

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M.E. Civil (Geotechnical Engineering)**  
**Semester: I**

Subject Name: **Numerical Methods in Geotechnical Engineering**  
**(Major Elective - I)**  
Subject Code: **714304**

<b>Sr. No</b>	<b>Course content</b>
1.	Error analysis, types of errors, accuracy & precision, stability in numerical analysis.
2	Empirical laws and curve fitting.
3	Interpolation & extrapolation, general, interpolation formulae, numerical differentiation & integration / solution of large systems of linear equations, use of software, solution of banded equations, transcendental equations.
4	Solution of non – linear algebraic equations, Newton – Raphson iterative method, numerical solutions of ordinary differential equations and partial differential equations using finite difference technique, its applications to structural engineering problems.
5	Solution of Eigen value problems, iterative methods & transformation methods, Use of software for transformation methods. Computer oriented algorithms.
6	Laplace transform methods, Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation.
7	Euler's equation - Functional dependant on first and higher order derivatives
8	Correlation and regression, Principles of least squares
9	Computational aspects of elimination and in-situ factorization methods for solution of large system of equations for dynamic problems, Eigen solution of large problems, Numerical differentiation, quadrature methods, Response evaluation by the Integration of ordinary differential equations, applications to geotechnical engg

**References Books:**

1. Numerical methods in Engineering Salvadori & Baron
2. Numerical Methods in Finite Element Analysis Bathe & Wilson
3. Advanced Mathematics Kresysig
4. Numerical Analysis Scarborough
5. Numerical Methods in Geotechnical Engg, Desai Chandrakant S, Christian John T