

SEMESTER-III

COURSE 7: LAPLACE TRANSFORMS

Theory

Credits: 4

5 hrs/week

Course Outcomes

After successful completion of this course, the student will be able to

1. understand the definition and properties of Laplace transformations
2. get an idea about first and second shifting theorems and change of scale property
3. understand Laplace transforms of standard functions like Bessel, Error function etc
4. know the reverse transformation of Laplace and properties
5. get the knowledge of application of convolution theorem

Course Content

Unit – 1

LAPLACE TRANSFORMS – I

Definition of Laplace Transform - Linearity Property - Piecewise Continuous Function - Existence of Laplace Transform - Functions of Exponential order and of Class A.

Unit – 2

LAPLACE TRANSFORMS – II

First Shifting Theorem, Second Shifting Theorem, Change of Scale Property, Laplace transform of the derivative of $f(t)$, Initial value theorem and Final value theorem.

Unit – 3

LAPLACE TRANSFORMS – III

Laplace Transform of Integrals - Multiplication by t , Multiplication by t^n - division by t - Laplace transform of Bessel Function - Laplace Transform of Error Function - Laplace transform of Sine and Cosine integrals.

Unit – 4

INVERSE LAPLACE TRANSFORMS – I

Definition of Inverse Laplace Transform - Linearity Property - First Shifting Theorem - Second Shifting Theorem - Change of Scale property - use of partial fractions - Examples.

Unit – 5

INVERSE LAPLACE TRANSFORMS – II

Inverse Laplace transforms of Derivatives - Inverse Laplace Transforms of Integrals - Multiplication by Powers of 'p' - Division by powers of 'p' - Convolution Definition - Convolution Theorem - proof and Applications - Heaviside's Expansion theorem and its Applications.

Activities

Seminar/ Quiz/ Assignments/ Applications of Laplace Transforms to Real life Problem /Problem Solving Sessions.

Text Book

Laplace Transforms by A.R. Vasishtha, Dr. R.K. Gupta, Krishna Prakashan Media Pvt. Ltd., Meerut.

Reference Books

1. Introduction to Applied Mathematics by Gilbert Strang, Cambridge Press
2. Laplace and Fourier transforms by Dr. J.K. Goyal and K.P. Gupta, Pragathi Prakashan, Meerut.
