SRM Institute of Science and Technology

College of Engineering and Technology

Kattankulathur-603 203

Department of Mathematics

21MAB102T-Advanced Calculus and Complex Analysis

Tutorial Sheet-3

Sl.No.	Part-B (8 Marks)	Answers
Q1.	Evaluate $\iiint_V \nabla \cdot \vec{F}\, dV$ if $\vec{F} = x^2\vec{i} + y^2\vec{j} + z^2\vec{k}$ and V is the volume of the region enclosed by the cube $x = 0, x = 1, y = 0, y = 1, z = 0, z = 1$.	3
Q2.	Evaluate $\int_C x\,dy - y\,dx$, where C is the circle $x^2 + y^2 = 4$.	8π
Q3.	Using divergence theorem, evaluate **(a)** $\iint_S \nabla r^2 \cdot \hat{n}\, dS$. **(b)** $\iint_S \vec{F} \cdot \vec{n}\, dS$ where $\vec{F} = (2x + 3z)\vec{i} + (xz + y)\vec{j} + (y^2 + 2z)\vec{k}$ and S is the surface of the sphere having centre (3, -1, 2) and radius 3.	$6V, 3V = 108\pi$
Q4.	Determine $f(r)$ so that the vector $f(r)\vec{r}$ is solenoidal	$f(r) = \frac{c}{r^3}$
Q5.	Determine $f(r)$ so that the vector $f(r)\vec{r}$ is irrotational	$f(r)$ any function
Sl.No.	**Part-C (15 Marks)**	**Answers**
Q6.	Verify Green's theorem for $\int_C ((x^2 - y^2)\,dx + 2xy\,dy)$ in the region bounded by the curves $x = y^2$ and $y = x^2$.	$2ab^2$