Statistical – Numerical – Fourier Techniques
(Common to all branches)

Course Code	18MATIS31	Credits	4
Course type	BS	CIE Marks	50
Hours/week: L-T-P	4-0-0	SEE Marks	50
Total Hours:	50	SEE Duration	3 Hours for 100 marks

Course Learning Objectives(CLO's)

Students should

1. Learn Numerical methods to solve Algebraic, Transcendental and Ordinary Differential Equations.
2. Understand the concept of Fourier series and apply when needed.
3. Get acquainted with Fourier Transforms and its properties.
4. Study the concept of Random variables and its applications.
5. Get acquainted with Joint Probability Distribution and Stochastic processes.

Pre-requisites :

1.Basic Differentiation and Integration
2. Basic Probability
3. Basic Statistics

Unit – I — 10 Hours

Numerical solution of Algebraic and Transcendental equations:
Method of False position, Newton- Raphson method (with derivation), Fixed point iteration method (without derivation).
Numerical solution of Ordinary differential equations: Taylor's Series method, Euler and Modified Euler method, Fourth order Runge–Kutta method

Unit - II — 10 Hours

Fourier Series: Periodic functions. Dirichlet's conditions, Fourier series, Half range Fourier sine and cosine series. Practical examples, Harmonic analysis.

Unit - III — 10 Hours

Fourier Transforms: Infinite Fourier Transform and Properties. Fourier Sine and Cosine Transforms Properties and Problems.

Unit - IV — 10 Hours

Probability: Random Variables (RV), Discrete and Continuous Random variables, (DRV,CRV) Probability Distribution Functions (PDF) and Cumulative Distribution Functions(CDF), Expectations(Mean, Variance). Binomial, Poisson, Exponential and Normal Distributions. Practical examples.

Unit - V — 10 Hours

Joint PDF and Stochastic Processes: Discrete Joint PDF, Conditional Joint PDF, Expectations (Mean, Variance and Covariance).Definition and classification of stochastic processes. Discrete state and discrete parameter stochastic process, Unique fixed probability vector, Regular Stochastic Matrix, Transition probability, Markov chain.