18BSM501T – Numerical Analysis										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		TotalMarks
					MS	ES	IA	LW	LE/Viva	
3	1	--	4	4	25	50	25	--	--	100

OBJECTIVES

1. Developing understanding of Numerical Methods.
2. How Numerical Methods could be applied in problems of science and engineering.
3. Methods to solve practical problems using MATLAB.

SYLLABUS

UNIT I	**09**

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**

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, Lagrange's and Newton's Divided Difference Interpolation Formula.

UNIT III	**10**

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**

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, Numerical Solution for partial differential equation, Finite Difference Method: Explicit & Implicit Method, Crank-Nicolson Method

UNIT-V	**13**

Useful NPTEL Lectures Link:

(1) https://nptel.ac.in/courses/111101003/
(2) https://nptel.ac.in/courses/122104019/
(3) https://nptel.ac.in/courses/111107062/
(4) https://nptel.ac.in/courses/103101009/

APPROXIMATE TOTAL	**52 Hours**

OUTCOMES

1. Using numerical methods for solving a various problems.
2. Locate and use good mathematical software.
3. Get the accuracy you need from the computer,
4. Assess the reliability of the numerical results

5. Determine the effect of roundoff error or loss of significance
6. Learn methods for solving ODE and PDE

TEXTS AND REFERENCES

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, 5th edition, New Age International (2007)
4. Numerical Recipes by WH Press, SA Teukolsky, WT Vetterling and BP Flannery, 3rd edition, Cambridge University Press.
5. Elementary Numerical Analysis An Algorithmic Approach by S.D. Conte, Carl, de Boor,Third Edition, McGraw Hill Book Company.