National University of Computer and Emerging Sciences, Lahore Campus

Course:	Linear Algebra	Course Code:	MT1004
Program:	BS (SE)	Semester:	Spring 2024
Duration:	60 Minutes	Total Marks:	40
Paper Date:	29-02-2024	Weight	15%
Section:	ALL	Page(s):	1
Exam:	Sessional-1	Roll No:	

Instruction/Notes:
1. Programmable calculators are not allowed.
2. Do all the questions in the given order as mentioned in the paper.
3. Do not ask any questions regarding contents. If you feel any essential information missing make your own assumption.

Question # 1 (CLO-1) [10] The given matrix represents an augmented matrix for a linear system.

$$\begin{bmatrix} 1 & 3 & 0 & 2 \\ -2 & -4 & 7 & 4 \\ 3 & 5 & 2 & 1 \\ 1 & -1 & 2 & -3 \end{bmatrix}$$

a. Write the corresponding set of linear equations for the system.
b. Use Gaussian elimination to solve the linear system.

Question # 2 (CLO-1) [10] Given the matrix $\begin{bmatrix} -1 & 1 & 2 \\ 3 & 0 & -5 \\ 1 & 7 & 2 \end{bmatrix}$

a. Find the minor M_{21} and cofactor C_{21}.
b. Evaluate the determinant by cofactor expansion.

Question # 3 (CLO-1) [10]

a. Find an equation of plane passing through a point $P(1, 1, 4)$ having normal vector $\vec{n} = (1, 9, 8)$.
b. Also find the distance between the point Q(-1, -1, 2) and the plane . Using the equation of the plane in part (a).

Question # 4 (CLO-1) [10] Find the vector component of $\vec{u}$ along $\vec{a}$ and the vector component of $\vec{u}$ orthogonal to $\vec{a}$ given that $\vec{u} = (2, 1, 1, 2)$ & $\vec{a} = (4, -4, 2, -2)$.