Online FDP on Numerical Methods, Computation, and Optimization using C and MATLAB Programming Language

(09–17 June, 2025)

Lecture Plan

Day 1, 9th June 2025 (Monday)		
Topics	**Speakers**	**Time**
Mathematical preliminaries, C programming Language, root finding techniques, System of linear equations,	Prof. Rahul Singhal	10:00 AM—12:00 PM
Numerical differentiation and integration	Prof. Vikas Gupta	04:00 PM---06:00 PM
Day 2, 10th June 2025 (Tuesday)		
MATLAB tools and Programming Language	Prof. Rahul Singhal	10:00 AM—12:00 PM
Simulation using MATLAB programming	Prof. Rahul Singhal	04:00 PM---06:00 PM
Day 3, 11th June 2025 (Wednesday)		
Topics	**Speakers**	**Time**
system of non-linear equations, Polynomial interpolation, Piecewise polynomial interpolation, spline interpolation	Prof. Rahul Singhal	10:00 AM—12:00 PM
Interactive computation, Writing scripts and functions, loops and conditional statements	Prof. Ritesh K Dubey	04:00 PM --- 06:00 PM
Day 4, 12th June 2025 (Thursday)		
Matlab program for root finding, interpolation and extrapolation, matrices, numerical integration,	Prof. Ashish Awasthi	10:00 AM --- 12:00 AM
Simulations and random numbers, 2D and 3D plots	Prof. Ritesh K Dubey	04:00 PM – 05:00 PM
Numerical Methods for ODE and PDE: Initial value problems,	Prof. Shruti Dubey	05:00 PM –06:00 PM
Day 5, 13th June 2025 (Friday)		
Topics	**Speakers**	**Time**
Predictor-corrector methods, Stability, Truncation error,	Prof. Shruti Dubey	10:00 AM –12:00 PM
Runge-Kutta method	Prof. Ashish Awasthi	12:00 PM—01:00 PM
Linear boundary value problem, Introduction to Finite Difference Method.	Prof. Vikas Gupta	04:00 PM—5:00 PM
Parabolic equations in 1-D: Explicit finite difference schemes	Prof. Kapil K. Sharma	5:00 PM --- 06:00 PM

Day 6, 14th June 2025 (Saturday)		
implicit finite difference schemes,	Prof. Mani Mehra	10:00 AM --- 12:00 PM
Truncation error and consistency, Stability analysis (matrix method, maximum principle)	Prof. Kapil K. Sharma	04:00 PM – 06:00 PM
Day 7, 15th June 2025 (Sunday)		
Topics	**Speakers**	**Time**
Von-Neumann stability analysis method Maximum principle and convergence,	Prof. Mani Mehra	10:00 AM—12:00 PM
Lax equivalence theorem,	Prof. Sarvesh K. Rajput	12:00 PM—01:00 PM
general boundary conditions,split operator methods, multilevel difference schemes,	Prof. Jeetendra Kumar	04:00 PM --- 06:00 PM
Optimization Techniques: Direct Search Methods, Gradient Based methods,	Prof. Sarvesh K. Rajput	06:00 PM – 07:00 PM
Day 8, 16th June 2025 (Monday)		
Topics	**Speakers**	**Time**
Simplex Method and Linear Programming, Integer Linear Programming,	Prof. Shiv Gupta	10:00 AM—12:00 PM
Non-Linear Optimization, Mixed Integer Non-Linear Programming,	Prof. Manoj Thakur	12:00 PM --- 01:00 PM
Genetic Algorithm, Particle Swarm Optimization	Prof. Shiv Gupta	04:00 PM --- 06:00 PM
Day 9, 17th June 2025 (Tuesday)		
Differential Evolution, Neural Network and its Applications	Prof. Manoj Thakur	10:00 PM – 12:00 PM
QUIZ and Lab Tools	Prof. Rahul Singhal	04:00 PM – 06:00 PM
Valedictory function		06:00 PM–06:30 PM