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MMT–008(P)(Set-II)

M. SC. IN MATHEMATICS WITH APPLICATIONS IN COMPUTER SCIENCE (MSCMACS)

Term-End Practical Examination

June, 2026

MMT–008(P)(Set-II) : PROBABILITY AND STATISTICS PRACTICAL

Time : $1\frac{1}{2}$ Hours *Maximum Marks : 40*

Note : *(i) There are two questions in this paper worth 30 marks.*

(ii) Answer both of them.

(iii) Remaining 10 marks are for viva-voce.

(iv) Symbols used have their usual meaning.

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1. Let $X \sim N_4(\mu, \Sigma)$, where :

$$\mu = \begin{bmatrix} 2 \\ 4 \\ 1 \\ -3 \end{bmatrix} \text{ and } \Sigma = \begin{bmatrix} 8 & 0 & 4 & 0 \\ 0 & 4 & 0 & 2 \\ 4 & 0 & 3 & 1 \\ 0 & 2 & 1 & 9 \end{bmatrix}$$

Write a program in 'C' language to find : 15

(i) Marginal distribution of $\begin{bmatrix} x_1 \\ x_3 \end{bmatrix}$.

(ii) Conditional distribution of $\begin{bmatrix} x_1 \\ x_4 \end{bmatrix}$ given $\begin{bmatrix} x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1.5 \\ -1.5 \end{bmatrix}$.

(iii) Correlation coefficient between x_1 and x_3.

2. Write a program in 'C' language to compute the Hotelling's T^2, for $n \leq 10$. Extend the

program to compute Hotelling's T^2 for the given data :

H_0 : $\mu' = [7, 10]$ and the data matrix

$$X = \begin{bmatrix} 1 & 10 \\ 7 & 8 \\ 5 & 8 \\ 6 & 8 \end{bmatrix}.$$ 15

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