20MA203T					Mathematics – III: Electrical Engineering					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs. / Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To understand the concept of Fourier series and its application to the solution of partial differential equations.
- To introduce the Fourier transforms and Z-transforms.
- To study the first and second order partial differential equations.
- To use this course as a base for higher studies and for accomplishing the projects at higher semesters.

UNIT 1 FOURIER SERIES **10 Hrs.**

Periodic functions, Euler's formulae, Dirichlet's conditions, expansion of even and odd functions, half range Fourier sine and cosine series, Parseval's formula, complex form of Fourier series.

UNIT 2 FOURIER TRANSFORM AND Z-TRANSFORM **10 Hrs.**

Fourier Transform: Integral transform, Fourier integral theorem, Fourier sine and cosine integrals, Fourier transforms, Fourier sine and cosine transforms, Properties of Fourier transform, Convolution, Parseval's identity, Relationship between Fourier and Laplace transform.

Z-transform: Z - transform, Properties of Z-transforms, Convolution of two sequences, inverse Z-transform, Solution of Difference equations

UNIT 3 PARTIAL DIFFERENTIAL EQUATIONS OF FIRST ORDER **10 Hrs.**

Formation of Partial Differential Equations (PDEs), Solutions of PDEs of first order, Cauchy problem for first order PDEs, Lagrange's method, Charpit and Jacobi methods for solving first order nonlinear PDEs

UNIT 4 PARTIAL DIFFERENTIAL EQUATIONS OF SECOND ORDER **10 Hrs.**

Classification of second order Partial Differential Equations, Method of separation of variables. Fourier Series Solutions of one-dimensional wave equation, One dimensional heat conduction, two dimensional Laplace equations.

40 Hrs.

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Identify the partial differential equations of first and second order in order to model or understand the Electrical Engineering applications.

CO2 – Understand the techniques of Fourier transforms and Z-transforms to understand the critical mathematical problems.

CO3 – Apply the methods of Fourier series, Fourier transform and Z-transform in understanding and solving the basic Electrical Engineering problems.

CO4 – Classify the second order partial differential equations and solve using method of separation of variables.

CO5 – Appraise the series representation of periodic functions using Fourier series.

CO6 – Formulate the first order partial differential equations and solve them using various analytical techniques.

TEXT / REFERENCE BOOKS

1. H. K. Dass, Advanced Engineering Mathematics, 21st ed., S. Chand & Company Ltd., 2013.
2. R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, 3rd ed., Narosa Publishing House, 2002.
3. E. Kreyszig, Advanced Engineering Mathematics, 10th ed., John Wiley & Sons, 2016.
4. Peter V. O'Neil, Advanced Engineering Mathematics, 8th ed., Cengage Learning, 2017.
5. K. Sankara Rao, Introduction to Partial Differential Equations, 3rd ed., PHI Learning, 2011.
6. T. Amaranth, An Elementary Course in Partial Differential Equations, 2nd ed., Narosa Publishing House, New Delhi, 2003.