

		SRM Institute of Science and Technology Kattankulathur	
		DEPARTMENT OF MEATHEMATICS	
		18MAB102T ADVANCED CALCULUS & COMPLEX ANALYSIS	
		UNIT - V : Complex Integration Tutorial Sheet 13	
Sl.No.	Questions	Answer	
Part – A			
1	Evaluate $\oint_C \frac{e^{-z}}{z-1} dz$ where C is a circle (i) $ z =2$ (ii) $ z =\frac{1}{4}$.	(i) $2\pi i e^{-1}$ (ii) 0	
2	Evaluate $\oint_C \frac{dz}{z^2-2z}$ where C is a circle $ z-2 =1$.	πi	
3	Evaluate $\oint_C z^2 \cdot e^{\frac{1}{z}} dz$ where C is the circle $ z =1$.	$\frac{\pi i}{3}$	
4	Obtain Taylor's series of $f(z)=\frac{z-1}{z^2}$ in powers of $z-1$.	$\sum_{n=1}^{\infty} (-1)^{n-1} n(z-1)^n$	
5	Obtain Laurent's series of $f(z)=\frac{1}{z(z-1)}$ in $ z <1$ and $ z >1$.	(i) $-\frac{1}{z}-\sum_{n=0}^{\infty} z^n$ (ii) $-\frac{1}{z}+\sum_{n=1}^{\infty} \left(\frac{1}{z}\right)^n$	
Part – B			
6	Evaluate $\oint_C \frac{\cos \pi z^2}{(z-1)(z-2)} dz$ where C is the circle $ z =\frac{3}{2}$.	$2\pi i$	
7	Evaluate $\oint_C \frac{z+4}{z^2+2z+5} dz$ where C is the circle $ z+1+i =2$.	$\frac{\pi}{2}(2i-3)$	
8	Expand $\frac{1}{(z-1)(z-2)}$ in the region $0< z-1 <1$	$-\frac{1}{z-1}-\sum_{n=0}^{\infty} (z-1)^n$	
9	Expand $\frac{7z-2}{(z+1)z(z-2)}$ in the region $1< z+1 <3$	$\frac{-2}{z+1}+\sum_{n=2}^{\infty} \frac{1}{(z+1)^n}-\frac{2}{3}\sum_{n=0}^{\infty} \left(\frac{z+1}{3}\right)^n$	
10	Represent the function $\frac{4z+3}{z(z-3)(z+2)}$ in Laurent's series (i) Within $ z =2$ (ii) in the annular region between $ z =2$ and $ z =3$ and (iii) exterior to $ z =3$.	(i) $\frac{z^{-1}}{2}-\frac{5}{3}\sum_{n=0}^{\infty} \left(\frac{z}{3}\right)^n-\frac{1}{4}\sum_{n=0}^{\infty} (-1)^n \left(\frac{z}{2}\right)^n$ (ii) $\frac{z^{-1}}{2}-\frac{5}{3}\sum_{n=0}^{\infty} \left(\frac{z}{3}\right)^n-\frac{1}{2z}\sum_{n=0}^{\infty} (-1)^n \left(\frac{2}{z}\right)^n$ (iii) $\frac{z^{-1}}{2}-\frac{5}{z}\sum_{n=0}^{\infty} \left(\frac{3}{z}\right)^n-\frac{1}{2z}\sum_{n=0}^{\infty} (-1)^n \left(\frac{2}{z}\right)^n$	