SARASWATI MAHILA MAHAVIDHYALAYA, PALWAL

LESSON-PLAN

Class: M.Sc Physics **Semester: IVth**

Subject: Computational Physics-II **Session: 2021-2022**

1.	Unit - I Random Numbers and its types
2.	Types of Random number generators
3.	Mid-square methods Algo and Program.
4.	Multiplicative congruential method Algo and Program.
5.	Mixed multiplicative congruential methods Algo and Program.
6.	Modelling of radioactive decay Algo and Program.
7.	Hit and Miss Monte-Carlo methods Algo and Program.
8.	Monte-Carlo calculation of π Algo and Program.
9.	Monte-Carlo evaluation of integration Algo and Program.
10.	Evaluation of multidimensional integrals Algo and Program.
11.	Chaotic dynamics: Some definitions,
12.	Chaotic dynamics: Some definitions,
13.	The simple pendulum Algo and Program.
14.	Potential energy of a dynamical system Algo and Program.
15.	Un-damped motion Algo and Program.
16.	Damped motion Algo and Program.
17.	Driven oscillator Algo and Program.

18.	Damped oscillator Algo and Program.
19.	Revision Of Unit 1
20.	Practice of Algo and Program.
21.	Practice of Algo and Program.
22.	Practice of Algo and Program.
23.	Unit-2 Numerical solution of Radial Schrodinger equation for Hydrogen atom using Forth-order Runge-Kutta method(when Eigen value is given)
24.	Program of Hydrogen atom
25.	Numerical Solutions of Partial Differential Equations using Finite Difference Method
26.	Program of Partial Differential Equations using Finite Difference Method
27.	Algorithms to simulate interference
28.	Program to simulate interference
29.	Algorithms to simulate diffraction of light
30.	Program to simulate diffraction of light
31.	Simulation of charging of a capacitor
32.	Program of charging of a capacitor
33.	Simulation of discharging of a capacitor
34.	Program of discharging of a capacitor
35.	Current in LR and LCR circuits

36.	Program of current in LR and LCR circuits
37.	Computer models of LR and LCR circuits driven by sine and square functions,
38.	Computer models of LR and LCR circuits driven by sine and square functions,
39.	Computer model of Rutherford scattering experiment,
40.	Computer model of Rutherford scattering experiment,
41.	Simulation of electron orbit in H2 ion.
42.	Simulation of electron orbit in H2 ion.
43.	Revision Of Unit 2
44.	Practice of Algo and Program.
45.	Practice of Algo and Program.
46.	Test of Unit 1 & 2
47.	UNIT-3 MATLAB – I : Introduction
48.	Working with arrays
49.	Creating and printing plots
50.	Interacting Computations: Matrices and Vectors
51.	Matrices and Array Operations
52.	Built in functions
53.	Saving and loading data
54.	Plotting simple graphs Programming in MATLA
55.	Script files

56.	Function files
57.	Compiled files
58.	P-code & variables
59.	Loops & branches
60.	Control flow
61.	Input/ Output
62.	Advanced data objects
63.	Structures & cells
64.	Revision Of Unit 3
65.	Practice of CODES
66.	Practice of CODES
67.	UNIT-4 MATLAB – II: Linear Algebra
68.	Solving a linear system
69.	Gaussian elimination, finding eigenvalues and Eigen vectors, matrix factorization
70.	Curve fitting and Interpolation
71.	Polynomial curve fitting
72.	Least square curve fitting
73.	Interpolation
74.	Interpolation

75.	Data analysis and statistics
76.	Numerical integration; double integration
77.	Ordinary differential equation; first order linear ODE
78.	Second order nonlinear ODE
79.	Tolerance & ODE suite
80.	Event location
81.	Non-linear algebraic equations
82.	Revision Of Unit 4
83.	Practice of CODES
84.	Practice of CODES