K L UNIVERSITY
COMPELX VARIABLES AND FINITE DIFFERENCE METHODS (13-BS 203)

Pre – requisite: Nil

L	T	P	Cr
3	0	0	3

Complex variables: Analyticity functions, Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions, Milne – Thompson method. Line integral, Cauchy's integral theorem, Cauchy's integral formula, generalized integral formula. Expansion in Taylor's series, Maclaurin's series and Laurent series. Types of singularities. Residue, Cauchy's residue theorem, evaluation of integrals by using residues, bilinear transformation and its applications.

Special functions: Bessel functions, recurrence relations for $J_n(x)$, orthogonality of Bessel functions, generating function for $J_n(x)$, integral form of Bessel's function, Jacobi's series, Legendre's equation, Rodrigues's formula, Legendre polynomials, generating function for $P_n(x)$, recurrence relation for $P_n(x)$, orthogonality of Legendre polynomials.

Finite Difference Method: boundary value problems, numerical solutions of second order linear PDEs, finite difference approximations of partial derivatives, elliptic equations-Laplace and Poisson's equations(two dimension), parabolic equations-heat equation (one dimension), hyperbolic equation- wave equation (one dimension).

Text Books:
1. Advanced Engineering Mathematics (Tenth Edition), Erwin Kreyszig.
2. Discrete Mathematical Structures with Applications to computer science J.P Tremblery, R.Manohar, TMH
3. Discrete Mathematical for computer Scientists & Mathematicians " J.L. Molt, A.Kandel T.P.Baker, PHI

Reference Books:
1. Higher Engineering Mathematics, By Dr. B.S. Grewal. Publisher: Khanna, New Delhi.
2. Discrete Mathematics, Malik, Sen, 6th ed., Cengage Learning, 2004
3. Discrete Mathematics for computer science, Bogart, Stein and Drysdale, Springer, 2005