

**M. SC. (APPLIED STATISTICS)
(MSCAST)**

Term-End Examination

June, 2025

**MST-025 : CATEGORICAL AND SURVIVAL
ANALYSIS**

Time : 2 Hours

Maximum Marks : 25

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **two** questions out of the remaining question nos. 2 to 4.*

(iii) *Use of scientific calculator (non-programmable) is allowed.*

(iv) *Symbols have their usual meanings.*

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1. Answer the following : 2+2+1
- (a) What are the assumptions of Chi-square test for proportions ?
- (b) How does the log-rank test compare two survival curves ?

- (c) What are the differences between sensitivity and specificity ? 5
2. (a) The following table represents the data of a case-control study related to lung disease and chemical exposure conducted on 150 pairs of workers in case of matched pairs design : 5

		No Disease	
		Exposed	Unexposed
Disease	Exposed	23	35
	Unexposed	27	65

Compute the odds ratio and test its significance at 5% level of significance.
[Given that : $Z_{0.025} = 1.96$]

- (b) Write a short note on the Receiver Operating Characteristic (ROC) curve. 5
3. (a) If the survival time t (in years) has the following density function : 6

$$f(t) = \begin{cases} \theta e^{-\theta t} & ; \quad \theta > 0, t \geq 0 \\ 0 & ; \quad \text{Otherwise} \end{cases}$$

Compute :

- (i) Survival function
- (ii) Cumulative distribution function
- (iii) Hazard function
- (iv) Median when $\theta = 0.2$.

[3]

(b) Explain the competing risk with example. 4

4. (a) The following table shows the data related to hypertension in 75 patients in two different groups :

Hypertension	Group	
Yes	6	16
No	31	22

Apply an appropriate test to compare the proportions of hypertension in both groups at 5% level of significance (Given that : $\chi^2_{1,0.05} = 3.84$). 6

- (b) Differentiate between left and right censoring in survival analysis. 4

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