No. of Printed Pages : 3 **MSTL-013(Set-I)**

M. SC. (APPLIED STATISTICS)

(MSCAST)

Term-End Practical Examination

June, 2026

MSTL-013(Set-I) : STATISTICAL COMPUTING USING R–III

Time : $2\frac{1}{2}$ Hours *Maximum Marks : 50*

Note : *(i) Attempt any **two** questions.*

(ii) Solve the questions using R-software and create a script file.

(iii) Mention necessary steps, hypothesis, interpretation, etc.

(iv) Symbols have their usual meanings.

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1. (a) Compute the spectral decomposition for the given matrix : 10

$$A = \begin{bmatrix} 4 & 1 & 1 \\ 1 & 3 & 0 \\ 1 & 0 & 2 \end{bmatrix}$$

(b) The breaking strength (in pounds) of a random sample of 10 ropes made by a manufacturer is given by 163, 165, 165, 160, 171, 158, 151, 162, 169, 172. Use the sign test, to test the manufacturer's claim that the average breaking strength of a rope is greater than 160 pounds at 5% level of significance. 15

2. Analyse a BIBD with the following data : 25

$v = 4$, $b = 4$, $r = 3$, $k = 3$, $\lambda = 2$

Block	**Treatment 1**	**Treatment 2**	**Treatment 3**
1	A(9)	B(7)	C(8)
2	A(10)	C(9)	D(7)
3	B(6)	D(8)	A(9)
4	B(8)	C(7)	D(6)

3. (a) A machine produces a number of defective items per day. To check whether the no. of defective items follow binomial distribution, a sample of items produced per day over a period of

40 days is taken and found the following results : 10

Number of defective items	Frequency
0	23
1	95
2	164
3	92
4	26
Total	400

Write R-code to examine the same using the K-S test at 5% level of significance.

(b) Generate a random sample of 100 from $p(x) \sim N(\mu = 0, \sigma = 1)$, using a Laplace proposal distribution $q(x) \sim$ Laplace (0, 1), using acceptance rejection method. 15

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