Test (Unit-1)

(Applied Mathematics-III)

Time – 2:30 **MM-50**

Attempt all questions-

1-Attempt any ten parts of the following:

(10x1=10)

(a)Find transpose of matrix A= $\begin{bmatrix}1 & 2 & 3\\4 & 5 & 6\\7 & 8 & 9\end{bmatrix}$

(b) Find A-B if A =$\begin{bmatrix}4 & 2\\3 & 5\end{bmatrix}$, B = $\begin{bmatrix}3 & 7\\2 & 9\end{bmatrix}$

(c) If A = $\begin{bmatrix}1 & 2\\4 & -3\end{bmatrix}$, then find A^2

(d) Differentiate between a matrix and a determinant.

(e) If $\begin{bmatrix}x-1 & 8\\2 & y\end{bmatrix}$ = $\begin{bmatrix}5 & 8\\2 & 0\end{bmatrix}$, then find x and y.

(f) Define diagonal matrix with example.

(g) Find trace of the matrix A = $\begin{bmatrix}4 & -1 & 7\\0 & 3 & 5\\2 & 8 & -6\end{bmatrix}$

(h) If 2,3,4 are eigen values of matrix A, then find eigen values of matrix A^{-1}.

(i) What is Cayley-Hamilton Theorem.

(j) If A is any matrix, write down its characteristic equation.

(k) If A = $\begin{bmatrix}3 & -1\\4 & 6\end{bmatrix}$ find 3A.

2-Answer any five parts of the following:

(5x2=10)

(a) If $\begin{bmatrix}x+3 & 2y+x\\z-1 & 4a-6\end{bmatrix}$ = $\begin{bmatrix}0 & -7\\3 & 2a\end{bmatrix}$ then find the value of x,y,z and a .

(b) Evaluate A^2- 4A -5I, where A = $\begin{bmatrix}1 & 2 & 2\\2 & 1 & 2\\2 & 2 & 1\end{bmatrix}$

(c) If A = $\begin{bmatrix}1 & 0 & -1\\3 & 4 & 5\\0 & -6 & -7\end{bmatrix}$, find adj A.

(d) Find the inverse of the given matrix A = $\begin{bmatrix}\cos\propto & \sin\propto\\-\sin\propto & \cos\propto\end{bmatrix}$

(e) If $\begin{bmatrix} x+y+z \\ x+y \\ y+z \end{bmatrix} = \begin{bmatrix} 9 \\ 5 \\ 7 \end{bmatrix}$, find value of x, y and z.

(f) Prove X = (1,2,3) and Y = (4, -2,7) are linearly independent.

:**3-Answer any two parts of the following:**

(2x5=10)

(a) If A = $\begin{bmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$,then find A^{-1} .

(b) Define the following with example:

(i) Hermitian matrix

(ii) Orthogonal matrix

(iii) Triangular matrix

(c) Find the rank and nullity of the matrix A = $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 5 \\ 3 & 5 & 8 \end{bmatrix}$

4-Answer any two parts of the following:

(2x5=10)

(a) Solve using matrix method:

x + y + z = 6, 2x – y + 2z = 6, x + y - z = 0

(b) Determine a and b such that the system of equations

2x + 3y + 5z = 9, 7x + 3y – 2z = 8, 2x + 3y – az = b

(i) has unique solution (ii) has no solution

(c) Find the following:

(i) Characteristic matrix (ii) Characteristic equation (iii) Characteristic roots (iv) Spectrum

For the matrix A = $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$

5-Answer any two parts of the following:

(2x5=10)

(a) Verify Cayley-Hamilton Theorem for the matrix A = $\begin{bmatrix} 4 & 3 & 1 \\ 2 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$ and find its inverse.

(b) Find the inverse of the following matrix elementary transformation

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

(c) Transform the following matrix into Echelon form and find rank

$$\begin{matrix} 1 & -1 & 2 & -3 \\ 2 & 2 & 1 & 1 \\ 5 & -3 & 2 & 6 \end{matrix}$$