MATHEMATICAL TRANSFORM TECHNIQUES

II Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
AHS011	**Foundation**	3	1	-	4	30	70	100

Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil	Total Classes: 60

I. COURSE OVERVIEW:

The course focuses on more advanced engineering mathematics topics which provide with the relevant mathematical tools required in the analysis of problems in engineering and scientific professions.The course includes types of matrices, difference calculus methods and differential equations. The mathematical skills derived from this course form a necessary base to analytical and design concepts encountered in the program.

II. OBJECTIVES:

The course should enable the students to:

I	The operation of non-periodic functions by Fourier transforms.
II	The transformation of ordinary differential equations in Laplace field and itsapplications
III	Z-transforms to solve the difference equations
IV	The partial differential equation for solving non-linear equations

III. COURSE OUTCOMES:

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

CO 1	**Explain** the nature of the Fourier series that represent even and oddfunctions.	Understand
CO 2	**Apply** to compute the Fourier series of the function with one variable.	Apply
CO 3	**Identify** the role of Fourier transform non-periodic functions up to infinity as a mathematical function in transforming a signal from the time domain to the frequency domain	Apply
CO 4	**Explain** the properties of Laplace and inverse transform to various functions the integral transforms operations of calculus to algebra inlinear differential equations	Apply
CO 5	**Compute** the Z-transforms and inverse of Z-transforms to difference equations by using the methods of partial fractions and convolution method.	Apply
CO 6	**Solve** the linear, nonlinear partial differential equation by the methodof Lagrange's, separable and Char pit to concern engineering field	Apply

IV. SYLLABUS:

UNIT-I	FOURIER SERIES	Classes: 09

Definition of periodic function, determination of Fourier coefficients; Fourier expansion of periodic function in a given interval of length 2π; Fourier series of even and odd functions; Fourier series in an arbitrary interval; Half- range Fourier sine and cosine expansions.

UNIT-II	FOURIER TRANSFORMS	Classes: 08

Fourier integral theorem, Fourier sine and cosine integrals; Fourier transforms; Fourier sine and cosine transform, properties, inverse transforms, finite Fourier transforms.

UNIT-III	LAPLACE TRANSFORMS	Classes: 10

Definition of Laplace transform, linearity property, piecewise continuous function, existence of Laplace transform, function of exponential order, first and second shifting theorems, change of scale property,

Laplace transforms of derivatives and integrals, multiplied by t, divided by t, Laplace transform of periodic functions.

Inverse Laplace transform: Definition of Inverse Laplace transform, linearity property, first and second shifting theorems, change of scale property, multiplied by s, divided by s; Convolution theorem and applications.

UNIT-IV	Z –TRANSFORMS	Classes: 09

Z-transforms: Elementary properties, inverse Z-transform, convolution theorem, formation and solution of difference equations.

UNIT-V	PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS	Classes: 09

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equation by Lagrange method; Charpit's method; method of separation of variables; One dimensional heat and wave equations under initial and boundary conditions.

Text Books:

1. Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons Publishers, 10th Edition, 2010.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2013.

Reference Books:

1. S. S. Sastry, "Introduction methods of numerical analysis", Prentice-Hall of India Private Limited, 5th Edition, 2005
2. G. Shanker Rao, "Mathematical Methods", I. K. International Publications, 1st Edition, 2011.

Web References:

1. https://www.efunda.com/math/math_home/math.cfm
2. https://www.ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E-Text Books:

1. https://www.keralatechnologicaluniversity.blogspot.in/2015/06/erwin-kreyszig-advanced-engineering-mathematics-ktu-ebook- download.html
2. https://www.faadooengineers.com/threads/13449-Engineering-Maths-II-eBooks

Course Home Page: