SRM Institute of Science and Technology
Kattankulathur

DEPARTMENT OF MEATHEMATICS

18MAB102T ADVANCED CALCULUS & COMPLEX ANALYSIS

UNIT - V :
Residue and Cauchy's residue theorem
Tutorial Sheet 15

Sl.No.	Questions	Answer
	Part – A	
1	Find the residues of $f(z)=\frac{z}{(z-1)^2}$ at the poles	1
2	Find the residues of $f(z)=\frac{e^z}{z^2+a^2}$ at $z=ai$	$2aie^{ai}$
3	Find the residue of $f(z)=\frac{1-e^z}{z^2}$.	-1
4	Find the residues of $f(z)=\frac{1}{(z^2+1)^2}$.	$-\frac{i}{4},-\frac{i}{4}$
5	Find the residue of $f(z)=\frac{1}{(z^2+a^2)^2}$ at $z=ai$	$-\frac{i}{4a^3}$
	Part – B	
6	Evaluate $\oint_C \frac{z-3}{z^2+2z+5}dz$ where C is the circle $\lvert z+1-i\rvert=2$	$\pi(i-2)$
7	Using Cauchy's residue theorem evaluate $\oint_C \frac{z\sec z}{1-z^2}dz$ where C is the ellipse $4x^2+9y^2=9$	$-2\pi i\sec 1$
8	Show that $\int_0^{2\pi}\frac{d\theta}{1+a\cos\theta}=\frac{2\pi}{\sqrt{1-a^2}},(a^2<1)$.	
9	Evaluate $\int_0^{2\pi}\frac{d\theta}{13+5\sin\theta}$	$\frac{\pi}{6}$
10	Evaluate $\int_0^{2\pi}\frac{d\theta}{1-2a\cos\theta+a^2}$, $a^2<1$	$\frac{2\pi}{1-a^2}$