

# CONTENTS.....

Page

## UNIT-I : SERIES SOLUTIONS AND SPECIAL FUNCTIONS

### 1. SERIES SOLUTIONS

Series solutions of ODE of 2nd order with variable coefficients with special emphasis to differential equations of Legendre and Bessel, Legendre, polynomials, Bessels functions and their properties.

## UNIT-II : INTEGRAL TRANSFORMS

### 2. FOURIER TRANSFORMS

Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and applications to simple heat transfer equations.

### 3. Z-TURNFORM

Z-transform and its application to solve difference equations.

## UNIT-III : FUNCTIONS OF A COMPLEX VARIABLE-I

### 4. ANALYTIC FUNCTIONS

Analytic functions, C-R equations and harmonic functions, Line integral in the complex plane.

### 5. COMPLEX INTEGRATION

Cauchy's integral, Cauchy's integral formula for derivatives of analytic functions, Liouville's theorem, Fundamental theorem of Algebra.

## UNIT-IV : FUNCTIONS OF A COMPLEX VARIABLE-II

### 6. REPRESENTATION OF A FUNCTION BY POWER SERIES

Power Series, Taylor's Theorem., Laurent's Theorem., Some useful Results to remember.

### 7. ZEROS AND SINGULARITIES

The Zeros of an Analytic Function, Zeros are Isolated, Singularities of an

Analytic Function, Kinds of Singularity, Method for Detecting Singularities.

**8. THE CALCULUS OF RESIDUES (CONTOUR INTEGRATION) 2**

Residue at a Pole. (Definition), Computation of residue at a finite pole, Residue at Infinity, Computation of Residue at Infinity, Cauchy's Residue Theorem, Evaluation of real Definite Integrals by Contour Integration, Integration Round the Unit Circle, Evaluation of the integrals of the form, Contour integration of functions having poles on the real axis, Contour integration of many valued functions

**9. CONFORMAL REPRESENTATION 3**

Introduction, If  $f(z)$  is analytic, mapping is conformal, Converse, The case  $f'(z_0) = 0$ , when  $f'(z) = 0$ , Geometrical Interpretation of, Transformation which are Isogonal but not conformal; Bilinear Transformation. Linear Fractional Transformation, Bilinear Transformation (Linear Fractional Transformations), Every bilinear transformation is the resultant of bilinear transformation with simple geometric imports, Theorem : The equation, Theorem, Cross-ratio, Preservance of cross-ratio under the bilinear transformation, To find the bilinear transformation which transform the points  $z_1, z_2, z_3$  of  $z$  plane respectively into the point  $w_1, w_2, w_3$  of  $w$  - plane, Bilinear transformation of a circle, Some Special Transformation, The Transformation  $w = z^n$ . (Where  $n$  is a positive integer), The transformation  $w = z^2$ , The transformation  $z = \sqrt{w}$  (inverse mapping of  $w = z^2$ ).

**UNIT-V : STATISTICS AND PROBABILITY**

**10. CORRELATION AND REGRESSION 3**

Correlation, Types of Correlation, Degree of Correlation, Methods of Determining Correlation, Sterograms and Correlation Surface, Probable Error of coefficient of Correlation, Spearman's Rank Correlation, Limits of Coefficient of rank correlation, Positive and Negative Rank Correlation Coefficients, Linear Regression, Line of Regression, Equations of Lines of Regression, Angle between two Lines of Regression, Coefficient of Regression, Properties of Regression Coefficients, Limits of Coefficient of correlation.

**11. THEORETICAL DISTRIBUTIONS 4**

Theoretical Distributions, Binomial Distribution, Pascal's Triangle, Characteristics of the Binomial Distribution, Moments of the Binomial Distribution (moments above the origin), Moments about the Mean, Recursion formula for binomial distribution, Poisson Distribution, Limiting form of Binomial distribution, Mode of the Poisson Distribution, Constants of Poission Distribution, Moments of Poission distribution, Normal Distribution, Derivation of Normal Distribution, Standard Form of the Normal curve, Properties of the Normal Distribution, Mean deviation from mean of the normal distribution, Some Further Properties of the Normal Distribution, Probable Error, Importance of the Normal Distribution.