Mathematics (Advanced)-I: Fundamental of Calculus

Faculty: FMS
Course Code: MTH101
Course Title: Fundamental of Calculus
Number of Credits: 3 (3+0+0)

Course objectives: To introduce the basic tools of differential and integral calculus.

Minimum prerequisites for taking this course, if any: Class XII pass with Mathematics.

Course structure with units, if applicable:

UNIT I: Higher Order Differentiability.
Higher order derivatives and calculation of the nth derivative, Leibnitz's theorem, Partial differentiation, Euler's theorem on homogeneous functions.

UNIT II: Mean Value Theorems and Their Applications.
Rolle's theorem, Mean value theorems and applications to monotonic functions and inequalities; Intermediate value theorem for derivatives, Taylor's theorem, Taylor's series, Maclaurin's series expansions, and Indeterminate forms.

UNIT III: Tracing of Curves and Reduction Formulae.
Asymptotes (parallel to axes and oblique), Concavity and inflexion points, Singular points, Tangents at the origin and nature of singular points, Curve tracing (cartesian and polar equations). Reduction formulae for , , and their applications.

Reading suggestions:
1. Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). John Wiley & Sons Singapore Pvt. Ltd. Reprint (2016) by Wiley India Pvt. Ltd. Delhi.
2. Bartle, Robert G., & Sherbert, Donald R. (2011). Introduction to Real Analysis (4th ed.). John Wiley & Sons. Wiley India edition reprint.
3. Ross, Kenneth A. (2013). Elementary Analysis: The Theory of Calculus (2nd ed.). Undergraduate Texts in Mathematics, Springer. Indian reprint.

Evaluation:
Mid-semester Written Examination: 40% Marks
End-semester Written Examination: 40% Marks
Quiz / Assignment/Presentation (oral / poster)/other: 20% Marks