

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

VI SEMESTER

MATHEMATICS

TIME: 5 Hrs/Week

M- A₁-6301(3)

w.e.f. 2017-2018

INTEGRAL TRANSFORMS

Max. Marks:100

Course Objectives:

To enable the students to

- Know and understand the problems and identities
- Synthesize the knowledge to formulate conclusions
- Solve simultaneous ordinary differential equations and partial differential equations using the Laplace transforms.
- Solve the various types of integral equations by using Laplace transforms.
- Find the Fourier transforms of sine and cosine transforms
- Find the convolution of two functions and relation between Fourier and Laplace transforms.

Learning Outcomes:

After successful completion of the course students should be able to:

- **CO1:** Laplace transforms is widely used by electronic engineers to **solve quickly differential equations** occurring in the analysis of electronic circuits.
- **CO2:** Simplify calculations in system modeling, one cannot imagine solving digital signal processing problems, without employing Laplace transforms.
- **CO3:** In order to get the true form of radioactive decay a Laplace transforms is used. It makes easy to study analytic part of Nuclear physics possible.
- **CO4:** Laplace transforms is a veritable tool in virtually all science related fields as it helps in dealing majorly with differential equations arising from these fields.
- **CO5:** Fourier transforms useful in the **study of solution of partial differential equations** to solve initial boundary value problems.
- **CO6:** Fourier transforms use in signal and image processing, cell phones.
- **CO7:** Fourier transforms resolves function or signals into its mode of vibration. It is used in designing electrical circuits, signal processing, cell phones, signal analysis, image processing and filtering.
- **CO8:** Apply the principles in engineering, physics and other Allied Sciences
- **CO9:** Apply the theories in every branch of science and also in Commerce and Management Systems.

COURSE SYLLABUS:

UNIT – 1 Application of Laplace Transform to solutions of Differential Equations :

Solutions of Ordinary Differential Equations.

Solutions of Differential Equations with Constants Co-efficient

Solutions of Differential Equations with Variable Co-efficient

UNIT – 2 Applications of Laplace Transform :

Solutions of Simultaneous Ordinary Differential Equations.

Solutions of Partial Differential Equations.

UNIT – 3 Application of Laplace Transforms to Integral Equations :

Definitions : 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's in 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 Transform-II :

Convolution Definition – 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).

Prescribed Text Book :

Integral Transforms by A.R. Vasistha and Dr. R.K. Gupta Published by Krishna Prakashan Media Pvt. Ltd. Meerut. (2010).

Reference Books :-

1. A Course of Mathematical Analysis by Shanthi Narayana and P.K. Mittal, Published by S. Chand and Company pvt. Ltd., New Delhi.(2006)
2. Fourier Series and Integral Transforms by Dr. S. Sreenadh Published by S.Chand and Company Pvt. Ltd., New Delhi.(2016)
3. Lapalce and Fourier Transforms by Dr. J.K. Goyal and K.P. Gupta, Published by Pragathi Prakashan, Meerut. (2016)
4. Integral Transforms by M.D. Raising hania, - H.C. Saxsena and H.K. Dass Published by S.Chand and Company pvt. Ltd., New Delhi. (2014)