University of Sargodha

BS 4th Term Examination 2016

Subject: Computer Science **Paper: Linear Algebra (Math: 3215)**

Time Allowed: 2:30 Hours **Maximum Marks: 80**

Note: **Objective part is compulsory. Attempt any four questions from subjective part.**

Objective Part (Compulsory)

Q.1. Write short answers of the following in 2-3 lines each. (2*16)

i. Check whether A is singular or not? $A = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

ii. Find the angle between u and v, $u = (1,-5,1)$; $v = (0,0,-1)$.

iii. What is characteristic equation?

iv. Define Eigen Vector

v. What are different types of distributions?

vi. If $A = \begin{bmatrix} 2 & 3a & 0 \\ 3a & 1 & b \\ 0 & b & 0 \end{bmatrix}$, find C_{21}

vii. Define similar matrices.

viii. What are dependent vectors, give example.

ix. What is meant by reduced echelon form of matrix?

x. Give example of augmented matrix.

xi. What are similar matrices?

xii. Prove $(AB)^T = B^T A^T$

xiii. If $u = (5, -1, 2)$, find norm of u.

xiv. Let A be the matrix $\begin{bmatrix} 2 & 0 \\ 4 & 1 \end{bmatrix}$ find P(A) where $P(x) = x^3 - 2x + 4$.

xv. Is given matrix symmetric? $\begin{bmatrix} 2 & 3a & 0 \\ 3a & 1 & b \\ 0 & b & 0 \end{bmatrix}$

xvi. Find λ for the matrix $A = \begin{bmatrix} \lambda - 4 & 4 & 0 \\ -1 & \lambda & 0 \\ 0 & 0 & \lambda - 5 \end{bmatrix}$ with $|A| = 0$

Subjective Part (4*12)

Q.2. Solve the linear system of equation by Gaussian elimination.

$x_1 + 2x_2 - 3x_3 = 6$

$2x_1 - x_2 + 4x_3 = 1$

$x_1 - x_2 + x_3 = 3$

Q.3. Find basis for the eigen space $A = \begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$

Q.4. Find all the minors and cofactors of given matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 3 & 3 & 6 \\ 0 & 1 & 4 \end{bmatrix}$

Q.5. Express (6,11,6) as linear combination of $u = (2,1,4)$, $v = (1,-1,3)$ and $w = (3,2,5)$.

Q.6. Find characteristic equation and eigen values of $A = \begin{bmatrix} -2 & 0 & 1 \\ -6 & -2 & 0 \\ 19 & 5 & -4 \end{bmatrix}$

Q.7. Find LU- decomposition of $A = \begin{bmatrix} 4 & 4 & 0 \\ 8 & 6 & 2 \\ -4 & -10 & 8 \end{bmatrix}$