Department Of Computer Science
Integrated M.Sc. (Computer Science)
Mathematics: Linear Algebra
Assignment-1

Last Date of submission: 2^{nd} **May,2022** **Date:26/4/2020**

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1) Find $2A + 5B$; whare $A = \begin{bmatrix} 1 & -2 & 6 \\ 5 & 8 & 7 \\ 2 & -3 & 0 \end{bmatrix}, B = \begin{bmatrix} 3 & -1 & 2 \\ 4 & 2 & 5 \\ 0 & 7 & 4 \end{bmatrix}$.

2) Define: Diagonal Matrix, Orthogonal Matrix, Transpose of Matrix, Upper Triangular Matrix.

3) Define symmetric matrix and skew-symmetric matrix. Prove that any square matrix can be uniquely expressed as the sum of a symmetric and a skew-symmetric matrices.

4) If $X + \begin{bmatrix} 4 & 6 \\ -3 & 8 \end{bmatrix} = \begin{bmatrix} 3 & -6 \\ 5 & -7 \end{bmatrix}$ then find the matrix X.

5) If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 8 \\ 6 & 2 \end{bmatrix}$ then find AB.

6) Show that the matrix $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ satisfies the equation $A^3 - 4A^2 + A = 0$.

7) Verify that $(AB)' = B'A'$; whare $A = \begin{bmatrix} 0 & -1 & 5 \\ 6 & 3 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 \\ 1 & 0 \\ 7 & -6 \end{bmatrix}$.

8) Find all the minors of the elements in the matrix $\begin{bmatrix} 1 & 6 & 4 \\ 0 & 2 & 3 \\ 0 & 1 & 2 \end{bmatrix}$.

9) Find $|A|$ if $A = \begin{bmatrix} \sin x & -\cos x \\ \cos x & \sin x \end{bmatrix}$.

10) Find $\begin{vmatrix} 4 & 3 & 1 \\ 8 & 9 & -1 \\ 0 & 5 & 8 \end{vmatrix}$.

11) Find adjoint of the matrix $\begin{bmatrix} -1 & 0 & -1 \\ 3 & 4 & 5 \\ 0 & -6 & -7 \end{bmatrix}$.

12) Find the inverse (if it exists) of the matrix $\begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$.

13) If$A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 9 & 3 \\ 1 & 4 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 & 0 \\ 2 & 3 & -1 \\ 1 & -1 & 3 \end{bmatrix}$ then verify that $(AB)^{-1} = B^{-1}A^{-1}$.

14) If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ then show that $A^2 - 4A + 3I = 0$ and hence find A^{-1}.

15) Find Row-Rank of a matrix $A = \begin{bmatrix} 1 & 5 & 9 \\ 4 & 8 & 12 \\ 7 & 11 & 15 \end{bmatrix}$.