QUESTION BANK OF ALGEBRA

(B.A-1, B.SC-1)

ASSINGMENT-1

1.Prove that the NASC for a matrix A to be hermitian is that $A^{\theta} = A$

2.Prove that the NASC for a matrix A to be skew hermitian is that $A^{\theta} = -A$

3.Prove that every matrix can be expressed in one and only one way as P + iQ where P and Q are hermitian.

4.Show that every hermitian matrix A can be uniquely expressed as P+iQ where P and Q are real symm. And real skew symm. Also show that $A^{\theta} A$ is real iff PQ = -QP

5.Define unitary matrix , orthogonal matrix

6. Define Rank of a matrix

7. Find the rank of matrix $\begin{bmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{bmatrix}$

8. Define elementary matrix .

9.Express A = $\begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 3 \end{bmatrix}$ as a product of elementary matrices.

10.Find rank of the matrix: $\begin{bmatrix} 0 & 2 & 2 & 1 & -5 \\ 1 & -2 & -3 & -3 & 1 \\ 0 & 1 & 1 & 2 & -6 \\ 3 & -4 & -7 & -8 & -2 \end{bmatrix}$

11. Define normal form of a matrix.

12. Reduce the matrix $\begin{bmatrix} 2 & -1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$ to the normal form.

13.Let A = $\begin{bmatrix} 1 & 2 & -1 & 3 \\ -2 & -4 & 4 & -7 \\ 1 & 2 & 1 & 2 \end{bmatrix}$ find non singular matrices P and Q such that PAQ is in normal form

14. Find the inverse of $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$

15.Define row and column rank of a matrix.

16. Reduce to row echelon form the matrix A = $\begin{bmatrix} 1 & -2 & -1 & 4 \\ 2 & -4 & 3 & 5 \\ -1 & 2 & 6 & -7 \end{bmatrix}$

17.Write the vector V = (3,2,1) as a linear combination of the vectors

$v_1 = (2,-1,0)$, $v_2 = (1,2,1)$, $v_3 = (0,2,-1)$

18. Is the vector V= (2,-5,3) a linear combination of the vectors

$v_1 = (1,-3,2)$, $v_2 = (2,-4,-1)$, $v_3 = (1,-5,7)$?

19. Under what condition on scaler a are the vectors (1-a, 1+a) and (1+a,1-a) L.I.

20. Prove that vectors x = (3,0,-3) ; y = (-1,1,2); z = (4,2,-2); t=(2,1,1) are L.D.