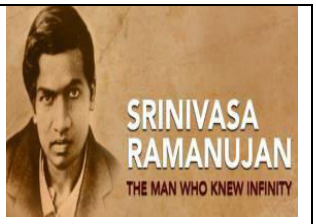

SRM Institute of Science and Technology
Kattankulathur

DEPARTMENT OF MEATHEMATICS

18MAB102T ADVANCED CALCULUS & COMPLEX ANALYSIS

UNIT - II Vector Calculus

Tutorial Sheet - 2

Sl.No.	Questions	Answer
	Part – A	
1	If $\vec{F} = x^2\vec{i} + y^2\vec{j}$, evaluate $\int_C \vec{F}.d\vec{r}$ from (0,0) to (1,1) along the path $y = x$.	$\frac{7}{12}$
2	Show that $\vec{F} = (4xy - 3x^2z^2)\vec{i} + 2x^2\vec{j} - 2x^3z\vec{k}$ is a conservative field.	0
3	Find the work done in moving a particle in the force field $\vec{A} = 3x^2\,\vec{i} + (2xz - y)\,\vec{j} - z\vec{k}$ from t = 0 to t = 1 along the curve $x = 2t^2$, $y = t$, $z = 4t^3$	$\frac{13}{6}$
4	Using Green's theorem evaluate $\int_C (2xy - x^2)dx + (x^2 + y^2)dy$ where C is the closed curve of the region bounded by $y = x^2$ and $y^2 = x$.	0
5	Evaluate $\iint_S \vec{A}.\hat{n}\,ds$, where $\vec{A} = z\,\vec{i} + x\,\vec{j} - 3y^2z\vec{k}$ and S is surface of the cylinder $x^2 + y^2 = 16$ included in the first octant below $z = 0$ and $z = 5$.	90
	Part – B	
6	Show that $\vec{F} = (2xy + z^3)\vec{i} + x^2\vec{j} + 3xz^2\vec{k}$ is a conservative field. Find the scalar potential and the work done is moving an object in this field from (1, -2, 1) to (3, 1, 4).	202 units
7	Verify Green's theorem in the plane for $\int_C (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the boundary of region bounded by (a) $y = \sqrt{x}$; $y = x^2$ and (b) $x = 0$; $y = 0$; $x + y = 1$.	(a) $\frac{3}{2}$ (b) $\frac{5}{3}$
8	Verify Green's theorem in the plane for $\int_C (x^2 - 2xy)dx + (x^2y + 3)dy$ where C is the boundary of region bounded by $y^2 = 8x; x = 2$.	$\frac{128}{5}$
9	Find $\int_C (x^2 + y^2)dx - 2xydy$ and the curve C is the rectangle in xy plane bounded by x = 0, x = a, y = b, y = 0.	$-2ab^2$
10	Evaluate $\iint_S \vec{A}.\hat{n}\,ds$, where $\vec{A} = (x^2 + y^2)\,\vec{i} - 2x\,\vec{j} + 2yz\vec{k}$ and S is the surface of the plane $2x + y + 2z = 6$ in the first quadrant.	81

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