**Semester Lecture Plan**

**Name of the college:** Government College of Arts, Science & Commerce Sanquelim – Goa.

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| **Name of Faculty:** Vishal Vinayak Gawas | **Subject: Calculus of 2 and 3 variables** | |
| **Paper code: MTC 107** | **Program/Course: TY BSc** | **Division: -** |
| **Academic year: 2024-25** | **Semester: V** | **Total Lectures: 30** |

**Course Objectives:**

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.

Course Learning Outcome: On completion of the course, the students 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.

| | **Lectures From:** | **To:** | **No. of lectures allotted** | **Topic, Subtopic to be covered** | **Learning outcome** | **ICT Tools** | **Reference books** |
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| July | 01/07/2024 | 06/07/2024 | 2 | Review of vectors in Plane and space | Distinguish between scalar & vector fields | Chalk Board | Basic multivariable Calculus by J.E. Marsden |

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| July | 08/07/2024 | 13/07/2024 | 2 | Vector products and their properties. n- dimensional Euclidean space. | Distinguish between scalar & vector fields | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| July | 15/07/2024 | 20/07/2024 | 2 | Curves in the plane and space. | Distinguish between scalar & vector fields | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| July | 22/07/2024 | 27/07/2024 | 2 | Functions from $IR^n$ to R (scalar fields) and functions from $IR^2$ to $IR^3$(vector fields), | Familiarize with functions of two variables | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| July | 29/07/2024 | 31/07/2024 | 2 | limits and continuity of functions | Familiarize with functions of two variables | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| August | 05/08/2024 | 10/08/2024 | 2 | basic results on limits and continuity of sum, difference, | Familiarize with functions of two variables | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| August | 12/08/2024 | 17/08/2024 | 2 | scalar multiples of vector fields, continuity and components of a vector field | Familiarize with functions of two variables | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| August | 19/08/2024 | 24/08/2024 | 2 | Partial derivatives and continuity. Differentiability. Derivative Matrix and tangent planes. The Chain rule. | Familiarize with functions of two variables | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| August | 26/08/2024 | 31/08/2024 | 2 | Gradients and directional derivatives. Implicit differentiation | Familiarize with functions of two variables | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| September | 02/09/2024 | 05/09/2024 | 2 | Gradients and directional derivatives. Implicit differentiation | Familiarize with functions of two variables | Chalk Board | Basic multivariable Calculus by J.E. Marsden |

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| September | 13/09/2024 | 14/09/2024 | 2 | Higher order partial derivatives. Equality of mixed derivatives | Familiarize with extremums & constrained extrema. | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| September | 16/09/2024 | 21/09/2024 | 2 | Taylors theorem. Critical points | Familiarize with extremums & constrained extrema. | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| September | 23/09/2024 | 28/09/2024 | 2 | Critical points and extrema. Second derivative test. | Familiarize with extremums & constrained extrema. | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| October | 01/10/2024 | 05/10/2024 | | Constrained extrema and Lagrange's multipliers. | Constrained extrema and Lagrange's multipliers. | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| October | 07/10/2024 | 12/10/2024 | 2 | Revision | | Chalk Board | Basic multivariable Calculus by J.E. Marsden |
| October | 14/10/2024 | 19/10/2024 | 2 | Revision | | Chalk Board | Basic multivariable Calculus by J.E. Marsden |