Complex Numbers

Pre-requisite: Review of Complex Numbers-Algebra of Complex Number, Cartesian, polar and exponential form of complex number. 1.1. Statement of D'Moivre's Theorem.

1.2. Expansion of $\sin n\ \theta$, $\cos n\theta$ in terms of sines and cosines of multiples of θ and Expansion of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$

1.3. Powers and Roots of complex number.

Hyperbolic function and Logarithm of Complex Numbers

2.1. Circular functions of complex number and Hyperbolic functions. Inverse Circularand Inverse Hyperbolic functions. Separation of real and imaginary parts of all typesof Functions.

2.2 Logarithmic functions, Separation of real and Imaginary parts of Logarithmic Functions. Applications of complex number in Signal processing, Electrical circuits.

Partial Differentiation

3.1 Partial Differentiation: Function of several variables, Partial derivatives of first andhigher order. Differentiation of composite function.

3.2.Euler's Theorem on Homogeneous functions with two independent variables (with proof). Deductions from Euler's Theorem. # Self learning topics: Total differentials, implicit functions, Euler's Theorem on Homogeneous functions with three independent variables.

Applications of Partial Differentiation and Successive differentiation.

Applications of Partial Differentiation and Successive differentiation. 4.1 Maxima and Minima of a function of two independent variables, Lagrange's method of undetermined multipliers with one constraint. Successive differentiation: nth derivative of standard functions. Leibnitz's Theorem (without proof) and problems # Self learning topics: Jacobian's of two and three independent variables (simple problems)

Matrices

Pre-requisite: Inverse of a matrix, addition, multiplication and transpose of a matrix 5.1.Types of Matrices (symmetric, skew- symmetric, Hermitian, Skew Hermitian, Unitary, Orthogonal Matrices and properties of Matrices). Rank of a Matrix using Echelon forms, reduction to normal form and PAQ form. 5.2.System of homogeneous and non – homogeneous equations, their consistency and solutions.

Numerical Solutions of Transcendental Equations and System of Linear Equations and Expansion of Function.

Solution of Transcendental Equations: Solution by Newton Raphson method andRegula –Falsi. And Regula –Falsi. Solution of system of linear algebraic equations, by (1) Gauss Jacobi Iteration

Method,

(2) Gauss Seidal Iteration Method.

6.3 Taylor's Theorem (Statement only) and Taylor's series, Maclaurin's series (Statement only).Expansion of sin(x), cos(x), tan(x), sinh(x), cosh(x),

sin(x), cos(x), tan(x), sinh(x), cosh(x), tanh(x), log(1+x), ( ), ( ), ( ).

Indeterminate forms, L- Hospital Rule, Gauss Elimination Method, Gauss Jordan Method.