



Visit

<https://tshahab.blogspot.com>

for more.

## University of Sargodha

BS 4<sup>th</sup> Term Examination 2018

**Subject: Computer Science**

**Course: Linear Algebra (Math-3215)**

**Time Allowed: 2:30 Hours**

**Maximum Marks: 80**

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

### Objective Part (Compulsory)

- Q. No. 1.** Write short answers of the following in 2-3 lines each. (2\*16)
- i. Define Eigen values and Eigen vectors? ii. Differentiate between Eigen space and Eigen basis? iii. Define Linear Combination of a Matrix? iv. Define Laplace Expansion? v. Differentiate between Hermitian and unitary Matrices? vi. Define Cofactor Expansion of Matrices? vii. Define Complex vector space? viii. Define Orthogonal Projection? ix. Define Upper and Lower Triangular Matrices? x. Define Linear Equation in x-y Plane? xi. Define the Determinant of the transpose? xii. Define the properties of the Determinant? xiii. Define the Dimensions of vector space and Subspaces? xiv. Find out the Eigen values and Eigen vectors of Hermitian Matrix A given as:

$$A = \begin{bmatrix} 2 & 1+i \\ 1-i & 3 \end{bmatrix}$$

- xv. Define the Column space? xvi. What is the dimension of a vector space?

### Subjective Part (3\*16)

- Q. No. 2:** Find characteristic equation and Eigen values and bases for the Eigen space of the matrix

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

- (b): Find the Cofactor Expansion along the first column and first row?

$$\begin{bmatrix} 3 & 1 & 0 \\ -2 & -4 & 3 \\ 5 & 4 & 2 \end{bmatrix}$$

- Q. No. 3 (a):** Write down the some special types of Matrix?

- (b): Reduce the Matrix to find the rank of the matrix?

$$\begin{bmatrix} 1 & 2 & -1 & 2 & 1 \\ 2 & 4 & 1 & -2 & 3 \\ 3 & 6 & 2 & -6 & 3 \end{bmatrix}$$

- Q. No. 4 (a):** Show that yz- Plane  $w = \{(0, y, z) : y, z \in R\}$  is Spanned by (0,1,1) and (0,2,-1)

- (b): Find the least square solution, the least square vector, and the least square error of the linear system

$$\begin{aligned} x_1 - x_2 &= 4, \\ 3x_1 + 2x_2 &= 1, \\ -2x_1 + 4x_2 &= 3. \end{aligned}$$

- Q. No. 5:** Find the solution of the following system of linear equations by Gauss-Jordan method;

$$\begin{aligned} x_1 + 3x_2 + 2x_5 &= 0, \\ 2x_1 + 6x_2 - 5x_3 - 2x_4 + 4x_5 - 3x_6 &= 1, \\ 5x_3 + 10x_4 + 15x_6 &= 5, \\ 2x_1 + 6x_2 + 8x_4 + 18x_6 &= 6. \end{aligned}$$

- Q. No. 6: a)** If,

$$A = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix},$$

Then evaluate whether A is Elementary Matrix?

b) If

$$A = \begin{bmatrix} 1-\lambda & 1 & 1 \\ 1 & 1-\lambda & 1 \\ 1 & 1 & 1-\lambda \end{bmatrix},$$

Examine whether A is invertible and, if so, determine  $A^{-1}$ .