

# SARASWATI MAHILA MAHAVIDHYALAYA, PALWAL

## LESSON-PLAN

Class: M.Sc-Physics-II<sup>nd</sup> year  
 Subject: Computational Physics-I.

Semester: ODD/EVEN ✓

Session: 2020-21

Lecture Number	Topic
1.	Unit-I: <u>Numerical Integration</u> : Derivation of Newton-Cotes formulae.
2.	Derivation and Numericals of Trapezoidal Rule.
3.	Derivation and Numericals of Simpson's $\frac{1}{3}$ Rule.
4.	Error Estimates in trapezoidal & Simpson's $\frac{1}{3}$ rule.
5.	<u>Numerical Differentiation</u> : Derivation of Taylor series and its numerical
6.	Derivation of Euler's method and its numericals
7.	Derivation of R.K method - 1 <sup>st</sup> order, 2 <sup>nd</sup> order, 3 <sup>rd</sup> order, 4 <sup>th</sup> order and their numericals
8.	Derivation of Predictor Corrector method and its numericals.
9.	<u>Curve fitting</u> : Principle of least square method for linear & Parabolic fit and its numericals
10.	Regression Explanation and its types.
11.	Roots of Linear, Non-linear Algebraic & transcendental equations and numericals
12.	Newton-Raphson method Derivation & Convergence of solution & numericals.
13.	Monte Carlo (mean Sampling) method for single, double integral
14.	Monte Carlo method for triple integral.
15.	Numerical Revision of Unit-I.
16.	Numerical Revision of Unit-I.
17.	<u>Unit-II Interpolation</u> : Derivation of Gregory-Newton's forward interpolation.

*Nishu Dagar*  
 Signature:

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Class: M.Sc-Physics-II<sup>nd</sup> year  
 Subject: Computational Physics-I

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 Session: 2020-21

Lecture Number	Topic
18	Numericals of forward interpolation.
19	Derivation of Backward interpolation
20	Numericals of Backward interpolation
21	Derivation of unequally spaced points: Lagrangian interpolation and its numerical.
22	Solution of simultaneous linear equation: Gauss elimination method derivation.
23	Gauss Quadrature method, pivoting. 2 numericals
24	Gauss-Jordan Elimination method
25	Numericals of Elimination methods
26	Derivation of matrix inversion, Eigenvalue & Eigen Vectors.
27	Derivation of Jacobi's method for symmetric matrix.
28	Numerical of Jacobi's.
29	<del>Unit</del> Revision of Unit II ; Assignment ; Discussion.
30	<u>Unit-III</u> Solution of partial differential eq <sup>n</sup> by separation of variables & its numericals
31	Numerical solutions of Second order differential eq <sup>n</sup> ; initial & boundary value Problem.
32	Numericals of above.
33	Shooting methods and Revision
34	<u>Unit-IV</u> : FORTRAN: Introduction of Basics of Computers and operating System.

*Nisha Dagar*  
 Signature:

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## LESSON-PLAN

Class: M.Sc-Physics II<sup>nd</sup> year  
Subject: Computational Physics-I

Semester: ODD/EVEN ✓  
Session: 2020-21

Lecture Number	Topic
35	DOS and its uses ; Basic definitions of Compilers, Interpreters:
36	Commands of DOS with examples.
37	Directory Structure ; file operators.
38	Introduction of FORTRAN : Explanation of Constants & Variables
39	Defining of Datatypes: Integer & floating point ; Variables: Real & integers
40	Defining of Input & output statements with examples
41	Built in functions ; Executable & Non executable statements
42	Explanation of Operators. with examples
43	Explanation of Control statements ; Brief of GOTO statement
44	Brief of If statements. with examples
45	Brief of Block If statement with examples
46	Brief of Do statements with examples
47	Brief of Nested If statements with examples
48	Explanation of Array & Dimensions.
49	Introduction of Sub programs ; Subroutine
50	Flow charts ; truncation errors, Round-off errors
51	Explanation of Double precision ; complex numbers

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