	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=** $\begin{pmatrix} 1 & -2 & 3 \\ -2 & -2 & 5/2 \\ 3 & 5/2 & 3 \end{pmatrix}$
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