SRM Institute of Science and Technology
Ramapuram Campus.

Department of Mathematics

Assignment – 2

Sub. Code: 18MAB102T — Date: 28.05.2021
Sub. Title: Advanced Calculus and Complex Analysis — Max. Marks: 10
Year : I Year B. Tech. (Common to all Branches) — Semester : II

Date of Submission : on or before 31.05.2021

Unit 2

Vector Calculus

1. Find the unit normal vector to the surface $x^2 + y^2 + z^2 = 1$ at the point (1, 1, 1).
2. Find the directional derivative of $\varphi = x^2 + y^2 + 4xyz$ at the point (1, – 2 , 2) in the direction $2\vec{i} - 2\vec{j} + \vec{k}$.
3. Find '*a*' such that $\vec{F} = (3x - 2y + z)\vec{i} + (4x + ay - z)\vec{j} + (x - y + 2z)\vec{k}$ is solenoidal.
4. Find the constants a, b, c so that $\vec{F} = (axy + bz^3)\vec{i} + (3x^2 - cz)\vec{j} + (3xz^2 - y)\vec{k}$ is irrotational.
5. Using Gauss divergence theorem, evaluate $\iiint_V \nabla \bullet \vec{F}\, dV$ where $\vec{F} = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ taken over the cube bounded by the planes $x = 0,\ x = 1, y = 0,\ y = 1, z = 0, z = 1.$

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