SRM Institute of Science and Technology
Department of Mathematics
18MAB102T-Advanced Calculusand Complex Analysis
2020-2021 Even
Unit – II: Vector Calculus
Tutorial Sheet - III

S.No.	Questions	Answers
	Part – A [3 Marks]	
1	Evaluate $\int_C (x^2+xy)\,dx+(x^2+y^2)\,dy$ where C is the square formed by the lines $x=\pm 1, y=\pm 1.$	0
2	Evaluate $\oint_C \vec{F}.\vec{dr}$ by stoke's theorem where $\vec{F}=y^2\vec{i}+x^2\vec{j}-(x+z)\vec{k},$ and C is the boundary of the triangle with vertices at (0,0,0), (1,0,0), (1,1,0).	$\frac{1}{3}$
3	Evaluate $\oint_C (xy\,dx+xy^2\,dy)$ by stoke's theorem where C is the square in the x-y plane with vertices (1,0), (-1,0), (0,1), (0,-1)	$\frac{4}{3}$
4	Evaluate $\iiint_V \phi\,dv,$ where $\phi=45x^2y$ and V is the closed origin bounded by the planes 4x + 2y + z = 8, x = 0, y = 0, z = 0.	128
5	If $\vec{F}=(2x^2-3z)\vec{i}-2xy\vec{j}-4x\vec{k},$ then evaluate $\iiint_V \nabla.\vec{F}\,dv,$ where V is bounded by the planes x = 0, y = 0, z = 0 and 2x + 2y + z =4.	$\frac{8}{3}$
	Part – B [6 Marks]	
6	Verify Stoke's theorem for the function $\vec{F}=x^2\vec{i}+xy\vec{j},$ integrated round the square in the z = 0 plane whose sides are along the lines $x=0,\ y=0, x=a, y=a$	$\frac{a^3}{2}$
7	Verify Stoke's theorem for $\vec{F}=(x^2+y^2)\vec{i}-2xy\vec{j},$ taken round the rectangle bounded by $x=\pm a,\ y=0, y=b$	$-4ab^2$
8	Verify Stoke's theorem for $\vec{F}=(y-z+2)\vec{i}-(yz+4)\vec{j}-(xz)\vec{k},$ over the surface of a cube $x=0,\ y=0, z=0, x=2, y=2, z=2$ above the XOY plane.	-4
9	Verify divergence theorem for $\vec{F}=(x^2-yz)\vec{i}+(y^2-zx)\vec{j}+(z^2-xy)\vec{k},$ taken over the rectangular parallelepiped $0\le x\le a, 0\le y\le b, 0\le z\le c.$	abc (a+b+c)
10	Verify divergence theorem for the function $\vec{F}=4xz\vec{i}-y^2\vec{j}+yz\vec{k},$ taken over the cube bounded by the planes $x=0, x=1, y=0, y=1, z=0, z=1.$	$\frac{3}{2}$