(Master of Science) (Mathematics)
(M.Sc.) (Mathematics) Semester (II)

Course Code	PS02CMTH53	Title of the Course	Differential Geometry
Total Credits of the Course	4	Hours per Week	4 hours

Course Objective	To provide the learners with the fundamental concepts of Differential geometry.

Course Content		
Unit	Description	Weightage* (%)
1.	**Curve Theory** Space curves, parameterization, Regular curves, Reparametrization, Curvature and Torsion, Signed curvature, Frenet-Serret equations, Fundamental theorem of Spaces curves	25%
2.	**Surfaces** Definition and Examples of Surfaces, Smooth surfaces, Tangent and Normal, Quadric surfaces, first fundamental form, isometries of surfaces, conformal mappings of surfaces, surface area.	25%
3.	**Curvatures of surfaces** Second fundamental form, The Gauss and Weingarten maps, Normal and Geodesic curvatures Gaussian and mean curvatures, Principal curvatures of surface.	25%
4.	**Geodesics and related topics** Chrostoffel 's symbols, Gauss equations, Definition and basic properties Geodesic Equations, Characterization of geodesics on surfaces viz. cylinder, plane, sphere Codazzi-Mainardi equations, Gauss Theorema Egregium, Gauss Bonnet theorem (statement only) and its applications.	25%

Teaching-Learning Methodology	Interaction based Classroom teaching

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Quizzes, Assignments, and Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: After completion of this course, student will be able to	
1	recognize parameterization, curvature, torsion, Frenet-Serret equations, fundamental theorem of curve theory, isoperimetric inequality.
2	obtain Surfaces, first fundamental form, isometries and conformal of surfaces.
3	evaluate Second fundamental form, Gauss map, several types of curvatures,
4	compute the curvature and torsion of a curves and surfaces.
5	explore the Gauss equations, Christoffel symbols, geodesic equations, Codazzi-Mainardi equations and applications.

Suggested References:	
Sr. No.	References
1.	Goetz A., Introduction to Differential Geometry, Addison Wesley, Publ. Co., 1970.
2.	Weatherburn C.E., Differential Geometry in Three Dimensions, Cambridge University Press, 1964

On-line resources to be used if available as reference material

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