

Lesson Plan: Computational Methods in Mechanical Engineering

Subject Code: EME307

Module	Topic Name	No. of Required
I	Introduction to Computational Methods & Modeling	1 hr
	Approximation & Formation of Linear and Nonlinear equations	1 hr
	Bisection Method	1 hr
	Newton Raphson Method	1 hr
	Secant Method	1 hr
	Solution of Algebraic equations by Gauss Elimination & Pitfalls	2 hr
	Techniques to improve solution	1 hr
	Gauss-Seidel Iteration Method	1 hr
	LU Decomposition for Symmetric matrices	1 hr
	LU Decomposition for unsymmetric matrices	1 hr
II	Solution for the Largest Eigen Value and vector with Mass spring example	1 hr
	Solution for the smallest Eigen Value and vector	1 hr
	Interpolation Methods –Polynomial	1 hr
	Lagrange Interpolation	1 hr
	Polynomial Interpolation with equi-spaced data	1 hr
	Regression by least square principle	1 hr
	Coefficient of Correlation	2 hr
	Multi Linear regression	2 hr
III	IVP-Euler	1 hr
	Modified-Euler	1 hr
	R-K Method of 2 nd and 4 th order	1 hr
	BVP: Linear and nonlinear equations	1 hr
	BVP Problems using finite differences-Linear	2 hr
	BVP Problems using finite differences-Non-Linear	2 hr
IV	Laplace and Poisson Equations	1 hr
	Finite difference Discretization of computational domain	2 hr
	Different types of Boundary conditions	1 hr
	Elliptic Equation solution	1 hr
	Explicit and implicit Crank-Nicolson Scheme	2 hr
	Continuous Fourier Series & Frequency and time domain	1 hr
	Fourier Integral Transform-DFT	1 hr
	Fast Fourier Transform, Laplace Transform	2 hr
V	Numerical Integration	1 hr
	Trapezoidal Rule	1 hr
	Simpson's Rules	2 hr

	Double Integration-Gauss Quadrature	1 hr
	Optimization: Constrained one dimensional	1 hr
	Unconstrained One dimensional –Golden Section	1 hr
	Newton's Method	1 hr