MATHEMATICAL TRANSFORM TECHNIQUES

II Semester: EEE III Semester: ECE/ AERO IVSemester:ME / CE

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		

OBJECTIVES:

The course should enable the students to:

I. Express non periodic function to periodic function using Fourier series and Fourier transforms.
II. Apply Laplace transforms and Z-transforms to solve differential equations.
III. Formulate and solve partial differential equations.

COURSE LEARNING OUTCOMES (CLOs):

1. Ability to compute the Fourier series of the function with one variable Understand the conditions.
2. Understand the nature of the Fourier series that represent even and odd functions.
3. Determine Half- range Fourier sine and cosine expansions
4. Understand the concept of Fourier series to the real-world problems of signal processing
5. Understand the nature of the Fourier integral.
6. Ability to compute the Fourier transforms of the function.
7. Evaluate finite and infinite Fourier transforms.
8. Understand the concept of Fourier transforms to the real-world problems of circuit analysis, control system design
9. Solving Laplace transforms using integrals.
10. Evaluate inverse of Laplace transforms by the method of convolution.
11. Solving the linear differential equations using Laplace transform.
12. summarize the concept of Laplace transforms to the real-world problems of electrical circuits, harmonic oscillators, optical devices, and mechanical systems
13. Apply Z-transforms for discrete functions.
14. Evaluate inverse of Z-transforms using the methods of partial fractions and convolution method.
15. Apply Z-transforms to solve the difference equations.
16. Understand the concept of Z-transforms to the real-world problems of automatic controls in telecommunication.
17. Understand partial differential equation for solving linear equations by Lagrange method.
18. Apply the partial differential equation for solving non-linear equations by Charpit's method.
19. Solving the heat equation and wave equation in subject to boundary conditions.
20. Summarize the concept of partial differential equations to the real-world problems of electromagnetic and fluid dynamics
21. Possess the knowledge and skills for employability and to succeed in national and international level competitive examinations

UNIT-I	FOURIER SERIES	Classes: 10

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: 8
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: 9**
Z-transforms: Elementary properties, inverse Z-transform, convolution theorem, formation and solution of difference equations.		
UNIT-V	**PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS**	**Classes: 8**
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, 43rd Edition, 2015.

REFERENCES:

1. G. Shanker Rao, "Mathematical Methods", I. K. International Publications, 1st Edition, 2009.
2. G. Shanker Rao, "Engineering Mathematics-1", I. K. International Publications, 1st Edition, 2009.

Web References:

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

E-Text Books:

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