# University of Sargodha

## BS 3$^{rd}$ Term Examination 2016

### Subject: I. T    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.    Find P(A) for P(x) = x$^2$-2x-3 and A= $\begin{bmatrix} -1 & 2 \\ 0 & 3 \end{bmatrix}$

ii.    Find inverse of A = $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

iii.    Explain eigen values.

iv.    What is meant by linearly independent give example.

v.    How L-U factors can be computed for rectangular matrix?

vi.    Find M$_{12}$, M$_{22}$ M$_{32}$ for the matrix A= $\begin{bmatrix} 4 & 4 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 5 \end{bmatrix}$

vii.    Differentiate between singular matrix and non-singular matrix.

viii.    Define Hermitian matrix.

ix.    Solve the augmented matrix which is reduced to row echelon form $\begin{bmatrix} 1 & -3 & 4 & 7 \\ 0 & 1 & 2 & 2 \\ 0 & 0 & 1 & 5 \end{bmatrix}$

x.    What is trace of a matrix?

xi.    Find 'a' and 'b' if $\begin{bmatrix} a+3 & 1 \\ -3 & 3b-4 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -3 & 2 \end{bmatrix}$

xii.    A= $\begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$, B= $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$; Find AB & BA.

xiii.    Define Linear Span.

xiv.    What is L-U decomposition?

xv.    Define skew symmetric matrix.

xvi.    Write two application areas of Eigen vectors.

### Subjective Part        (4*12)

Q.2. Verify det(A) = det(A$^T$) ; A= $\begin{bmatrix} 3 & 1 & -2 \\ 1 & 0 & 4 \\ 5 & -3 & 6 \end{bmatrix}$

Q.3. Find A$^{-1}$ ; if A= $\begin{bmatrix} 2 & 1 & 0 \\ 1 & 1 & 0 \\ 2 & -3 & 5 \end{bmatrix}$.

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

Q.5. For what values of 'a' is the vector (a$^2$, a, 1) in span { (1,2,3) , (1,1,1) , (0,1,2).

Q.6. For what values of 'λ' is the set [t +3, 2t + λ$^2$ + 2] linear independent

Q.7. Determine the values of 'a' for which the system has non- solution, exactly one solution and infinitely many solution.