

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} , $\sin(at)$, $\cos(at)$, $\sinh(at)$, $\cosh(at)$ 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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1.3	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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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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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.

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 4.6 Orthogonal Trajectories4-27

Module 5

Chapter 5 : Statistical Techniques 5-1 to 5-40

Syllabus :
 5.1 : Karl Pearson's coefficient of correlation (r).
 5.2 : Spearman's Rank correlation coefficient (R) (with repeated and non-repeated ranks).
 5.3 : Lines of regression.
 5.4 : Fitting of first-degree and second-degree curves.

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Module 6

Chapter 6 : Probability 6-1 to 6-34

Syllabus :
 6.1 : Definition and basics of probability, Conditional probability.
 6.2 : Total Probability theorem and Bays' theorem.
 6.3 : Discrete and continuous random variable with probability distribution and probability density function.
 6.4 : Mathematical Expectation, Variance and covariance.
 6.5 : Moment generating function, Raw and central moments up to fourth order.

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