AGHOREKAMINI PRAKASHCHANDRA MAHAVIDYALAYA

ADD ON COURSE ON

Basics of Some Mathematical Softwares

ORGANIZED BY

DEPARTMENT OF MATHEMATICS

IN ASSOCIATION WITH

IQAC, AGHOREKAMINI PRAKASHCHANDRA MAHAVIDYALAYA

COURSE TITLE: **Basics of Some Mathematical Softwares**

COURSE DURATION: 36 HOURS (FROM 15.06.2023- 30.06.2023)

COURSE OFFERED BY: **Department of Mathematics,**

A.K.P.C. Mahavidyalaya,

Bengai, Hooghly

PARTICIPATING TEACHERS:

1. Dr. SOURAV HALDAR (Assistant Professor)

2. Sri KUNTAL MUKHERJEE (SACT)

3. Sri HIRANMOY MAITI (SACT)

COURSE COORDINATOR: Dr. Sourav Haldar (9123374492)

SYLLABUS:

1. Scientific Computing In Sagemath:

Introduction to SageMath, Installation Procedure, Use of SageMath as a Calculator, Numerical and symbolic computations using mathematical functions such as square root, trigonometric functions, logarithms, exponentiations etc.

Graphical representations of few functions through plotting in a given interval, like plotting of polynomial, functions, trigonometric functions, Plots of functions with asymptotes, superimposing multiple graphs in one plot like plotting a curve along with a tangent on that curve (if it exists), polar plotting of curves.

SageMath commands for differentiation, higher order derivatives, plotting $f(x)$ and $f'(x)$ together, integrals, definite integrals etc.

Introduction to Programming in SageMath, relational and logical operators, conditional statements, loops and nested loops, without using inbuilt functions write programs for average of integers, mean, median, mode, factorial, checking primes, checking next primes, finding all primes in an interval, finding gcd, lcm, finding convergence of a given sequence, etc.

Use of inbuilt functions that deal with matrices, determinant, inverse of a given real square matrix (if it exists), solving a system of linear equations, finding roots of a given polynomial, solving differential equations.

2. Programming in Python:

Introduction to Python and installation, Data types: int, float, Boolean, string, and list; variables, expressions, statements, precedence of operators, comments; modules, functions and its use, flow of execution, parameters and arguments.

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditionals (if-elif-else); iteration: while, for, break, continue.

Fruitful functions: return values, parameters, local and global scope, function composition, recursion; strings: string slices, immutability, string functions and

methods, string module; Python arrays, access the elements of an array, array methods.

3. Basics in LaTeX:

Installation of TeX Studio and MikTeX, Class and packages, Latex programming and commands, sample packages, Error messages : Some sample errors, list of LaTeX error messages, Fonts, symbols, indenting, paragraphs, line spacing, word spacing, titles and subtitles, Document class, page style, parts of the documents, table of contents, Command names and arguments, environments, declarations , Theorem like declarations, comments within text, Mathematical environments, math mode , mathematical symbols, Graphic package, multivalued functions, drawing matrices, Tables, tables with captions, references to figures and tables in text.

MODULES:

UNIT- 1

Introduction to Sage commands, Symbols and Syntaxes. Computational Algorithms.

[Time: 4 Hours(Theory) + 2 hours (Practical)]

UNIT- 2

Plotting of Graphs in Cartesian, Polar, Contour, Statistical systems.

[Time: 2 Hours(Theory) +4 hours (Practical)]

UNIT- 3

Introduction Data, Expressions, Statements.

[Time: 2 Hours(Theory) +4 hours (Practical)]

UNIT- 4

Control Flow, Loops, Functions, Arrays.

[Time: 3 Hours(Theory) +3 hours (Practical)]

UNIT- 5

Installation of LaTeX and Formating of output document.

[Time: 2 Hours(Theory) +4 hours (Practical)]

UNIT- 6

Mathematical Formulae.

[Time: 2 Hours(Theory) +4 hours (Practical)]

PROGRAMME OUTCOME:

After completion of the course, students will be able to:

- Read, Write and Execute by hand simple Programs on different softwares like Python and Sagemath.
- Create documents with clarity and precision in LaTeX.
- Structure simple programs on Python and Sagemath for solving problems.
- Represent an algorithm in both Sagemath and Python languages.
- Read and write data from/to files in softwares.
- Prepare an entire manuscript into well written formats like article, paper, book etc using LaTeX software.

COURSE OUTCOME:

CO-1 : Students will learn about the Installation of Related softwares like Python, Sagemath and LaTeX.

CO-2 : They can develop the skill of using the related softwares for computational works.

CO-3 : They can obtain the knowledge of using Sagemath and Python for plotting various type of graphs – mathematical as well as statistical and also their representations and labeling procedures.

CO-4 : They can acquire the skill of writing a different type of mathematical problems in the form of programming and hence that of execution like debugging, compilation etc.

CO-5 : They will learn about the process of typing different kinds of articles (research papers, question papers, books, reports, slides etc.) using the LaTeX software.

CO-6 : By gathering knowledge about the exact commands the students will learn how to place a diagram within an article at a specified place and generate the entire file in different formats (like PDF, PS etc) as per requirement.

MODE OF EVALUATION:

After the completion of course, Written examination will be taken for 20 Marks and a Practical examination (60 Marks) & Viva (20 Marks) will be conducted. On the basis of marks obtained for written examination, practical examination and viva, the results will be prepared. The gradation system for the declaration of results will be as follows:

Grading system

Level	Excellent	Very Good	Good	Above Average	Average	Below Average	Poor	Fail
Grade	A+	A	B+	B	C	D	E	F
Marks range	90-100	80-89	70-79	60-69	50-59	40-49	33-40	0-32