NUMERICAL ANALYSIS & COMPUTATION THEORY**(GS-401)**

Pre-requisite: None
Credit Hours: 02
Contact Hours: 32

RECOMMENDED BOOK(S)

Numerical Analysis by Richard L Burden and J Douglas Fairs
Numerical Analysis by Francis Scheid, Schaum‟s outline series, McGraw Hill
Applied Numerical Analysis by Curtis F Gerald, Addison-Wesley
Introduction to Numerical Analysis by F B Hillbrand, Tata McGraw Hill

COURSE OBJECTIVES

To provide understanding of main sources of numerical errors and the power of numerical methods that minimize these errors
To understand the implementation of numerical methods to the solution of engineering problems

S. No.	CLO/PLOS MAPPING	DOMAIN	PLO
1	**Explain** main sources of numerical errors.	C2	01`
2	**Apply** appropriate numerical methods to the engineering and science problems to reduce numerical errors	C3	02

COURSE CONTENTS

Introduction, basic ideas, concepts and terminology, , essential elements of numerical analysis, continuum formulation, solution domain, discretization, solution algorithm, polynomials and finite differences, round-off and solution errors, introduction to Least-square, Min-max, cubic splines, and piece-wise osculating polynomials, collocation polynomials and finite differences, round-off and solution errors, introduction to Least-square, Min-max, cubic splines, and piece-wise osculating polynomials, collocation polynomials with advantages and disadvantages, Newton forms of linear interpolation and quadratic interpolation polynomials, Progression of forward, backward and central differences in tabular form, and construction of polynomials, operator algebra, solution of equation with one, two and three variables, III-conditioning of equations set, direct methods of solution, Gaus elimination method, LU decomposition method, matrix inversion, iterative methods of solution, Eign-value problems, characteristics polynomial and the stability criterion, solution of first order ordinary differential equations, initial value and boundary value problems, Euler predictor method and Euler predictor cum corrector method of solving and ordinary differential equation, one-step solution methods second order Runge-Kutta method.