SE551: Numerical Methods for Structural Engineering

Teaching Scheme			Credits	Marks Distribution				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	
3	2	0	5	70	30	30	20	150

Course content:

Sr. No.	Topics	Teaching Hrs.
1	**Error analysis:** Types of errors, accuracy & precision, stability in numerical analysis.	02
2	**Empirical laws and curve fitting:** Interpolation & extrapolation, general, interpolation formulae, numerical, differentiations and integration / solution of large system of linear equations, use of software, solution of banded equations.	13
3	**Solution of non-linear algebraic and transcendental equations:** Newton-raphson iterative approach, Numerical solutions of ordinary differential equations and partial differential equations using finite difference technique, its applications to structural engineering problems.	10
4	**Eigen Value Problems :** Solution of Eigen value problems, iterative methods & transformation methods. Applications to Structural Dynamic problems, stress problems, buckling of columns.	06
5	**Laplace transformation:** Laplace transform methods, Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation.	06
6	**Euler's Equation:** Euler's Equation - functional dependant on first order and higher order derivatives.	04

7	**Statistics:**	04

Correlation and regression, Principles of least squares, Introduction to design of experiments.

	Total Hrs.	**45**

Reference Books:

1. Salvadori and Baron, "*Numerical methods in Engineering*".

2. Bathe and Wilson, "*Numerical Methods in Finite Element Analysis*".

3. Kresysig, "*Advanced Mathematics*".

4. Scarborough, "*Numerical Analysis*".