Lecture Plan

Name of the College: Government College of Arts, Science and Commerce, Sanquelim-Goa

Name of Faculty: Prajyot Maruti Patil	**Subject:** Mathematics	
Paper code: MAT-306, Vector Calculus	**Program:** B.Sc.	**Division: -**
Academic year: 2025-26	**Semester: VI**	**Total Lectures:** 60

Course Objectives:

1) This course helps in understanding the basic concepts in multivariable calculus.

Student Learning Outcome: Student will be able to

1) Familiarize with functions of two variables & their related properties on limits, continuity, differentiability, extremums& constrained extrema.
2) Distinguish between scalar & vector fields and prove results based on gradient, divergence & curl.
3) Point out inter relationship between double, line, surface & volume integrals.
4) Sharpen problem solving skills through geometric visualizations & use of Transformations from Cartesian / to polar /to cylindrical /to spherical coordinate systems.

Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/ Assignment	ICT Tools	Reference books

December	01/12/2025	06/12/2025	St. Francis Xaviers Feast 03	Vectors in two- and three-dimensional space, geometry theorems by vector methods, equation of line (parametric form), inner product, length and distance		Smart Board	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	08/12/2025	13/12/2025	04	Cauchy-Schwarz inequality, orthogonal projection, triangle inequality, cross product and its elementary properties, equation of plane in vector form, ndimensional Euclidean space revisit.		Smart Board PDF	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	15/12/2025	20/12/2025	Liberation Day 03	Graph of functions, level sets, curves and surfaces, limit of function and its properties, continuous functions and its properties, continuity of composite functions.			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	22/12/2025	23/12/2025	04	Partial derivatives, the linear approximation, differentiability of functions of two and three variables,		Data projector	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
January	02/01/2026	03/01/2026	04	tangent plane, differentiability-the general case. Basic theorems related to differentiability and continuity.			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	05/01/2026	10/01/2026	04	Paths and curves, velocity and tangents to path, chain rule (no proof),			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition

	12/01/2026	17/01/2026	04	special cases of chain rule, gradient and directional derivatives and its elementary properties		Smart Board	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	19/01/2026	24/01/2026	04	Iterated partial derivatives and equality of mixed partial derivatives, implicit differentiation			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	26/01/2026	31/01/2026	04 Republic Holiday	Differentiation of paths, differentiation rules, arc length function, reparametrization		Smart Board PDF	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
February	02/02/2026	07/02/2026	04	vector fields and scalar fields, gradient field, divergence and curl			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	09/02/2026	14/02/2026	04	physical interpretations of divergence and curl, Laplacian operator, Basic identities of vector analysis.		Smart Board	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	16/02/2026	21/02/2026	04	Double integrals and triple integrals as volume, reduction to iterated integrals, Fubini's theorem (no proof), Integrals over general regions, change of order of integrations			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition

	23/02/2026	28/02/2026	04	Change of variable formula (no proof) for two and three variables, special cases- polar co-ordinates, cylindrical co-ordinates and spherical co-ordinates.		Smart Board	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
March	02/03/2026	07/03/2026	03 Holi	Path integrals, line integrals, reparametrization of paths and its properties, parametrized surfaces		Smart Board	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	09/03/2026	14/03/2026	04	tangent vector and tangent plane to a parametrized surface, area of parametrized surface, integrals of scalar fields and vector fields over surfaces,			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	16/03/2026	21/03/2026	03 Gudi Padva / Id-Ul Fitr	reparametrization of surfaces and its properties, physical interpretation of surface and volume integrals.			Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	23/03/2026	28/03/2026	03 Ram Navami	Green's theorem and its applications, Stokes theorem, Conservative fields		Smart Board	Jerrold E. Marsden and Anthony Tromba: Vector calculus, Sixth edition
	30/03/2026	31/03/2026	02	physical interpretations of line integrals, Gauss Divergence theorem.			

*** Assessment Rubrics**

Component	Max Marks
ISA 1	10
ISA 2	10
Practical	Nil
Project	Nil
Semester End Exam	80