SRM Institute of Science and Technology

DEPARTMENT OF MATHEMATICS

ASSIGNMENT 2

18MAB102T

ADVANCED CALCULUS AND COMPLEX ANALYSIS

1. Verify Stoke's theorem for $F = (y - z + 2)\vec{i} + (yz + 4)\vec{j} - xy\vec{k}$ where S is an open surface of a cube $x = 0, x = 2$, $y = 0, y = 2$ and $z = 0, z = 2$.

2. Verify Gauss divergence theorem for the function $F = 4xz\vec{i} - y^2\vec{j} + yz\vec{k}$ taken over the cube bounded by the planes $x = 0, x = 1$, $y = 0, y = 1$, $z = 0, z = 1$.

3. Find the laplace transform of the periodic function

$$f(t) = \begin{cases} t & \text{if } 0 < t < 1 \\ 2 - t & 1 < t < 2 \end{cases}$$

   given that $f(t + 2) = f(t)$.

4. Using Convolution theorem evaluate $L^{-1}\left[\dfrac{s^2}{(s^2 + a^2)(s^2 + b^2)}\right]$.

5. Using Laplace transform method solve $\dfrac{d^2x}{dt^2} - 2\dfrac{dx}{dt} + xt = e^{-t}$, $x(0) = 2$, $x'(0) = 1$.