



Seat No. \_\_\_\_\_

**HAJ-MS-301**  
**M. Sc. (Sem.-III) (CBCS) Examination**  
**May - 2023**  
**MS-301 : Statistics**  
*(Survival Analysis & Clinical Trials)*

Time :  $2\frac{1}{2}$  Hours / Total Marks : 70

**Instructions :** (1) Attempt all questions.  
(2) Each question carries equal marks.

- 1** Answer the following questions: (any **seven**) **14**
- (1) Define censoring.
  - (2) Define constant failure rate.
  - (3) Type-I censoring also known as \_\_\_\_\_.
  - (4) Write c.d.f. of Pareto distribution.
  - (5) Define clinical trials.
  - (6) What is meant by predicted risk?
  - (7) What is meant by risk ratio?
  - (8) What is meant by odd ratio?
  - (9) What is the role of hazard function in modeling survival data?
  - (10) What are the goals of survival analysis?
- 2** Answer the following questions: (any **two**) **14**
- (1) Explain Type-II censoring with example.
  - (2) Explain Type-I censoring with example.
  - (3) Explain following terms of clinical trials:
    - (i) Plan of study
    - (ii) Study Population.
- 3** Answer the following questions: **14**
- (1) Discuss Clinical Development Plan in clinical trials.
  - (2) Derive Hazard function of Weibull distribution.

**OR**

- 3** Answer the following questions : **14**
- (1) Explain randomized control study and write its advantages.
  - (2) Explain Phase-I of clinical trial study.
- 4** Answer the following questions: (any **two**) **14**
- (1) Explain Culter-Ederer method of estimate for survival data.
  - (2) Find the hazard rate function of Gamma distribution.
  - (3) Derive analysis of Cross-Over design.
- 5** Answer the following questions: (any **two**) **14**
- (1) Explain Phase-II of clinical trial study.
  - (2) Suppose 20 participants are follow the period of 1 year, and to the nearest 10<sup>th</sup> of a month death were observed at the following time.  
Time : 0.5, 1.5, 1.5, 3.0, 4.8, 6.2, 10.5 month. In addition, loses to follow-up were recorded at 0.6, 2.0, 3.5, 4.0, 8.5 and 9.0. Find the estimated value by using Kaplan-Meier estimate.
  - (3) Explain Nonparametric Estimation of the Survival Function for uncensored data.
  - (4) Discuss Cox proportional hazard model and their link functions.
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