APPLIED CALCULUS BS-110

Pre-requisite: None
Credit Hours 03
Contact Hours 48

RECOMMENDED BOOKS

- Thomas's Calculus by George B. Thomas, Jr. 11th Edition.

REFERENCE BOOKS

- Advanced Engineering Mathematics, By Erwin Kreyszig, 8th Edition
- Calculus And Analytical Geometry, Schaum's Series

OBJECTIVE OF COURSE

The main aim of this course is to give students some basic ideas of calculus. The purpose is not just making the students learn these ideas but to enable them to apply these ideas to solve problems of practical nature. The course will provide the students with the necessary tools to understand and formulate advanced mathematical concepts and an awareness of their relationship to a variety of problems arising in engineering and sciences. Students wishing to major in the sciences, engineering, or medicine are required to have a working knowledge of the calculus and its applications.

S.NO	CLO/PLOS MAPPING	DOMAIN	PLO
01	**Explain** algebraic and transcendentalfunctions in various forms, differentiate the limiting value and exact value of a function at some point, and **describe** the derivative of a function as the limit of a difference quotient and as instantaneous rate of change.	C2,C4	01
02	**Discuss the idea** of derivative and to use derivative rules for algebraic and transcendental functions to solve engineering problems, **evaluate** critical points and to discuss the behavior of the functions **defined** in some interval.	C2,C3, C6	01
03	**Explain the concept** of definiteand indefinite integrals and **discuss** the basic properties of definite integrals and to use integration techniques to **evaluate** the area under a curve, area between the curves, length of a curve, average value of a function and volume of several types	C2,C3, C6	01

	of solid.		
04	**Demonstrate** a working knowledge of multivariable functions including partial derivatives, extrema of functions and to **evaluate** multiple integrals	C3, C6	01

COURSE CONTENTS

Functions

- Lines Circles, Parabolas, Functions and Their Graphs
- Shifting, Scaling of Graphs and Trigonometric Functions

Limits and Continuity

- Calculating Limits using Limits Laws, One Sided Limits and Limits at Infinity
- Infinite Limits, Vertical Asymptotes and Continuity

Differentiation

- The Derivative as a Function and Differentiation Rules
- Derivative As a Rate of Change Derivatives of Trigonometric Functions
- Chain Rule and Parametric Equations
- Implicit Differentiation and Related Rates
- Inverse Functions and Their Derivatives

Applications of Derivatives

- Extreme Vales of Functions
- Monotonic Functions and 1st Derivative Test
- Indeterminate Forms and L'Hopital Rule

Integration

- Integration: Estimating with Finite Sum
- Sigma Notation, Limits of Finite Sum and Definite Integral
- Fundamental Theorem of Calculus
- Indefinite Integrals and Substitution Rules
- Substitution and Area Between Curves

Applications of Definite Integrals

- Volumes by Using Slicing, Rotation About an Axis
- Volumes by Cylindrical Shells

Integrals and Transcendental Functions

- Natural Logarithms, Exponential Functions, ax and logax
- Exponential Growth and Decay

Techniques of Integration

- Integration by Parts
- Integration of Rational Functions by Partial Fractions

Conic Sections and Polar Coordinates

- Polar Coordinates, Graphing, Areas & Lengths in Polar Coordinates
- Partial derivatives
- Chain Rule for Partial Derivatives
- Double Integrals
- Double Integrals in Polar Form
- Triple Integrals in Rectangular Coordinate