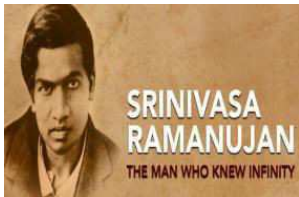
	SRM Institute of Science and Technology Kattankulathur	
	DEPARTMENT OF MATHEMATICS	
	18MAB101T Calculus and Linear Algebra	
	UNIT –I Matrices	
Sl.No.	Tutorial Sheet -3	Answers
Part – A		
1	Write the Quadratic form $Q=x^2-2y^2+3z^2-4xz+5yz+6xz$ as product of matrices. —	$Q=X^TAX$ where $X^T=[x \ y \ z]$ $A=\begin{pmatrix} 1 & -2 & 3 \\ -2 & -2 & \frac{5}{2} \\ 3 & \frac{5}{2} & 3 \end{pmatrix}$
2	Write the Q.F where $A=\begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 9 \\ 3 & 9 & 3 \end{pmatrix}$	$x^2+4y^2+3z^2+4xy+18yz+6xz$
3	Determine the nature of the quadratic form (i) $6x^2+3y^2+14z^2+4yz+18xz+4xy$ (ii) $2xy+2yz-2xz$ without reducing into canonical form.	(i) $D_1=6, D_2=14, D_3= -ve$ Q.F is indefinite. (ii) $D_1=0, D_2=-1, D_3= -2$ Q.F is indefinite.
Part – B		
4	Reduce the quadratic form $Q=3x^2+5y^2+3z^2-2xy-2yz+2xz$ to canonical form and hence find its nature, rank, index and signature. — —	$A=\begin{pmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{pmatrix}$ $\lambda^3-11\lambda^2+36\lambda-36=0$ $\lambda=2,3,6$ $Q=2y_1^2+3y_2^2+6y_3^2$ nature=positive definite index=3 signature=3 rank=3
5	Reduce the quadratic form $Q=x_1^2+2x_2x_3$ to canonical form and hence find its nature, rank, index and signature. — —	$\lambda^3-\lambda^2-\lambda+1=0$ $\lambda=1,1,-1$ $Q=y_1^2+y_2^2-y_3^2$ nature=indefinite index=2 signature=1 rank=3
6	Reduce the quadratic form $Q=x_1^2+2x_2^2+x_3^2-2x_1x_2+2x_2x_3$ to canonical form and hence find its nature, rank, index and signature.	$\lambda^3-4\lambda^2+3\lambda=0$ $\lambda=0,1,3$ $Q=0y_1^2+y_2^2+3y_3^2$ nature=positive semi definite index=2 signature=2 rank=2