

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Numerical Analysis
2.	Course Number	MA2024
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered To	UG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Mathematics
8.	To take effect from	July 2019
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective: This course is to introduce the basic concepts of numerical analysis to the students. To learn how to find roots of a polynomial or a non-linear equation, and interpolate a polynomial. To demonstrate methods to solve differential equations and system of linear equations numerically. To identify different methods to find the approximate integration.	
12.	Course Content: Introduction: Round-off Error, Truncation Error, Errors in Scientific and Engineering Computation. Interpolation: Lagrange's interpolation, forward, backward and divided differences, error of the interpolating polynomial. Numerical Solutions of Nonlinear Equations: Bisection method, regula-falsi, secant method, Newton's method, fixed-point iteration, convergence acceleration for fixed-point iteration, real roots of polynomials, complex roots of polynomials. Numerical Integration: Basic methods of numerical integration, Gaussian rules, composite rules, adaptive quadrature. Solution of a System of Linear Equations: Gaussian elimination, pivoting strategy, LU- factorization, Cholesky's method, ill-conditioning, norms, Jacobi and Gauss-seidel methods, partial pivoting. Numerical Solution of Differential Equations: Taylor series method, Euler method, Runge-Kutta method, predictor-corrector methods for initial value problems, Adams-Moulton method, shooting method and finite difference methods for boundary value problems.	
13.	Text book(s): 1. E. Kreyzig, <i>Advanced Engineering Mathematics</i> , John Wiley & Sons, (2010).	
14.	Reference(s): 1. F. B. Hildebrand, <i>Introduction to Numerical Analysis</i> , Tata McGraw-Hill, (1993). 2. S. D. Conte, C. deBoor, <i>Elementary Numerical Analysis-An Algorithmic Approach</i> , McGraw-Hill, (1980).	