

Module Code: MATH-306
Module Title: **Differential Geometry**
Module Rating: 3 Cr. Hours

Theory of Space Curves

- Introduction, index notation and summation convention
- Space curves, arc length, tangent, normal and binormal
- Osculating, normal and rectifying planes
- Curvature and torsion
- The Frenet-Serret theorem
- Natural equation of a curve
- Involutives and evolutes, helices
- Fundamental existence theorem of space curves

Theory of Surfaces

- Coordinate transformation
- Tangent plane and surface normal
- The first fundamental form and the metric tensor
- Christoffel symbols of first and second kinds
- The second fundamental form
- Principal, Gaussian, mean, geodesic and normal curvatures
- Gauss and Weingarten equations
- Gauss and Codazzi equations

Recommended Books

1. R. S. Millman and G.D. Parker, *Elements of Differential Geometry* (Prentice-Hall, New Jersey, 1977).
2. A. Goetz, *Introduction to Differential Geometry* (Addison-Wesley, 1970).
3. E. Kreyzig, *Differential Geometry* (Dover, 1991).
4. M. M. Lipschutz, *Schaum's Outline of Differential Geometry* (McGraw Hill, 1969).
5. D. Somasundaram, *Differential Geometry* (Narosa Publishing House, New Delhi, 2005).



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