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

SNS College of Technology,Coimbatore-35.

(An Autonomous Institution)

Internal Assessment -I

Academic Year 2022-2023 (Even)

Second Semester

(Common to All Branches)

Department of Mathematics

19MAB102-Integral Calculus & Laplace Transforms

A

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

		PART – A (5 x 2 = 10 MARKS) ANSWER ALL QUESTIONS	CO	Blooms
1.		Evaluate $\int_1^2 \int_2^3 xy^2\,dx\,dy$	CO1	(Rem)
2.		Evaluate $\int_0^c \int_0^b \int_0^a e^{x+y+z}\,dx\,dy\,dz$	CO1	(Und)
3.		Find a unit normal vector to the surface $x^2+y^2-z=10$ at (1,1,1).	CO2	(Und)
4.		Show that the vector $\vec{F}=3y^4z^2\,\vec{i}+4x^3z^2\,\vec{j}-3x^2y^2\vec{k}$ is solenoidal.	CO2	(App)
5.		State Green's theorem.	CO2	(Rem)
		PART –B (13+13+14 = 40 MARKS) ANSWER ALL QUESTIONS		
6.	a) i)	Evaluate $\int_0^1 \int_x^1 (x^2+y^2)\,dy\,dx.$	CO1	(Und) (6)
	ii)	Find the area included between the curves $y^2=4x$ and $x^2=4y.$	CO1	(App) (7)
		(OR)		
	b)	Change the order of integration and evaluate $\int_0^a \int_{x^2/a}^{2a-x} xy\,dy\,dx$	CO1	(Ana) (13)

7.	a) i)	Prove that $\vec{F} = (6xy + z^3)\vec{i} + (3x^2 - z)\vec{j} + (3xz^2 - y)\vec{k}$ is irrotational vector and find the scalar potential such that $\vec{F} = \nabla\emptyset$	CO2	(App) (7)
	ii)	Find the angle between the surfaces $x^2 + y^2 + z^2 = 25$ and $z = x^2 + y^2 - 5$ at the point (3,0,4).	CO2	(App) (6)
		(OR)		
	b) i)	Using Green's theorem ,evaluate $\int_C (x^2 - y^2)dx + 2xy\ dy$ where C is the boundary of the common area between $x^2 = y$ and $y^2 = x$.	CO2	(App) (7)
	ii)	Find the directional derivative of $\varphi = 3x^2 + 2y - 3z$ at (1,1,1) in the direction of $2\vec{i} + 2\vec{j} - \vec{k}$.	CO2	(App) (6)
8.	a) i)	Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x\,dx\,dy\,dz$	CO1	(App) (10)
	ii)	What is the greatest rate of increase of $\varphi = xy^2z^3$ at the point $(-1,1,2)$?	CO2	(App) (4)
		(OR)		
	b)	Evaluate $\iiint_V dx\,dy\,dz$ where V is the finite region of space (tetrahedron) bounded by the planes $x = 0, y = 0, z = 0, \quad \frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$	CO1	(Ana) (14)

Rem/Und: Remember/ Understand **App:** Apply **Ana:** Analyze **Eva:** Evaluate

Cre: Create

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