



**PHY 1105: Vector Analysis**  
**Academic Session: 2020-2021**

2 Hours/week, 2 Credits

Examination Duration: 3 Hours

- 1. Vector Sum and Products:** Introduction to Vectors; Vectors Addition; Dot and Cross Products of Vectors; Scalar Triple Product; Vector Triple Product.
- 2. Vector Differentiation:** Ordinary Derivatives of Vectors; Space Curves; Differentiation Formulae; Partial Derivatives of Vectors; Differentials of Vectors; Vector Differential Operator; Gradient, Divergence, Curl and their Physical Significance.
- 3. Vector Integration:** Ordinary Integrals of Vectors; Line Integrals; Surface Integrals; Volume Integrals; **Theorems Relating Different Integrals:** The Divergence Theorem of Gauss; Green's Theorem in the Plane and Stokes' Theorem.
- 4. Curvilinear Coordinates:** Concept of Curvilinear Coordinates; Unit Vectors in Curvilinear Systems; Rectangular, Spherical Polar and Cylindrical Coordinates and their relations; Line arc Length, Surface and Volume Elements in Different Coordinates.

**Reference:**

*Spiegel, MR*

Vector Analysis and an Intro. to Tensor Analysis