

Government PG College, Ambala Cantt

Course File (Session 2023-2024)(Odd SEMESTER)

Name of professor: Deepak Kumar

Class: B.Sc I/1st semester/computer science

Name of the Course: Calculus

Course Code: B23-MAT-101

Course Type: CC

Syllabus

Unit 1

ϵ - δ definition of limit and continuity of a real valued function, Basic properties of limits, Types of discontinuities, Differentiability of functions, Application of L'Hospital rule to indeterminate forms, Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's series expansion with different forms of remainder.

Unit 2

Asymptotes: Horizontal, vertical and oblique asymptotes for algebraic curves, Asymptotes for polar curves, Intersection of a curve and its asymptotes, Curvature and radius of curvature of curves (cartesian, parametric, polar & intrinsic forms), Newton's method, Centre of curvature and circle of curvature

Unit 3

Multiple points, Node, Cusp, Conjugate point, Tests for concavity and convexity, Points of inflexion, Tracing of curves, Reduction formulae.

Unit 4

Rectification, intrinsic equation of a curve, Quadrature, Area bounded by closed curves, Volumes and surfaces of solids of revolution.

Recommended Books:

1. Howard Anton, I. Bivens & Stephan Davis (2021). Calculus (12th edition). J. Wiley & Sons.
2. Gabriel Klambauer (1986). Aspects of Calculus (4th edition). Springer.

3. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs. Alpha Science Int'l Ltd.
4. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.
5. George B. Thomas Jr., Joel Hass, Christopher Heil & Maurice D. Weir (2018). Thomas' Calculus (14th edition). Pearson Education.
6. Monty J. Strauss, Gerald L. Bradley & Karl J. Smith (2002). Calculus (3rd edition). Dorling Kindersley (India) Pvt. Ltd.

Course Learning Outcomes(CLOs):

After completing this course, the learner will be able to:

1. Gain knowledge of the concepts and theory of limit, continuity and differentiability of functions. Attain skills of calculating the limit of functions and examining the continuity and differentiability of different types of functions, and perform successive differentiation of functions. To apply the procedural knowledge to obtain the series expansions of functions which find multidisciplinary applications.
2. Understand concepts of asymptotes and curvature, the geometrical meaning of these terms and to have procedural knowledge to solve related problems.
3. Determine singular points of a curve and classify them. Understand the concept of rectification of curves and derive the reduction formulae.
4. Have theoretical knowledge and practical skills to evaluate the area bounded by the curves, and volume and surface area of solids formed by revolution of curves.

Lesson Plan

Scheduled dates/month	Topic to be covered
September	ϵ - δ definition of limit and continuity of a real valued function, Basic properties of limits, Types of discontinuities, Differentiability of functions, Application of L'Hospital rule to indeterminate forms, Successive differentiation, Leibnitz theorem, Taylor's and Maclaurin's series expansion with different forms of remainder.

October	Asymptotes: Horizontal, vertical and oblique asymptotes for algebraic curves, Asymptotes for polar curves, Intersection of a curve and its asymptotes, Curvature and radius of curvature of curves (cartesian, parametric, polar & intrinsic forms), Newton's method, Centre of curvature and circle of curvature
November	Multiple points, Node, Cusp, Conjugate point, Tests for concavity and convexity, Points of inflexion, Tracing of curves, Reduction formulae.
December	Rectification, intrinsic equation of a curve, Quadrature, Area bounded by closed curves, Volumes and surfaces of solids of revolution.