Semester III

Subject Name: Differential Geometry	Duration: 5 hrs /Cycle
Subject Code: 3PGM2 (2015 on)	Credit : 4

Unit I: The Theory of Space Curves: Introductory remarks about space curves - Definitions - Arc length - Tangent, normal, and binormal - Curvature and torsion of a curve given as the intersection of two surfaces - Contact between curves and surfaces - Tangent surface, involutes and evolutes.

Unit II: The Theory of Space Curves (continued) and the Metric : Local Intrinsic Properties of a Surface: Intrinsic equations, fundamental existence theorems for space curves -Helices -Definition of a surface -Curves on a surface -Surfaces of revolution – Helicoids.

Unit III: The Metric : Local Intrinsic Properties of a Surface(continued): Metric - Direction coefficients -Families of curves - Isometric correspondence -Intrinsic properties -Geodesics -Canonical geodesic equations -Normal property of geodesics.

Unit IV: The Metric: Local Intrinsic Properties of a Surface (continued): Existence theorems - Geodesic parallels - Geodesic curvature - Gauss-Bonnet theorem - Gaussian curvature - Surfaces of constant curvature - Conformal mapping -Geodesic mapping.

Unit V: Second Fundamental Form: Local Non-Intrinsic Properties of a Surface: The second fundamental form - Principal curvatures - Lines of curvature - Developable - Developable associated with curves on surfaces - Minimal surfaces - Ruled surfaces.

Text Book: An Introduction to the Differential Geometry by T.J Willmore,   Oxford University Press (2008).

Chapters: I (sec.1- 9), II (sec.1 – 20), III (sec.1 – 8).

Reference Books: 1. Differential geometry of Three Dimensions by C.E. Weatherburn, Edition 1964, Reprint 1971, The English Language Book Society and Cambridge University Press.

2. Differential Geometry by P.P. Gupta, G.S. Malik and S.K. Pundir, 4th edition 2012, Pragati Prakashan.