National University of Computer and Emerging Sciences

Linear Algebra MT1004

Date: March 20th 2024

Course Instructor(s)

Mr. Muhammad Jamil

Sessional-I Exam

Total Time: 1 Hours
Total Marks: 30
Total Questions: **02**

Semester: SP-2024
Campus: Karachi
Dept: Computer Science

Student Name	Roll No	Section	Student Signature

CLO1 #: Interpreting and finding the solutions of linear equations in detail. [20]

Q1(a) Let

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

Find

(a) M_{32} and C_{32}. (b) M_{44} and C_{44}.

(c) M_{41} and C_{41}. (d) M_{24} and C_{24}.

Q1(b) Find the value of "k" for which the matrix A is invertible $A = \begin{bmatrix} 1 & 2 & 4 \\ 3 & 1 & 6 \\ k & 3 & 2 \end{bmatrix}$

Q1(c) Let : $\begin{pmatrix} 3 & -7 & 2 \\ 1 & 1 & -5 \\ -1 & 2 & -3 \end{pmatrix}\begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix} = \begin{pmatrix} 1 \\ 15 \\ 4 \end{pmatrix}$ Solve the system $Ax = b$ using Gaussian method .

Q1(d) Express the vector $(6,11,6)$ as a linear combination of $u = (2,1,4), v = (1,-1,3), w = (3,2,5)$

CLO2 #: Applying the basic linear algebra concepts in computer science [10]

Q2(a) Find the cubic polynomial whose graph passes through the following points (Use calculator for the solution of systems)

$(-1,-1), (0,1), (1,3), (4,-1)$

Q2(b) Write a balanced equation for the given chemical reaction. (Use calculator for the solution)

$CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$