SRM Institute of Science and Technology

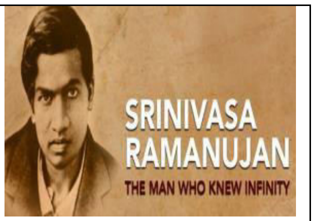
Kattankulathur

DEPARTMENT OF MEATHEMATICS

18MAB102T ADVANCED CALCULUS & COMPLEX ANALYSIS

UNIT - II Vector Calculus

Tutorial Sheet - 3



Sl.No.	Questions	Answer
	Part – A	
1	Find $\int_C \overrightarrow{F}\cdot\overrightarrow{dr}$ where $\overrightarrow{F}=(x^2+y^2)\overrightarrow{i}-2xy\overrightarrow{j}$ the curve C is the rectangle in the $xy-$plane bounded by $x=0,\ x=a,\ y=b$ and $y=0$.	$[-2ab^2]$
2	Verify Stoke's theorem for $\overrightarrow{F}=(y-z+2)\overrightarrow{i}-(yz+4)\overrightarrow{j}-xz\overrightarrow{k}$ over the surface of a cube $x=0,\ y=0,\ z=0,\ x=2,\ y=2$ and $z=2$.	-4
3	Verify Stoke's theorem for $\overrightarrow{F}=(2x-y)\overrightarrow{i}-yz^2\overrightarrow{j}-y^2z\overrightarrow{k}$ where S is the upper half of the sphere $x^2+y^2+z^2=1$ and C is its boundary in the $xy-$plane.	π
4	Verify Stoke's theorem for $\overrightarrow{F}=(x^2+y^2)\overrightarrow{i}-2xy\overrightarrow{j}$ taken round the rectangle bounded by $x=\pm a,\ y=0$ and $y=b$.	$[-4ab^2]$
5	Verify Green's theorem in a plane for the $\int_C (x-2y)dx+xdy$ taken around the circle $x^2+y^2=1$.	3π
	Part – B	
6	Using Stoke's theorem to evaluate $\int\int(\nabla\times\overrightarrow{F})\cdot\hat{n}ds$ where $\overrightarrow{F}=y\overrightarrow{i}+(x-2xz)\overrightarrow{j}xz\overrightarrow{k}$ and S is the surface of the sphere $x^2+y^2+z^2=a^2$ above the $xy-$plane. (**Answer**	0
7	Verify Gauss divergence theorem for $\overrightarrow{F}=x^2\overrightarrow{i}+z\overrightarrow{j}+yz\overrightarrow{k}$ over the cube formed by $x=\pm1,\ y=\pm1$ and $z=\pm1$.	0
8	Using Stoke's theorem evaluate $\int_C \overrightarrow{F}\cdot d\overrightarrow{r}$ where $\overrightarrow{F}=\sin(x-y)\overrightarrow{i}-\cos x\overrightarrow{j}$ where C is the boundary of the triangle where vertices are $(0,0)$, $(\frac{\pi}{2},0)$ and $(\frac{\pi}{2},1)$. (**Answer**	$[\frac{\pi}{4}+\frac{2}{\pi}]$
9.	Apply Gauss divergence theorem to evaluate $\int\int((x^3-yz)dydz-2x^2ydzdx+zdxdy)$ over the surface of a cube bounded by the co-ordinate plane $x=y=z=a$.	$a^2[\frac{a^3}{3}+a]$
10	Verify Gauss divergence theorem for $\overrightarrow{F}=(x^2-yz)\overrightarrow{i}+(y^2-zx)\overrightarrow{j}+(z^2-xy)\overrightarrow{k}$ taken over the rectangular parallelopiped $0\le x\le a$, $0\le y\le b$ and $0\le z\le c$.	abc(a+b+c)