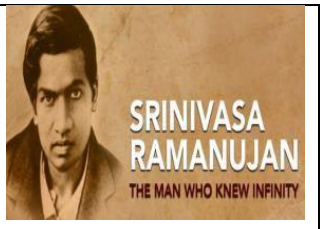
	SRM Institute of Science and Technology **Kattankulathur** **DEPARTMENT OF MEATHEMATICS** **18MAB102T ADVANCED CALCULUS & COMPLEX ANALYSIS** **UNIT –V Taylor's & Laurent' series, Singularity, Poles and Residue** **Tutorial Sheet -2**	

Sl.No.	Questions	Answer
	Part – A	
1	**State Taylor's and Laurent's Theorem.**	
2	**Obtain the Taylor's series of $f(z)=\frac{z-1}{z^2}$ in powers of $z-1$.**	
3	**Find the Laurent's expansion of $f(z)=\frac{1}{z(z-1)}$ in $\|z\|<1$ and $\|z\|>1$.**	$f(z)=\left(-\frac{1}{z}\right)^n-\sum_0^\infty z^n$ for $\|z\|<1$, $f(z)=\left(-\frac{1}{z}\right)+\frac{1}{z}\sum_0^\infty\left(\frac{1}{z}\right)^n$ for $\|z\|>1$.
4	**Find the residue at $z=0$ of** **i. $f(z)=e^{1/z}$** **ii. $f(z)=\sin z/z^4$**	i. 1 ii. $-1/6$
5	**Find the residue of $\frac{e^z}{z^8}$.**	$=\frac{1}{7!}$
	Part – B	
6	**Find the Taylor's expansion of $f(z)=\frac{2z^3+1}{z^2+z}$ about the point $z=i$**	
7	**Expand $f(z)=\frac{1}{(z-1)(z-2)}$ in the region i) $\|z\|<1$, ii) $1<\|z\|<2$ iii) $\|z\|>2$, iv) $0<\|z-1\|<1$**	
8	**Find the residues of $f(z)=\frac{z^3}{(z-1)^2(z-2)(z-3)}$ and its poles**	$\frac{101}{16},-8,\frac{27}{16}$
9	**Find residues of $f(z)=\frac{e^z}{\cos\pi z}$ and hence evaluate $\oint_C f(z)dz$ where C is the unit circle $\|z\|=1$**	
10	**Find the nature and location of the singularities of the functions i) $\frac{z-\sin z}{z^2}$ ii) $(z+1)\sin\frac{1}{z-2}$ iii) $\frac{1}{(\cos z-\sin z)}$**	(i) $z=0$ is a removable singularity. (ii) $z=2$ is an essential singularity. (iii) $z=\pi/4$ is a simple pole

Coordinators: Dr.N.Parvathi