MATH 01GE1 Calculus - I

Credits: 6 (Theory-5, Tutorial-1)

Contact Hours per Week: 6 (5 Theory lectures + 1 Tutorial)

Real Numbers: Axiomatic defnition. Intuitive idea of completeness.

Real-valued functions defined on an interval : Limit of a function (Cauchy's defnition). Algebra of limits. Continuity of a function at a point and in an interval. Acquaintance with the important properties of continuous functions on closed intervals.

Derivative its geometrical and physical interpretation. Sign of derivative Monotonic increasing and decreasing functions. Relation between continuity and differentiability.

Successive derivative (Leibnitz's Theorem and its application).

Mean Value Theorems and expansion of functions like ex; sinx; cosx; (1 + x)n; ln(1 + x) (with validity of regions).

Applications of Differential Calculus : Maxima and Minima, Tangents and Normals, Pedal equation of a curve. De nition and examples of singular points (viz. Node, Cusp, Isolated point).

Indeterminate Forms : L'Hospital's Rule.

Sequence of real numbers: convergence, Cauchy criteria and other elementary properties. Series of real number, Absolute and conditional convergence of series.

Books Recommended:

1. S. Bartle, Introduction to Real Analysis.

2. T.M.Apostol, Calculus (Vol. I).

3. D. Widder, Advanced Calculus.

4. Shanti Narayan, Differential Calculus.