NOVEMBER 2016

### ST 4815 - BIO-STATISTICS

Date: 12-11-2016  
Time: 01:00-04:00

Dept. No.

Max. : 100 Marks

#### Part-A

Answer **ALL** the questions:

(10 x 2 = 20)

1. What is Epidemiology?
2. What is the use of randomization in Clinical trials?
3. Define Morbidity rate.
4. Write the Cox – proportional Hazard model.
5. Write the hazard function for a Weibull distribution
6. Define Odds ratio.
7. What is a Censored Observation?
8. What is the use of Log rank test?
9. What is the use of Kaplan-Meier Curve?
10. What is a concurrent control in conducting an Experimental study?

#### Part- B

Answer any **FIVE** questions:

( 5 X 8 = 40)

11. Consider the following data on heart patients.

	Myocardial infarction	No Myocardial infarction	Total
Aspirin	139	10898	11037
Placebo	239	10795	11034

Obtain i) Experimental event rate, ii) Control event rate, iii) Absolute risk reduction and iv) Relative risk reduction.

12. Explain the terms i) Cause Specific Mortality rate, ii) Prevalence, iii) Case fatality rate and iv) Infant Mortality rate.
13. Explain i) Survival function , ii) Probability density function, iii) Hazard function, and iv) Cumulative Hazard function.
14. A new diagnostic procedure is used to diagnose a disease. The following data is obtained on 140 patients.

Test	Disease			Total
		Positive	Negative	
positive	50	10	60	
Negative	20	60	80	
Total	70	70	140	

- Obtain i) Sensitivity  
ii) Specificity  
iii) Predictive value of the positive test  
iv) Likelihood ratio for a positive test

15. Find the Kaplan-Meier Curve for the following data of remission durations

3	6.5	6.5	10	12	15	8.4+	4+	5.7+	10+
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16. Obtain the MLE of the parameters in the case of Weibull distribution without censoring.

17. Explain the Lavene's test for testing equality of variances.

18. Explain Wilcoxon – Mann Whitney test.

**Part-C**

Answer any **TWO** questions:

**( 2 X 20 = 40)**

19. a) Explain the Observational Studies in detail

b) Explain the different types of censoring in detail.

**( 10+10)**

20. Explain the three phases of Clinical trials and the steps in planning them.

**(20)**

21. a) Explain the methods used to check the PH assumption in the Cox-model.

b) Explain the Cox- likelihood and estimation of parameters in detail.

**(14+6)**

22. a) Explain Mcnemar test and Kappa Statistics

b) Obtain the Hazard function, Survival function of the log-logistic model and hence

obtain the regression model for the survival time.

**(10+10)**

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