	SRM Institute of Science and Technology Kattankulathur	
	DEPARTMENT OF MEATHEMATICS	
	18MAB102T ADVANCED CALCULUS & COMPLEX ANALYSIS	
	UNIT –IV ANALYTIC FUNCTIONS	
Sl.No.	**Tutorial Sheet -1**	**Answers**
	Part – A	
1	**Test whether** $f(z) = z^3$ **is analytic.**	**Analytic everywhere**
2	**If** $f(z)$ **and** $f(\bar{z})$ **are analytic function of z, then prove that** $f(z)$ **is constant.**	
3	**Show that the function** $e^x(\cos y + i \sin y)$ **is analytic and find its derivative.**	$f'(z) = e^z$
4	**Prove that if v is harmonic conjugate of u and u is harmonic conjugate of v, then** $f(z)$ **is constant.**	
5	**Show that the function** $u = 2\log(x^2 + y^2)$ **is harmonic.**	
	Part – B	
6	**Show that an analytic function with (i) constant real part is constant (ii) constant modulus is constant.**	
7	**If** $f(z) = u + iv$ **is an analytic function of z, show that** $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \lvert f(z)\rvert^2 = 4\lvert f'(z)\rvert^2$	
8	**If** $f(z) = u + iv$ **is an analytic function of z, show that** $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right) \log\lvert f(z)\rvert = 0$	
9	**Show that the function** $u = e^x \cos y$ **is harmonic and find the harmonic conjugate of u.**	$v = e^x \sin y$