

**PAPER NO-18: BIO-STATISTICS**

1. Survival Analysis
  - 1.1 Functions of Survival times
  - 1.2 Survival Distributions and their Applications-exponential, gamma, Weibull, Rayleigh, lognormal, death density function for a distribution having bath-tub shaped hazard function.
2. Censoring Schemes:
  - 2.1 Type I, Type II and Progressive or Random censoring with biological examples.
  - 2.2 Estimation of mean survival time and variance of the estimator for Type I and Type II censored data with numerical examples
3. Non-parametric methods- Actuarial and Kaplan-Meier methods for estimating survival function and variance of the Estimator.
4. Cox Proportional-hazard model: concept, definition, properties and proportionality assumption with graphical explanation
5. Competing Risk Theory
  - 5.1 Indices for measurement of probability of death under competing risks and their inter-relations
  - 5.2 Estimation of probabilities of death using maximum likelihood principle and modified minimum Chi-square methods
6. Stochastic Simple Epidemic Models and duration of an epidemic
7. Statistical Genetics
  - 7.1 Introduction, concepts: Genotype, Phenotype, Dominance, Recessiveness, Linkage and Recombination, Coupling and Repulsion
  - 7.2 Mendelian laws of Heredity, Random mating, Gametic Array
  - 7.3 Relation between genotypic array and gametic array under random mating
  - 7.4 Distribution of genotypes under random mating
8. Clinical Trials
  - 8.1 Planning and design of clinical trials, Phase I, II and III trials
  - 8.2 Single Blinding

**WEEK-WISE DETAILS**

**Week 1-2: Survival Analysis**

- Lee, E.T. and Wang, J.W. (2003): *Statistical Methods for Survival data Analysis*, 3<sup>rd</sup> Edition, John Wiley and Sons. pp 1-18 (with Ex 2.1, 2.2, Ex 2.1, 2.2, 2.4, 2.5), 134-136,138-141,143-146,150-152, 157-160, Ex 7.2(pg 167), Ex 7.3(pg 169), Ex 7.4(pg 172), Ex 7.8(pg 177), Ex 7.15(pg 177), Ex 8.9(pg 214), Exercise 8.5(pg 220)

**Week 3-4: Censoring Schemes**

- Biswas, S. (2007): *Applied Stochastic Processes: A Biostatistical and Population Oriented Approach*, Reprinted 2<sup>nd</sup> Central Edition, New Central Book Agency. pp. 362-370, 372

**Week 4-5: Non parametric Methods**

- Lee, E.T. and Wang, J.W. (2003): *Statistical Methods for Survival data Analysis*, 3<sup>rd</sup> Edition, John Wiley and Sons. pp 64-70, 87-91, Ex 4.2 (pg 69).

**Week 5-6: Cox model**

- Kleinbaum, D.G. (1996): *Survival Analysis*, Springer. pp. 94-99, 108, 112 (Exercise 1(a), (b), (e) pp. 115)

### **Week 6-7: Competing Risk Theory**

- Biswas, S. (2007): *Applied Stochastic Processes: A Biostatistical and Population Oriented Approach*, Reprinted 2<sup>nd</sup> Central Edition, New Central Book Agency. pp. 333-347
- Chiang, C.L. (1968): *Introduction to Stochastic Processes in Bio Statistics*, John Wiley and Sons. pp. 242-262

### **Week 7-8: Stochastic Epidemic Models**

- Biswas, S. (2007): *Applied Stochastic Processes: A Biostatistical and Population Oriented Approach*, Reprinted 2<sup>nd</sup> Central Edition, New Central Book Agency. pp. 144-151

### **Week 9-10: Statistical Genetics**

- Biswas, S. (2007): *Applied Stochastic Processes: A Biostatistical and Population Oriented Approach*, Reprinted 2<sup>nd</sup> Central Edition, New Central Book Agency. pp. 389-393

### **Week 11-12: Clinical Trials**

- Indrayan, A. (2008): *Medical Biostatistics*, 2<sup>nd</sup> Edition Chapman and Hall/CRC. pp 125-127

## **Practical/ Lab work**

### **LIST OF PRACTICALS**

1. To estimate survival function
2. To determine death density function and hazard function
3. To identify type of censoring and to estimate survival time for type I censored data
4. To identify type of censoring and to estimate survival time for type II censored data
5. To identify type of censoring and to estimate survival time for progressively type I censored data
6. Estimation of mean survival time and variance of the estimator for type I censored data
7. Estimation of mean survival time and variance of the estimator for type II censored data
8. Estimation of mean survival time and variance of the estimator for progressively type I censored data
9. To estimate the survival function and variance of the estimator using Non-parametric methods with Actuarial methods
10. To estimate the survival function and variance of the estimator using Non-parametric methods with Kaplan-Meier method
11. To estimate Crude probability of death
12. To estimate Net-type I probability of death
13. To estimate Net-type II probability of death
14. To estimate partially crude probability of death
15. To estimate gene frequencies