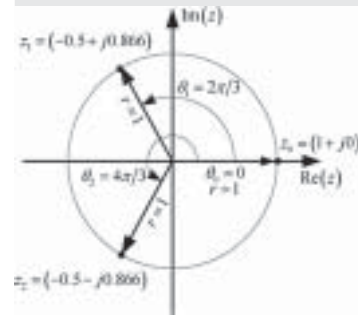


19HS202 TRANSFORMS & COMPLEX VARIABLES

Hours Per Week :

L	T	P	C
3	1	-	4



SOURCE:

[https://
www.google.com/
search?client](https://www.google.com/search?client)

COURSE DESCRIPTION AND OBJECTIVES:

To provide students with foundation in elementary topics of transformations and complex variables such as Z- and Fourier transformations, analytical functions, complex integration, theory of residues required for various engineering applications.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes
1	Apply the concept of complex integration.
2	Apply properties of transformations for various problems.
3	Analyse functions for their continuity, differentiation and analyticity.
4	Construct harmonic conjugate of a given analytic function.
5	Use residue to evaluate real integrals.

SKILLS:

- ✓ Check the analyticity of a function.
- ✓ Decide the nature of singularity.
- ✓ Apply Cauchy's theorems.
- ✓ Expand a function into Taylor series.
- ✓ Evaluate real integrals using singularities.
- ✓ Find the Laplace transformation of a given function.

UNIT - I**L-9, T-3**

Z-TRANSFORMATIONS, DIFFERENCE EQUATIONS : Introduction, Definition, Standard Z-transformations, Linear property, Damping rule, Shifting rules, Multiplication and division by n , Initial and final value theorems, Inverse Z-transformations, Convolution theorem, Solving difference equations using z-transformations.

UNIT - II**L-9, T-3**

FOURIER TRANSFORMATIONS: Fourier integral theorem, Fourier sine and cosine integrals, Fourier's complex integral, Fourier transforms, Fourier sine and cosine transforms, Properties, Convolution Theorem, Parseval's identity.

UNIT - III**L-9, T-3**

ANALYTICAL FUNCTIONS: Complex numbers, Properties including roots of a complex number (Not for testing). Functions of complex variables, Limit and Continuity, Differentiability, Analytic functions, Cauchy-Riemann equations (without proof), Cauchy-Riemann equations in polar form (without proof), Orthogonal curve, Harmonic functions, Conjugate harmonic functions, Construction of conjugate harmonic function, Milne-Thomson method.

UNIT - IV**L-9, T-3**

ELEMENTARY FUNCTIONS: Complex trigonometric functions, Hyperbolic functions, Relation between trigonometric and hyperbolic functions, Separation of real and imaginary parts of trigonometric and hyperbolic functions, Logarithmic function, Inverse functions.

COMPLEX INTEGRATION: Line integral, properties of contour integrals; Cauchy's Integral theorem, Cauchy's Integral formula and its generalization; Evaluation of integrals.

UNIT - V**L-9, T-3**

RESIDUES: Convergence of series of complex terms, Power series, Region and radius of convergence, Taylor's series, Maclaurin's series and Laurent's series; Singularity, Classification of Singularities, Pole at infinity. Zeros of analytic function, Residue of a pole, Residue at infinity, Residue theorem, Method of finding residues, Residue integrals.

TEXT BOOKS:

1. H. K. Dass and Er. Rajanish Verma, "Higher Engineering Mathematics", S. Chand & Co., 3rd edition, New Delhi, 2015.
2. B.S. Grewal, "Higher Engineering Mathematics", 44th edition, Khanna Publishers, 2015.

REFERENCE BOOKS:

1. B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill Publishing Co, 3rd edition, 2008.
2. R K Jain and S R K Iyengar, "Advanced Engineering Mathematics", 2nd Edition, Narosa Publishing House, 2007.