

SEMESTER-IV

COURSE 11: INTEGRAL TRANSFORMS WITH APPLICATIONS

Theory

Credits: 4

5 hrs/week

Learning Outcomes

Students after successful completion of the course will be able to

1. understand the application of Laplace transforms to solve ODEs
2. understand the application of Laplace transforms to solve Simultaneous DEs
3. understand the application of Laplace transforms to Integral equations
4. basic knowledge of Fourier-Transformations
5. Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms.

Course Content

Unit – 1

Application of Laplace Transform to solutions of Differential Equations

Solutions of ordinary Differential Equations - Solutions of Differential Equations with constant coefficients - Solutions of Differential Equations with Variable coefficients.

Unit – 2

Application of Laplace Transform to solutions of Differential Equations

Solutions of Simultaneous Ordinary Differential equations - Solutions of Partial Differential Equations.

Unit – 3

Application of Laplace Transforms to Integral Equations

Definitions of Integral Equations - Abel's Integral Equation - Integral Equation of Convolution Type - Integral Differential Equations - Application of L.T. to Integral Equations.

Unit – 4

Fourier Transforms - I

Definition of Fourier Transform - Fourier sine Transform - Fourier cosine Transform - Linear Property of Fourier Transform - Change of Scale Property for Fourier Transform - sine Transform and cosine transform shifting property - Modulation theorem.

Unit – 5

Fourier Transforms – II

Definition of Convolution - Convolution theorem for Fourier transform - Parseval's Identity - Relationship between Fourier and Laplace transforms - problems related to Integral Equations - Finite Fourier Transforms - Finite Fourier Sine Transform - Finite Fourier Cosine Transform - Inversion formula for sine and cosine transforms only - statement and related problems.

Activities

Seminar/ Quiz/ Assignments/Applications of Integral Transforms in real life problems /Problem Solving Sessions.

Text Book

B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.

Reference Book

1. Fourier Series and Integral Transformations by Dr.S. Sreenadh and others, published by S.Chand and Co, New Delhi
2. E.M. Stein and R. Shakarchi, Fourier analysis: An introduction, (Princeton University Press, 2003).
3. R.S. Strichartz, A guide to Distribution theory and Fourier transforms, (World scientific, 2003).
