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MST–025

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.

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 $\theta = 0.2$.

(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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