

## LECTURE PLAN (B.Tech. Civil VII sem.)

### Sub: - (7CE5A) Application of Numerical Methods in Civil Engineering

Unit No.	Lecture No.	Topic to be covered
<b>1:-Errors &amp; Approximations in Numerical Computation</b>	1	Introduction to Mathematical Modeling and Engineering Problem Solving
	2	Decimal and Binary Number System, problem of number system
	3	Accuracy, Precision and Significant digit
	4	Errors and their types: absolute and relative errors, approximations and round off errors
	5	truncation errors and Problems on Errors
	6	Taylor's series and its use to find error
	7	Propagation of errors and problems
<b>2- Roots of Equations</b>	8	Roots of Equation , Existence of roots in engineering practices & their geometrical representation
	9	Roots of the equations by: Graphical Method and its Problems
	10	Method of Successive Substitution its Problems
	11	Bisection Method, False Position Method and problems solving
	12	Secant Method, Regula Falsi Method,
	13	Newton-Raphson Method
	14	Problems of Newton- Raphson Method
<b>3- Matrices and Determinants</b>	15	Simple Civil Engineering Problems solving using Numerical Methods
	16	Types of Matrices and basic components
	17	Rank of matrix, determinant of matrix and operation in matrix
	18	Solution of Linear system of equations by Direct methods- Cramer's Rule, Problems on Cramer's Rule
	19	Gaussian elimination method its and problems
	20	Gauss-Jordan Elimination Method its and problems
	21	Cholesky Method its and problems
22	Simple Civil Engineering Problems solving using Numerical Methods	
<b>4- Iterative Methods for solving Linear system of equations</b>	23	Solution of Linear system of equations by iterative methods- Jacobi method and its problems
	24	Problems of Jacobi method
	25	Gauss Seidel method
	26	Problems on Gauss Seidel method
	27	LU decomposition
	28	Problems on L-U decomposition method
	29	Matrix inversion
	30	Problems on Matrix inversion method
	31	Application of iterative methods to solve the simple civil engineering problems
<b>5- Interpolation and Curve Fitting</b>	32	Interpolation and Extrapolation, Polynomial function
	33	Lagrangian Interpolation and Problems
	34	Newton's Forward Difference and Problems
	35	Newton's Backward Difference and Problems
	36	Newton's Central Difference and Problems
	37	Newton's Divided Difference method and Problems
	38	Hermitian Interpolation method and Problems
	39	Method of least square and Problems
	40	Application of Interpolation to simple civil engineering problems.

**LECTURE PLAN** (M.Tech. (str.) III Sem.)

**Sub: -(MSE-302.1) REPAIR AND REHABILITATION OF STRUCTURES**

<b>Lecture No.</b>	<b>Topic to be Covered</b>
1 & 2	Introduction to Repair, Restoration and rehabilitation/strengthening of existing buildings.
3 & 4	Causes of deterioration/decay and their remedial measures
5 & 6	Flexural & shear distress of concrete structures. Diagnostic methods & analysis
7 to 9	preliminary investigations, experimental investigations using NDT
10& 11	load testing, corrosion mapping,
11 & 12	core drilling and other instrumental methods
13& 14	Cracks: structural & surface cracks, their identification & causes
15 to 17	methods of repair of small cracks & large cracks: Guniting and Shot Crete, Epoxy injection
18& 19	Corrosion mechanism: corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.
20 to 22	Strengthening of existing walls & RCC members, stitching, routing & Sealing, Jacketing Materials for Repair
23& 24	Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete,
25& 26	Ferrocement,
27 & 28	Fiber reinforced concrete
29 to 31	FRP wrap , banded plates
32 & 33	Numerical problems on strengthening of concrete structures using above materials & techniques