National University of Computer and Emerging Sciences, Lahore Campus
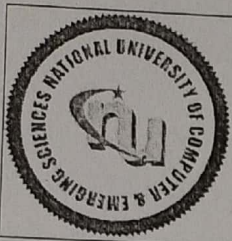
Course:	Linear Algebra	Course Code:	MT1004
Program:	BS (CS, DS, SE)	Semester:	Fall 2021
Duration:	60 Minutes	Total Marks:	30
Paper Date:	01-Dec-21	Weight	12.5%
Section:	ALL	Page(s):	1
Exam:	Midterm-II	Roll No:	

Instruction/Notes: Programmable calculators are not allowed.

Question # 1(a) [5]: Evaluate the determinant of the following matrix by reducing the matrix to row echelon form

$$\begin{bmatrix} 3 & -6 & 9 \\ -2 & 7 & -2 \\ 0 & 1 & 5 \end{bmatrix}$$

Question # 1(b) [5]: Determine whether the given planes are parallel, if so, then find the distance between them $8x - 4z + 5 = 2y$ and $x = (½) z + (¼) y$.

Question # 2(a) [5]: Show that the set of vectors $\{(2,-3, 1), (4, 1, 1), (0,-7, 1)\}$ is a basis for R^3.

Question # 2(b) [5]: Find the general solution to the linear system

$$x_1 + 5x_2 + x_3 + 2x_4 - x_5 = 0$$
$$x_1 - 2x_2 - x_3 + 3x_4 + 2x_5 = 0$$

1. Confirm that the row vectors of the coefficient matrix are orthogonal to the solution vectors.
2. Find the dimension and basis for the solution space.
3. Find the basis for the Row and Column spaces.
4. Determine Rank and Nulity.

Question # 3 [10]: Let $B = \{u_1, u_2\}$ and $B' = \{v_1, v_2\}$ are the bases for R^2 in which $u_1 = (1,2)$, $u_2 = (2,3)$, $v_1 = (1,3)$ and $v_2 = (1,4)$. Find the transition matrices $P_{B \to B'}$ and $P_{B' \to B}$