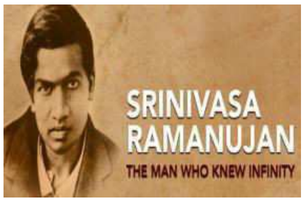
SRM Institute of Science and Technology
Kattankulathur

DEPARTMENT OF MATHEMATICS

18MAB101T Calculus and Linear Algebra

UNIT –I Matrices



Sl.No.	Tutorial Sheet -2	Answers
	Part – A	
1	Using Cayley-Hamilton theorem, find the inverse of $\begin{pmatrix} 2 & 1 \\ 1 & -5 \end{pmatrix}$	$\lambda^2+3\lambda-11=0$ $\frac{1}{11}\begin{pmatrix} 5 & 1 \\ 1 & -2 \end{pmatrix}$
2	Express A^3 in terms of <u>A and I</u> if $A=\begin{pmatrix} 1 & 0 \\ 4 & 5 \end{pmatrix}$	$\lambda^2-6\lambda+5=0$ $A^3= 31A-30I$
3	Using Cayley Hamilton theorem, find A^3 if $A=\begin{pmatrix} 1 & 2 \\ 4 & 3 \end{pmatrix}$	$\begin{pmatrix} 41 & 42 \\ 84 & 83 \end{pmatrix}$
4	Find A^5-25A^2+122A if $A=\begin{pmatrix} 0 & 0 & 2 \\ 2 & 1 & 0 \\ -1 & -1 & 3 \end{pmatrix}$	$\begin{pmatrix} -34 & 0 & -20 \\ -20 & -54 & 0 \\ 10 & 10 & -74 \end{pmatrix}$
5	Find $A^8-5A^7+7A^6-3A^5+A^4-5A^3+8A^2-2A+I$ of $A=\begin{pmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix}$	$\lambda^3-5\lambda^2+7\lambda-3=0$ $\begin{pmatrix} 8 & 5 & 5 \\ 0 & 3 & 0 \\ 5 & 5 & 8 \end{pmatrix}$
	Part – B	
6	Verify Cayley-Hamilton theorem and find A^{-1} and A^4 if $A=\begin{pmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{pmatrix}$	$\lambda^3-11\lambda^2+38\lambda-40=0$ $A^{-1}=\frac{1}{20}\begin{pmatrix} 7 & -2 & -3 \\ 1 & 4 & 1 \\ -2 & 2 & 8 \end{pmatrix}$ $A^4=\begin{pmatrix} 53 & 203 & 37 \\ -369 & 625 & -369 \\ 203 & -203 & 219 \end{pmatrix}$
7	Verify Cayley-Hamilton theorem and find A^{-1} and A^4 if $A=\begin{pmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{pmatrix}$	$\lambda^3-6\lambda^2+9\lambda-4=0$ $A^{-1}=\frac{1}{4}\begin{pmatrix} 3 & 1 & -1 \\ 1 & 3 & 1 \\ -1 & 1 & 3 \end{pmatrix}$ $A^4=\begin{pmatrix} 86 & -85 & 85 \\ -85 & 86 & -85 \\ 85 & -85 & 86 \end{pmatrix}$

8	**Diagonalise the matrix A by orthogonal transformation if A=** $\begin{pmatrix} 2 & 1 & -1 \\ 1 & 1 & -2 \\ -1 & -2 & 1 \end{pmatrix}$	**λ^3-4λ^2-λ+4=0, λ= -1,1,4** $\begin{pmatrix} 0 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 2 \\ -1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ -1 \end{pmatrix}$ **D=N^TAN=** $\begin{pmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 4 \end{pmatrix}$
9	**Diagonalise the matrix A by orthogonal transformation if A=** $\begin{pmatrix} 3 & 1 & 1 \\ 1 & 3 & -1 \\ 1 & -1 & 3 \end{pmatrix}$	**1, 4, 4** $\begin{pmatrix} -1 \\ 1 \\ 1 \end{pmatrix}, \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ -1 \\ 2 \end{pmatrix}$ **D=** $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 4 & 0 \\ 0 & 0 & 4 \end{pmatrix}$