Reg.No: | | | | | | | |

SNS College of Technology, Coimbatore - 35.
(An Autonomous Institution)
Internal Assessment -II
Academic Year 2022-2023(Even)
Second Semester
Department of Mathematics
19MAB102- Integral Calculus & Laplace Transforms

B

Time: 1.30 Hours **Maximum Marks: 50**

PART – A (5 x 2 = 10 MARKS)
ANSWER ALL QUESTIONS

			BLOOMS
1.	State Stoke's theorem.	CO2	(R)
2.	Find $\nabla.\vec{F}$ for the vector point function $\vec{F} = xz^3\vec{i} - 2x^2yz\vec{j} + 2yz^4\vec{k}$ at the point (1,-1,1).	CO2	(U)
3.	Lineate the conditions necessary and sufficient condition for a function to be analytic.	CO3	(R)
4.	Determine whether the function $w = 2xy + i(x^2 + y^2)$ is analytic or not.	CO3	(U)
5.	Obtain the fixed points of the transformation $w = \frac{2z-5}{z+4}$	CO3	(U)

PART –B (2 x 13 = 26 MARKS)
ANSWER ALL QUESTIONS

6.	a)	Verify Stoke's Theorem for the vector $\vec{F} = (x^2 - y^2)\vec{i} + 2xy\vec{j}$ in the rectangular region $x = 0; y = 0; x = a; y = b$	CO2	(App) (13)
		(or)		
	b)(i)	Show that the function $u = x^3 + x^2 - 3xy^2 + 2xy - y^2$ is harmonic and hence find the analytic function.	CO3	(App) (8)
	(ii)	Find the bilinear transformation that maps $0,1,\infty$ onto $i, 1, -i$	CO3	(An) (5)

7.	a)(i)	If f(z) = u + iv is an regular function of z in the domain D, then show that $\left[\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right]\|f(z)\|^2 = 4\|f'(z)\|^2$	CO3	(An) (10)
	(ii)	Interpret the critical points of the transformation $w = z + \frac{1}{z}$	CO3	(An) (3)
		(or)		
	b)(i)	Prove that u = $\frac{1}{2}\log(x^2+y^2)$ is a harmonic function and establish its Harmonic Conjugate.	CO3	(App) (8)
	(ii)	Identify the image of | z – 2i | = 2 under the translation w = $\frac{1}{z}$	CO3	(App) (5)
8.	a)	Verify Gauss divergence theorem for the vector $\vec{F} = (x^2 - yz)\vec{\imath} + (y^2 - zx)\vec{\jmath} + (z^2 - xy)\vec{k}$ over the rectangular parallelepiped $0 \le x \le a; 0 \le y \le b; 0 \le z \le c$.	CO2	(App) (14)
		(or)		
	b)	Discuss in detail about the Applications of flow problems and categorize using analytic functions.	CO3	(App) (14)

R/U: Remember/ Understand **App:** Apply **An**: Analyze **E:** Evaluate **C**: Create

Prepared by **Verified by** **Dean (S & H)**