Name of Subject	Numerical Computation Lab	
L-T-P	1-0-3	
Credits	3	
Name of the Department	Civil Engineering	
Status of the subject	(a) Semester: Spring (b) Level of Subject: 1st year UG (c) Nature of Subject: Core (d) Semester to be offered: 1st (e) Programme in which the course is included: B.Tech. (H) in Civil Engineering	
Prerequisites	None	
Objectives	This laboratory introduces the concept of numerical computation in Civil Engineering. The students are expected to learn about the different computational techniques such as curve fitting, interpolation, numerical differentiation and integration, solution to linear and non-linear algebraic equations, solution of ODEs and PDEs, eigenvalue analysis, matrix inversion, Fast Fourier Transform	
Names of the faculty members of the department who have the necessary expertise to teach the course	All Civil Engineering Faculty	
Any overlap with existing subjects	NONE	
Recommended Text Books	1. "Numerical Methods in Engineering with Python 3" by Jaan Kiusalaas 2. Hoffman, Joe D., and Steven Frankel. Numerical methods for engineers and scientists. CRC press, 2018	
Topics to be Covered	**Name of the Topic**	**Hourly Breakup**
	Floating point representation of a number, errors associated, iterative and bisection methods for solving nonlinear equations	Week 1
	Secant method and Newton-Raphson method for solving nonlinear equations	Week 2
	Gauss elimination and LU decomposition method for solving linear system of equations	Week 3
	Gauss-Siedel and Gauss Jacobi methods for solving linear system of equations	Week 4
	Power Method and Shifted Inverse Power Method for calculating eigenvalues of a matrix	Week 5

	Interpolating polynomial using Newton's Forward and Backward Difference expressions, Stirling and Lagrange interpolation, Spline and Cubic Spline Interpolation	Week 6
	Numerical Differentiation and Integration	Week 7
	Solution of ODEs	Week 8
	Solution of ODEs (contd.)	Week 9
	Solution of PDEs	Week 10
	Solution of PDEs (contd.)	Week 11
	Fast Fourier Transform	Week 12