23MA805 **DIFFERENTIAL GEOMETRY** **3 0 0 3**

Course objectives: This course explores the application of calculus towards the study of higher-dimensional surfaces and their geometry.

Unit I: Surfaces and Straightness, Geodesic, Surfaces of revolution, Geodesics on the Sphere, Geodesics on the Hyperbolic Plane, Geodesics on the Hyperbolic Disk.

Unit II: Surfaces and Curvature, Tangent space, Extrinsic Curvature, Geodesic Curvature, Directional Derivative, Riemannian Metrics, Isometries, Stereographic Projection.

Unit III: Surfaces and Area, Parallel Transport, Holonomy, Gaussian Curvature, First and Second Fundamental Form, Gauss-Bonnet Theorem, Mean Curvature and Minimal Surfaces, Surfaces of Constant Curvature. Introduction to Manifolds and Curvature.

Text Books / References:

1. Henderson, David W., Differential Geometry: A Geometric Introduction, Prentice-Hall, 1998.
2. Boothby, William M., An Introduction to Differential Manifolds and Riemannian Geometry, Academic Press, 1986.
3. Kuhnel, Wolfgang. *Differential Geometry: Curves – Surfaces – Manifolds*. Student mathematical library, vol. 16. Providence, RI: American Mathematical Society, 2002.
4. Spivak, Michael. *A Comprehensive Introduction to Differential Geometry*. Vol. 2. Boston, MA: Publish or Perish, 1999.