19MA202T Numerical and Statistical Methods										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs./Week	Theory		IA	LW	LE /Viva	Total Marks
					MS	ES				
3	1	---	4	4	25	50	25	---	---	100

COURSE OBJECTIVES:

1. To understand the numerical solution of algebraic, transcendental and system of linear equations.
2. To apply the concept of interpolation and extrapolation for the given data sets.
3. To understand the concept of solving integration and differential equations numerically for various real world problems.
4. To apply the probability distribution functions and statistical measurements in different problems.

UNIT I **[10]**

Numerical Solution of System of linear equations & non-linear equations: Solution of transcendental and non-linear equations by Bisection, Regula Falsi, Newton's Raphson and Secant method. Solution of a system of linear simultaneous equations by LU Decomposition, Cholesky Decomposition, Jacobi and Gauss Seidel methods. Concept of Ill conditioned system.

UNIT II **[10]**

Interpolation and Extrapolation: Introduction of Finite differences, Operators, Newton Gregory Forward Interpolation Formula, Newton Gregory Backward Interpolation Formula, Gauss's Forward and Backward Interpolation Formula, Stirling's Central Difference Formula, Lagrange's Interpolation Formula for unevenly spaced data, Inverse Interpolation, Divided Differences, Properties of Divided Differences, Newton's Divided Difference Formula, Relation between Divided Differences and Ordinary Differences.

UNIT III **[10]**

Numerical differentiation and Integration: Formulae for Derivatives, Newton-Cotes's Quadrature Formula, Trapezoidal rule, Simpson's one-third rule, Simpson's Three-Eighth rule, Weddle's rule, Romberg's method, Double Integration.

Numerical solution of solution of ODE - Numerical solution of first order ordinary differential equation by Taylor series method, Picard's method, Euler's Method, Modified Euler's method and Runge-Kutta (4^{th} order only) method. Multi step methods: Adams - Moulton method and Milne's method.

UNIT IV **[9]**

Probability & Statistics: Random variable-discrete and continuous. Distribution function and their properties, probability mass and density functions. Mathematical Expectation, Moment Generating Function and its properties. Probability distributions:

Bernoulli, Binomial, Negative Binomial, Poisson and Normal Distributions. Theory of least squares and curve fitting. Correlation - Simple, Regression lines and Regression coefficients.

Tutorials **[13]**

TOTAL **52 Hours**

Text Books and References

1. B.S. Grewal, Numerical Methods in Engineering and Science with Programs in C & C++,Khanna Publishers (2010).
2. S.S. Sastry, Introductory Methods for Numerical Analysis,4th Ed., Prentice Hall of India (2009).
3. M.K. Jain, S.R.K. Iyenger and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 5thEd., New Age International (2007).
4. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, S. Chand Publisher (2007).
5. R.K. Jain & S.R.K. Iyenger,Advanced Engineering Mathematics, 3rdEd., Narosa (2002).

COURSE OUTCOMES:

1. Enable to get the numerical solution of algebraic, transcendental and system of linear equations.
2. Enable to find the missing data points form the given data using interpolation and extrapolation.
3. Enable to integrate data set in the absence of actual function using numerical integration.
4. Enable to apply various probability distribution functions and statistical measurements in different problems.