

ADVANCED CALCULUS

Course No: **MM24204CR**

Semester: **M.A/M.Sc 2nd Semester**

Continuous Assessment: **Marks 10, Theory Marks: 10**

Total Credits: **02**

Total Marks: **50**

Time Duration: **1½ Hrs Course**

Objectives: To extend the ideas of functions of one variable to several variables in order to study calculus and optimization problems in higher dimensions.

Course Outcomes: To explore more advanced topics of calculus, and developing strong problem-solving skills. It will deepen the understanding of concepts from single-variable calculus, including limits, continuity, differentiation, and integration.

UNIT-I

Functions of several variables in \mathbb{R}^n , the directional derivative, directional derivative and continuity, total derivative, matrix of a linear function, Jacobian matrix, chain rule, mean value theorem for differentiable functions.

UNIT-II

Sufficient conditions for differentiability and for the equality of mixed partials, Taylor's theorem for functions from \mathbb{R}^n and \mathbb{R} , inverse and implicit function theorem in \mathbb{R}^n , extremum problems for functions on \mathbb{R}^n , Lagrange's multiplier's, multiple Riemann Integral and change of variable formula for multiple Riemann integrals.

Recommended Books:

1. W. Rudin, Principles of Mathematical Analysis, McGraw Hill, Standard Edition (2023).
2. T. M. Apostol, Mathematical Analysis, Narosa (2002).
3. P. M. Fitzpatrick, Advanced Calculus, American Mathematical Society, 2nd Edition (2009).
4. James J. Callahan, Advanced Calculus, Springer (2010).