Module 1

Chapter 1 : Laplace Transform 1-1 to 1-34

Syllabus :

1.1 : Definition of Laplace transform, Condition of Existence of Laplace transform.

1.2 : Laplace Transform (L) of standard functions like e^{at}, sin (at), cos (at), sin h (at), cos h (at) and t^n, $n \geq 0$.

1.3 : Properties of Laplace Transform : Linearity, First Shifting Theorem, Second Shifting Theorem, Change of scale property, Multiplication by t, Division by t, Laplace Transform of derivatives and integrals (Properties without proof).

1.4 : Evaluation of real improper integrals by using Laplace Transformation.

Module 2

Chapter 2 : Inverse Laplace Transform 2-1 to 2-16

Syllabus :

2.1 : Definition of Inverse Laplace Transform, Linearity property, Inverse Laplace Transform of standard functions, Inverse Laplace transform using derivatives.

2.2 : Partial fractions method to find Inverse Laplace transform.

2.3 : Inverse Laplace transform using Convolution theorem (without proof).

Module 3

Chapter 3 : Fourier Series 3-1 to 3-54

Syllabus :

3.1 : Dirichlet's conditions, Definition of Fourier series and Parseval's Identity (without proof).

3.2 : Fourier series of periodic function with period 2π and $2l$.

3.3 : Fourier series of even and odd functions.

3.4 : Half range sine and cosine series.

Module 4

Chapter 4 : Complex Variables 4-1 to 4-31

Syllabus :

4.1 : Function f (z) of complex variable, Limit, Continuity and Differentiability of f (z), Analytic function : Necessary and sufficient conditions for f (z) to be analytic (without proof).

4.2 : Cauchy-Riemann equations in Cartesian coordinates (without proof).

4.3 : Milne-Thomson method : Determine analytic function f (z) when real part (u), imaginary part (v) or its combination (u + v / u – v) is given.

4.4 : Harmonic function, Harmonic conjugate and Orthogonal trajectories.

Module 5

Chapter 5 : Matrices 5-1 to 5-38

Syllabus :

5.1 : Characteristic equation, Eigen values and Eigen vectors, Properties of Eigen values and Eigen vectors. (No theorems/ proof)

5.2 : Cayley-Hamilton theorem (without proof): Application to find the inverse of the given square matrix and to determine the given higher degree polynomial matrix.

5.3 : Functions of square matrix.

5.4 : Similarity of matrices, Diagonalization of matrices.

Module 6

Chapter 6 : Numerical Methods for PDE 6-1 to 6-28

Syllabus :

6.1 : Introduction of Partial Differential equations, Method of separation of variables, Vibrations of string, Analytical method for one dimensional heat and wave equations. (only problems)

6.2 : Crank Nicholson method.

6.3 : Bender Schmidt method.

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