

1. Basic Notions

- 1.1 Definition and examples
- 1.2 Open Balls and Open Sets

2. Convergence

- 2.1 Convergent Sequences
- 2.2 Limit and Cluster points
- 2.3 Cauchy Sequences and Completeness
- 2.4 Bounded Sets
- 2.5 Dense Sets
- 2.6 Boundary of a set

3. Continuity

- 3.1 Continuous Functions
- 3.2 Equivalent Definitions of Continuity
- 3.3 Topological Property
- 3.4 Uniform Continuity
- 3.5 Limit of a Function
- 3.6 Open and closed maps

4. Compactness and Connectedness

- 4.1 Compact Spaces and their Properties
- 4.2 Connected Spaces

5: Analytic functions

- 5.1. Functions of a Complex Variables
- 5.2. Limits, Theorems on limits (Without Proof), Limits involving the point at infinity, Continuity, Derivatives, Differentiation formulas (Without Proof)
- 5.3. Cauchy- Riemann Equations, Sufficient Conditions for differentiability (Only Statement and Examples)
- 5.4. Polar coordinates, Analytic functions, Harmonic functions.

6: Elementary Functions

- 6.1 The Exponential functions
- 6.2 The Logarithmic function, Branches and derivatives of logarithms, Some identities involving logarithms
- 6.3 Complex exponents, Trigonometric functions.

7. Integrals

- 7.1 Derivatives of functions, Definite integrals of functions
- 7.2 Contours, Contour integral, Examples
- 7.3 Upper bounds for Moduli of contour integrals, Anti-derivatives (Only Examples)
- 7.4 Cauchy-Goursat Theorem (without proof), Simply and multiply Connected domains. Cauchy integral formula, Derivatives of analytic functions. Liouville's Theorem and Fundamental Theorem of Algebra (Without Proof).

8. Series

- 8.1 Convergence of sequences and series (Theorems without proof)
- 8.2 Taylor's series (without proof), Laurent series (without proof), examples only.

9. Residues and Poles

- 9.1 Isolated singular points, Residues
- 9.2 Cauchy residue theorem (Without Proof), residue at infinity, types of isolated singular points, residues at poles
- 9.3 Zeros of analytic functions, zeros and poles.