

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Semester: 1

Civil Engineering (Computer Aided Structural Analysis & Design)

Subject Name Numerical Methods (Major Elective I)

Sr. No	Course content
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

Reference Books:

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|---|-------------------|
| 1) Numerical methods in Engineering | Salvadori & Baron |
| 2) Numerical Methods in Finite Element Analysis | Bathe & Wilson |
| 3) Advanced Mathematics | Kresysig |
| 4) Numerical Analysis | Scarborough |