ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27

M.Sc. STATISTICS - IV SEMESTER

SEMESTER EXAMINATION - JULY 2022

ST0320 – BIOSTATISTICS

Time: 2½ Hours   **Max Marks: 70**

This question paper has **TWO** printed pages and **TWO** sections

SECTION – A

I   Answer any SIX of the following: 3 x 6 = 18

1. Define hazard function and Survival function.
2. Distinguish between type I censoring and type II censoring.
3. Describe the construction of a likelihood function for the right censoring samples from a continuous distribution.
4. Write a note on accelerated failure time model.
5. Define Odd's ratio. Give its confidence interval.
6. Explain competing risk analysis.
7. State three laws of Mendel on inheritance
8. What is allele frequency?

SECTION B

II   Answer any FOUR of the following: 13 x 4 = 52

9. a) Check whether Gamma distribution is increasing failure rate or decreasing failure rate distribution?

   b) Briefly outline
      i)   likelihood ratio test
      ii) Wald's test
      iii) Rao's score test. Discuss the difference in these tests.   (5+8)

10. a) Explain type II censoring with an example. Derive maximum likelihood estimator of the survivor function of the exponential distribution with mean θ under type II censoring. Also find 100(1-α)% confidence interval for θ.
    b) Describe random censoring with an example.   (8+5)

11. a) Write a brief note on types of clinical study.
    b) Explain general epidemic process.   (8+5)

12. (a) Define Cox proportional hazards (PH) model stating the assumptions. Explain the method of partial likelihood for the estimation of regression parameter. State important properties of the estimator.
    b) Describe any two phases of Clinical trials.   (9+4)

13. a) Describe Competing Risk model. Distinguish between independent and dependent risk.
b) For the log linear model in the exponential regression, derive modified minimum χ^2 method for the estimation of the regression parameters. (6+7)

14. a) Write a brief note on Hardy Weinberg principle on equilibrium
b) Explain the method adopted for detection and of estimation linkage in heredity. (6+7)