

## Complex Functions

### Part A – Basics of Complex numbers

Define the complex number and the four basic mathematical operations the complex conjugate and define the form of the complex number and the Cartesian and Polar representation and how to use the complex number to find the conic sections and how to use the De Moivre and Euler formulas and learn the student how to calculate the power on the roots of the complex equations.

### Part B – Complex Function

Defined the form of the complex function and how to determine its limit, continuity and its differentiability and how to find its derivative. How to find the analytical, harmonic functions and the harmonic conjugate of the complex function and define the Laplace equation in the polar coordinates.

### Part C – Elementary Functions

Define the complex form of the elementary functions like Exponential, Logarithmic, Trigonometric and Hyperbolic functions and the complex form and their inverse and the relationship between them.

### Part D – Complex Integral

Define the complex integral and the parametric equation and know how to use it to solve the complex equation and use the Cauchy's Integral formulas to solve the complex integral.

### Part E – Sequences and Series

Defined the Sequences and Series and the difference between them and defined the Taylor and Maclaurin series and the complex form of the power series.

### Part F – Residues

Define the residues, poles and the type of singularity in the complex functions.

### Part G – Physical Applications

Apply the complex functions to solve some problem in physical application.