GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. FIRST YEAR

Subject Name: **Calculus**
Subject Code: **110014**

Course Objectives of Calculus:

Students entering in Calculus should have a firm grasp of algebra and trigonometry. They should be able to graph elementary functions and solve both linear equations and inequalities.

The objective of Calculus is for students to learn the basics of the Calculus. They will study Convergence of series, Curve tracing, Expansion of function and error estimation, an introduction to the Fundamental Theorem of Calculus, Partial differentiation and its applications, Multiple integrals and its applications.

More generally, the students will improve their ability to think critically, to analyze a real problem and solve it using a wide array of mathematical tools. These skills will be invaluable to them in whatever path they choose to follow, be it as a mathematics major or in pursuit of a career in one of the other sciences.

They will also able to apply these ideas to a wide range of problems that include the equations of motion, related rates, curve sketching and optimization. The students should be able to interpret the concepts of Calculus algebraically, graphically and verbally.

After the successful completion of the course, students will be able to
- Determine the convergence of infinite series
- Calculate the derivatives of functions of several variables
- Graphing and optimization of the functions
- Compute the basic multiple integrals

The course is designed in such a way that it can be covered comprehensively in period of semester.

Sr. No	Course Content	Total Hrs.
1.	Convergence of Sequences and Series, Power Series and radius of convergence.	04
2.	Monotonic function, Concavity and Convexity of a curve, Points of inflection, Curve tracing: Cartesian and Polar curves.	03
3.	Taylor's series, Maclaurin's series, Convergence of Taylor's series and error estimation, Indeterminate forms,	05
4.	Fundamental theorem of calculus, Leibnitz,s Rule, Reduction formulae.	06
5.	Improper Integrals and its convergence, Application of definite integrals: volume by slicing, by rotation about an axis and by cylindrical shells.	06
6.	Limit, Continuity of functions of several variables, Partial derivatives, Chain rules, Euler's theorem	04
7.	Application of partial derivatives: Tangent planes and normal, Linearization and error approximation, extreme values and saddle points, Lagrange multipliers, partial derivatives with constrained variables, Taylor's expansion.	08
8.	Double and Triple integrals, Change of order of integration, Change of variables, Jacobian. Applications: Area, Volume.	06

Text Books:

1. Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas' Calculus, Person Education (11th edition) Sections: 11.1-11.7, 4.4, 2.5, 10.5-10.6, 11.8-11.9, 4.6, 5.4, 14.6-14.10
2. James Stewart, Calculus (5th Edition), Thomson (2003).Sections: 6.1-6.3, 14.1-14.5, 14.7-14.8, 15.1-15.4, 15.6-15.9

Reference Books:

1 Hughes – Hallett et al., Calculus – Single and Multivarible (3rd Edition), John-Wiley and Sons (2003).
2 T. M. Apostol, Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern (1980).