Course Objectives:

To understand the numerical methods and how they apply to problems of science and engineering. To apply the knowledge of these methods to solve practical problems with MATLAB.

Numerical Analysis (18BSM501)										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	--	4	4	25	50	25	--	--	100

UNIT I **9 hours**

Introduction, errors in numerical methods, 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, Jacobi and Gauss Seidel methods.

UNIT II **10 hours**

Interpolation, errors estimation in interpolation, Finite and divided differences. Interpolation in equal and unequal intervals, Relations between operators, Newton's Gregory Forward & backward Interpolation Formula, Gauss's Forward and Backward and Stirling's Interpolation Formula, Lagrange's and Newton's Divided Difference Interpolation Formula.

UNIT III **10 hours**

Introduction to numerical differentiation & integration, Newton-Cotes's Quadrature Formula, Trapezoidal rule, Simpson's one-third rule Simpson's Three-Eighth rule, Weddle's rule, Gauss quadrature formula.

UNIT IV **10 hours**

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.

APPROXIMATE TOTAL 39 Hours

Text and Reference books

1. 1. Numerical Methods in Engineering and Science with Programs in C & C++ by B.S. Grewal, Khanna Publisher (2010)
2. Introductory Methods for Numerical Analysis by S.S. Sastry, Fourth edition, Prentice Hall of India (2009)
3. Numerical Methods for Scientific and Engineering Computation by M.K. Jain, S.R.K. Iyenger and R.K. Jain, 5^{th} edition, New Age International (2007)
4. Numerical Recipes by WH Press, SA Teukolsky, WT Vetterling and BP Flannery, 3^{rd} edition, Cambridge University Press.

Course Outcomes:

On completion of this course students will be expected to

1. use numerical methods for solving a problem,
2. locate and use good mathematical software,
3. get the accuracy you need from the computer,
4. assess the reliability of the numerical results, and
5. determine the effect of roundoff error or loss of significance