Course Title:	Calculus
Course Code:	SMTH-101
Semester:	I
Credit Hours:	3 Credit Hours
Pre-requisites:	None

Learning Outcomes

By the end of this course, students will be able to:
1. The students will be able to understand the concept of limit and continuity of the function fundamental concepts of the *derivative* (in terms of tangential slope and instantaneous rate), and *integration*, (in terms of accumulated change and area under the curve)
2. The students will be able to apply various techniques to compute derivatives and integrals of different function types used in optimization problems and other related applications.
3. The students will be able to understand the concept of multi variables functions, partial derivative and double integration.

Course Outline

Week #	Contents
Week 1	Introduction to Calculus (Big Picture), Introduction to Functions: Rule of Four, independent variable, dependent variable, domain, and range of a function, Toolkit Functions: linear, quadratic, polynomial, rational, transcendental functions
Week 2	- Introduction to Limit and continuity: Intuitive and Geometric Approach, techniques of funding limits,
Week 3	Continuous and discontinuous functions Slope of a function Average rate of change, Secant Lines
Week 4	Instantaneous rate of change, Tangent line, Concept and idea of differentiation, Geometrical and Physical meaning of derivatives, Rules of differentiation
Week 5	Techniques of Differentiation Product rule, quotient rule, chain rule
Week 6	Applications of derivative: Increasing decreasing function Local Maxima and Minima, critical points of a function First derivative test
Week 7	inflection point Concavity, Second derivative test
Week 8	Newton Raphson method
Week 9	Introduction to Integration as antiderivative The indefinite integral of exponential, polynomials, and trigonometric functions
Week 10	Techniques of integration(by substitution, by parts)

Week 11	Techniques of integration(by partial fraction)
Week 12	Integration as Area under the curve, Definite Integral, properties of definite integral, Fundamental theorem of calculus
Week 13	Area between two curves
Week 14	Trapezoidal Rule
Week 15	Functions of several variables Derivatives of several variables
Week 16	Multiples integrals

- **Teaching-learning Strategies:**
  Class Lecture method, which includes seminars, discussions, assignments and projects.
  (Audio-visual tools are used where necessary)

- **Assignments-Types and Number with calendar:**
  According to the choice of respective teacher.

- **Assessment and Examinations:**
  According to the University's Semester Rules.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Text Books
1. APPLIED CALCULUS by Hughes Hallett (4th Edition)
2. Thomas Calculus by G B Thomas, 11TH Edition.

Suggested Readings
1. CALCULUS by Howard Anton 10th Edition
2. CALCULUS AND ITS APPLICATION by Marvin L. Bittinger 10th Edition
3. Calculus single and Multivariable by Hughes Hallett al., 6th edition.
4. James Stewart, "Multivariable Calculus" 7th Ed.