University of Sargodha

BS 3rd Term Examination 2014

Subject: Information Technology **Paper: Linear Algebra (SSC-270)**

Time Allowed: 2:30 Hours   Session: 2012-16   Maximum Marks: 80

Objective Part Compulsory

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

1. $A = \begin{bmatrix} 1 & x & 3 \\ 2 & -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 \\ 4 \\ y \end{bmatrix}$, if $AB = \begin{bmatrix} 12 \\ 6 \end{bmatrix}$, find x and y.

2. Let $w = \begin{bmatrix} \sin\theta \\ \cos\theta \end{bmatrix}$. Compute $w.w$.

3. Give any example of inconsistent system.

4. What is meant by nonsingular matrix?

5. $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, Find Row reduced echelon form.

6. Prove that $\det(A) = \det(A^T)$

7. If $\det(A) = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = 2$ find determinant without computing of $\begin{vmatrix} 2a & 2b \\ 2c & 2d \end{vmatrix}$

8. Inverse of singular matrix is _____

9. Define diagonalization.

10. What is meant by row – equvilant matrix, provide example.

11. If $u.v = 0$ then how u and v are related?

12. Let $L: R^2 \rightarrow R^2$ be a linear transformation $L(i)=(2,3)$ and $L(j)=(-1,2)$;Find $L(-4,3)$.

13. $A = \begin{bmatrix} 4 & 7 \\ 5 & 9 \end{bmatrix}$, Find $A^T + 2I_2 A^T + 6I_2$

14. What is the smallest value of k for which $T(u) = A^k u = u$?

15. What are orhtonrmal basis, provide example

16. $2X^2 + 4y^3 = 5$ Is this equation is linear? justify

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

Q.No. 2 Let $L: R^3 \rightarrow R^3$ be the linear transformation defined by $L(x) = Ax$, where
$A = \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 5 \\ 3 & 2 & 4 \end{bmatrix}$ Is $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ in Range L?

Q.No. 3 Solve the linear system by Guass-Jordan reduction
$$3x + 2y = 5$$
$$2x - y + z = 4$$
$$3x - z = 3$$

Q.No.4. Find A^{-1} through co-factor method

$A = \begin{bmatrix} 3 & 2 & -4 \\ -8 & -11 & 5 \\ 4 & 13 & -7 \end{bmatrix}$

Q.No.5. Find characteristic equation, eigen values and eigen vectors
$A = \begin{bmatrix} 1 & 0 & 0 \\ -1 & 3 & 0 \\ 3 & 2 & -2 \end{bmatrix}$

Q.No.6. For what values of a is the vector $(a^2, a, 1)$ in span $\{(1,2,3), (1,1,1), (0,1,2)\}$?

Q.No.7. Diagonalize $A = \begin{bmatrix} 1 & 1 & -2 \\ 4 & 0 & 4 \\ 1 & -1 & 4 \end{bmatrix}$ if possible.