

CC XII - DIFFERENTIAL GEOMETRY

UNIT I : SPACE CURVES:

Definition of a space curve - Arc length - tangent - normal and binormal - curvature and torsion - contact between curves and surfaces- tangent surface- involutes and evolutes- Intrinsic equations - Fundamental Existence Theorem for space curves- Helics.

UNIT II : INTRINSIC PROPERTIES OF A SURFACE:

Definition of a surface - curves on a surface - Surface of revolution - Helicoids - Metric- Direction coefficients - families of curves- Isometric correspondence- Intrinsic properties.

UNIT III : GEODESICS:

Geodesics - Canonical geodesic equations - Normal property of geodesics- Existence Theorems - Geodesic parallels - Geodesics curvature- Gauss- Bonnet Theorem - Gaussian curvature- surface of constant curvature.

UNIT IV : NON INTRINSIC PROPERTIES OF A SURFACE:

The second fundamental form- Principal curvature - Lines of curvature - Developable – Developable associated with space curves and with curves on surface - Minimal surfaces - Ruled surfaces.

UNIT V : DIFFERENTIAL GEOMETRY OF SURFACES:

Compact surfaces whose points are umbilics- Hilbert's lemma - Compact surface of constant curvature - Complete surface and their characterization - Hilbert's Theorem - Conjugate points on geodesics.

TEXT BOOK(S)

- [1] T.J. Willmore, An Introduction to Differential Geometry, Oxford University Press, (17th Impression) New Delhi 2002. (Indian Print).
UNIT – I Chapter I : Sections 1 to 9.
UNIT – II Chapter II: Sections 1 to 9.;UNIT – III Chapter II: Sections 10 to 18.
UNIT – IV Chapter III: Sections 1 to 8.;UNIT – V Chapter IV : Sections 1 to 8

REFERENCE(S)

1. Struik, D.T. Lectures on Classical Differential Geometry, Addison - Wesley, Mass. 1950.
2. Kobayashi S. and Nomizu. K. Foundations of Differential Geometry, Interscience Publishers, 1963.
3. Wilhelm Klingenberg: A course in Differential Geometry, Graduate Texts in Mathematics, Springer Verlag, 1978.
4. J.A. Thorpe Elementary topics in Differential Geometry, Under - graduate Texts in Mathematics, Springer - Verlag 1979.