University of Sargodha

BS 4th Term Examination 2015

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

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

Objective Part Compulsory

Q.No1. Write short answers of the following questions. (16*2=32)

i. Find all values of c_1, c_2 and c_3 ; $c_1(-1,0,2) + c_2(2,2,-2) + c_3(1,-2,1) = (-6,12,4)$

ii. Find $u.v$; $u = (2,1,-2,4)$, $v = (0,-1,-3,1)$

iii. Which of the following are sub-spaces of R^3
All vectors of the form (a,0,0)
All vectors of the form (a,1,0)

iv. Find the standard matrix for the transformation defined by the formula
$T(x_1, x_2, x_3) = (x_1+2x_2+x_3, x_1+5x_2, x_3)$

v. Define Eigen values.

vi. State Cauchy- Schwarz inequality.

vii. Define inner product.

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

ix. What are orthonormal basis, provide example

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

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

xii. Define symmetric matrix

xiii. Define a diagonal matrix with example.

xiv. Check whether A is singular or not? $A = \begin{bmatrix} -1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{bmatrix}$

xv. What is characteristic equation?

xvi. Define similar matrices.

Subjective Part

Attempt any four out of six questions (4*12=48)

Q.2. Do the polynomials $t^3+2t+1, t^2-t+2, t^3+2, -t^3+t^2-5t+2$ span P^3

Q.3. Determine the values of 'a' for which the system has non- solution, exactly one solution and infinitely many solution.

$$x + 2y - 3z = 4$$
$$3x - y + 5z = 2$$
$$4x + y + (a^2-2)z = a+4$$

Q.4. Find Eigen values and Eigen vectors for following matrix;

$$A = \begin{bmatrix} 1 & -2 & 3 \\ 6 & 7 & -1 \\ -3 & 1 & 4 \end{bmatrix}$$

Q.5. Solve the linear system by Gauss-jordan (Row reduced Echelon form) elimination

$$-2x_2 + 3x_3 = 1$$
$$3x_1 + 6x_2 + 3x_3 = -2$$
$$6x_1 - 6x_2 + 3x_3 = 5$$

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

Q.7. Compute adjoint of A and A^{-1}

$$A = \begin{bmatrix} 3 & -2 & 1 \\ 5 & 6 & 2 \\ 1 & 0 & -3 \end{bmatrix}$$