Name: SUDHANSHU GUPTA Student University Roll No.:	Printed Pages: 1
School of Engineering **First Sessional Examination, Odd Semester (AS: 2023-24)** **B. Tech: All** **Year: Second** **Semester: III**	
Course Title: Complex Analysis and Integral Transforms **Course Code: BAS3301**	**Max Marks: 30** **Time: 1 *hr***

Instructions if any: Read the question Carefully.

	SECTION 'A'		**Marks**
Q.N.1. Attempt all parts of the following:			
a)	Define analytic function.	CO3	1
b)	Write Cauchy Integral formula.	CO5	1
c)	Evaluate $\int_C \frac{z}{(z-2)(z-3)}dz$ where C is the circle with $\|z\| = \sqrt{2}$	CO5	1
d)	State Liouville's theorem	CO5	1
e)	State Taylors theorem.	CO6	1
	SECTION 'B'		**Marks**
Q.N.2. Attempt any two parts of the following:			
a)	Write necessary and sufficient condition for f(z) to be analytic. Show that the function $e^x(\cos y + i \sin y)$ is analytic function and find its derivative.	CO3	7.5
b)	Prove that an analytic function with constant modulus is constant.	CO3	7.5

c)	Define harmonic function. Show that the Function $u = x^4 - 6x^2y^2 + y^4$ is harmonic.	CO3	7.5
d)	Evaluate $\int_{1-i}^{2+3i} (z^2 + z)dz$ along the line joining the points (1,-1) and (2,3).	CO4	7.5
	SECTION 'C'		**Marks**
Q.N.3. Attempt any one part of the following:			
a)	If $u - v = (x - y)(x^2 + 4xy + y^2)$ and $f(z) = u + iv$ is an analytic function of z, find $f(z)$ in terms of z by Milne Thomson method.	CO3	10
b)	Evaluate $\oint_C \frac{z^2+1}{z^2-1} dz$ where C is circle (i) $\lvert z \rvert = \frac{3}{2}$, (ii) $\lvert z-1 \rvert = 1$, (ii) $\lvert z \rvert = \frac{1}{2}$.	CO5	10
c)	Define Laurent series. Expand $f(z) = \frac{1}{(z+1)(z+3)}$ in Laurent series valid for (i) $1 < \lvert z \rvert < 3$ (ii) $\lvert z \rvert > 3$	CO6	10

Table 1: Mapping between COs and questions

(Number of COs may vary from course to course)

COs	Questions Numbers	Total Marks
CO3	1a, 2a, 2b, 2c, 3a,	33.5
CO4	2d	10
CO5	1b, 1c,1d, 3b	13
CO6	1e, 3c	11