APPLIED MATH-IV (COMPLEX VARIABLE TECHNIQUE AND FOURIER TRANSFORMATION) (GS-302)

Pre-requisite: None
Credit Hours: 03
Contact Hours: 48

RECOMMENDED BOOK(S)

Erwin Kreyszig, "WIE Advanced Engineering Mathematics," Ninth Edition, 2005, International

COURSE OBJECTIVES

To discuss the complex number system, different types of complex functions, analytic properties of complex numbers, theorems in complex analysis to carryout various mathematical operations in complex plane, roots of a complex equation. To discuss limits, continuity, differentiability, contour integrals, analytic functions and harmonic functions. Cauchy–Riemann equations in the Cartesian and polar coordinates, Cauchy's integral formula, Cauchy–Goursat theorem, convergence of sequence and series, Taylor series, Laurents series. Integral transforms with a special focus on Laplace integral transform. Fourier transform

S. No.	CLO/PLOS MAPPING	DOMAIN	PLO
1	**Define** the complex number system, complex functions, integrals of complex functions and **fourier transformation.**	C1	01
2	**Explain** the concept of limit, continuity, differentiability of complex valued functions.	C2	01
3	**Apply** the results/theorems in complex analysis to complex valued functions.	C3	02

COURSE CONTENTS

Introduction to complex number systems, Argand's diagram, modulus and argumen to fa complex number, polar form of a complex number, De Moivre's theorem and its applications, complexunctions, analytical functions, harmonic and conjugate, harmonic functions, Cauchy-Riemann equations, line integrals, Green's theorem, Cauchy'stheorem, Cauchy's integral formula, singularities, poles, residues, contourintegrationand applications; Laplace transform definition, Laplace transforms of elementary functions, properties of Laplace transform, periodic functions and their Laplace transforms, inverse Laplace transform and its properties, convolute on theorem, inverse Laplace transform by integral and partial fraction methods, Heaviside expansion formula, solutions of ordinary differential equations by Laplace transform,

applications of Laplace transforms; series solution of differential equations, validity of series solution, ordinary point, singular point, For beniusmethod, indicial equation, Bessel's differential equation, its solution of first kind and recurrence formulae, Legendre differential equation and its solution, Rodrigues formula; Fourier transform definition, Fourier transforms of simple functions, magnitude and phase spectra, Fourier transform theorems, inverse Fourier transform, solutions of differential equations using Fourier transform.