D4AST2103(S1) **(2 Pages)** **Name.....**
Reg.No.....

FOURTH SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2024
(Improvement/Supplementary- 2021 admission)

STATISTICS
FMST4E06 - BIOSTATISTICS

Time: 3 Hours **Maximum Weightage: 30**

Part A: Answer any *four* questions. Each carries *two* weightage.

1. Write down the density function and distribution function of a population with constant hazard function h(t) = 1/15 for every t > 0.
2. Define log-normal distribution and derive its mean survival time.
3. Distinguish between type-I and type-II censored data.
4. Define the terms sensitivity and specificity.
5. Describe the concept of mutation.
6. Explain the ethics behind randomized studies involving human subjects.
7. Elaborate on Hardy-Weinberg equilibrium.

(4 × 2 = 8 weightage)

Part B: Answer any *four* questions. Each carries *three* weightage.

8. Define a Weibull distribution and derive its survival function and hazard function. Also derive the median survival.
9. Explain Cox proportional hazard model and Cox's F-test.
10. Describe the major assumptions required for a logistic regression model.
11. Explain the ML method of estimation of probability of death under competing risks.
12. Write short notes on genetic drift and natural selection.
13. Explain various randomization techniques.
14. What are the advantages of generalized linear models over traditional ordinary linear regression?

(4 × 3 = 12 weightage)

Part C: Answer any *two* questions. Each carries *five* weightage.

15. (a) Explain any two parametric methods to compare two survival functions.

    (b) Derive the survival function and hazard function of log-normal and Gamma distributions and give a brief discussion on the nature of these hazard functions.

(P.T.O.)

16. (a) Explain Kaplan-Meier method of estimating survival function.

(b) Obtain Kaplan-Meier estimate of the survival function based on the following data.

51, 56+, 58, 57, 59+, 51, 57+, 54, 58, 60+, 54, 59, 52, 60.

17. (a) What is a Deviance and what is its importance in logistic regression estimation?

(b) How will you test the significance of the logistic regression coefficients?

18. (a) Explain permutation test.

(b) Write short notes on Mendel's law and randomized clinical trials.

(2 × 5 = 10 weightage)