

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.

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1.2	Properties of Laplace Transform	1-3
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1.2.2	Change of Scale Property	1-5
1.2.3	First Shifting Property	1-6
1.2.4	Second Shifting Property.....	1-11
1.2.5	Effect of Multiplication by 't'	1-11
1.2.6	Effect of Division by 't'	1-17
1.2.7	Laplace Transform of Derivative.....	1-21
1.2.8	Laplace Transform of Integral.....	1-24
1.3	Evaluation of Integral using Laplace Transform.....	1-28

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).

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2.4	Evaluation of Inverse Laplace Transform using Derivative : ($\log, \tan^{-1}, \cot^{-1}, \tan h^{-1}$).....	2-10

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.

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3.2	Fourier Series	3-1
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3.3.5	Examples based on Even and Odd Functions in $(-\pi, \pi)$	3-41
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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.	

4.1	Complex Variables	4-1
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Module 5

Chapter 5 : Linear Algebra : Matrix Theory 5-1 to 5-38

Syllabus :	
5.1 :	Characteristic equation, Eigen values and Eigen vectors, Example based on properties of Eigen values and Eigen vectors.(Without Proof).
5.2 :	Cayley-Hamilton theorem (Without proof), Examples based on verification of Cayley-Hamilton theorem and compute inverse of Matrix.
5.3 :	Similarity of matrices, Diagonalization of matrices, Functions of square matrix.

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Module 6

Chapter 6 : Vector Differentiation and Integral

6-1 to 6-44

Syllabus :

6.1 :	Vector differentiation : Basics of Gradient, Divergence and Curl (Without Proof).
6.2 :	Properties of vector field : Solenoidal and irrotational (conservative) vector fields.
6.3 :	Vector integral : Line Integral, Green's theorem in a plane (Without Proof), Stokes' theorem (Without Proof) only evaluation.

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