GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Basic Sciences

Bachelor of Science Honours in Mathematics
Mid Term Examination - Nov 2023

Duration : 90 Minutes
Max Marks : 50

Sem III - C1UC302T - Complex analysis

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	Explain whether the function $f(z) = \|z\|^2$ is analytic at z=0 or not.	K2	(2)
2)	Find the Arg $(1+i)$ and arg$(1+i)$.	K1	(3)
3)	Find the value of $\lim_{(x,y)\to(0,0)} \frac{xy}{x+y}$.	K2	(4)
4)	Show that the following function is continuous at origin: $f(z) = \begin{cases} \frac{x^3y^5(x+iy)}{x^4+y^4}, & z \neq 0 \\ 0, & z = 0 \end{cases}$	K2	(6)
5)	Using the concept of analyticity, show that $\sin \bar{z}$ is nowhere analytic.	K3	(6)
6)	Verify the function $u(x,y) = e^x cosy$ is harmonic. Find its conjugate harmonic function and the corresponding analytic function $f(z)$.	K3	(9)
7)	Categorize which of the following functions are harmonic: (i) e^z (ii) $x^2 + iy^2$	K4	(8)
8)	Examine, whether the function $f(z) = z + \bar{z}$ is differentiable or not.	K4	(12)
	OR		
	Examine, whether the function $f(z) = \frac{1}{(z-1^3}$ has isolated singularity or not and find the kind of singularity of the function $f(z) = \frac{e^z}{(z-1)}$.	K4	(12)