



**S.S. JAIN SUBODH P.G. AUTONOMOUS COLLEGE**

**RAM BAGH CIRCLE, JAIPUR-302004**

**SYLLABUS & SCHEME OF EXAMINATION**

**OF VALUE ADDED COURSES**

**AS PER**

**UGC CURRICULUM AND CBCS FRAMEWORK FOR UNDERGRADUATE**

**PROGRAMMES UNDER NEP 2020**

**FOR**

**BACHELOR OF SCIENCE / ARTS (B.SC. / B.A.)**

**MATHEMATICS**

**(2023-2024 & ONWARDS)**

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**Value Added Courses  
Scheme of Examination**

**Non-credit course**

<b>Total of End Sem. Exam -</b>	<b>50</b>
<b>Internal Assessment -</b>	<b>Nil</b>
<b>Maximum Marks -</b>	<b>50</b>
<b>Minimum Marks-</b>	<b>20</b>

**Examination Question Paper Pattern for Value Added Course**

**30 marks Objective/Multiple Choice/One word type questions**

**20 marks Project work/Assignment/ Class test/ Practical/Field work/Project report etc.**

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**DEPARTMENT OF MATHEMATICS**

**VALUE ADDED COURSE-I**

(For the students admitted from the academic year 2023-2024)

**SAGEMATH**

**Course Duration: 30 Hours**

**Course outcome**

1. Using SageMath as a calculator.
2. Implement and illustrate 2-D graphs and 3-D graphs.
3. Solving mathematical problems and to plot using SageMath.
4. Implement SageMath to find maxima and minima.
5. Make use of theoretical concepts to solve problems and visualize the output.

**List of Practical**

**Unit I:** Introduction SageMath, Exploring integers in SageMath, Solving Equations in SageMath, 2d Plotting with SageMath, Calculus of one variable with SageMath

**Unit II:**

Applications of derivatives, Integrals in SageMath, Applications of Integrals, Partial Derivatives and gradients, jacobians, Local maximum-minimum, Application of local maximum and minimum, Applications to least square problems, Lagrange Multipliers.

**Books for Reference:**

1. Razvan A. Mezei, An Introduction to SAGE Programming: With Applications to SAGE, Wiley, 2016
2. <https://www.sagemath.org/calctut/index.html>

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## VALUE ADDED COURSE-II

(For the students admitted from the academic year 2023-2024)

### Logic and Sets

**Course Duration: 30 Hours**

**Course outcome:** Students who have learned to logically question assertions, recognize patterns and distinguish the essential and irrelevant aspects of problems can think deeply and precisely, nurture the products of their imagination to fruition in reality, and share their ideas and insights while seeking and benefiting from the knowledge and insights of others.

#### List of Practical

**Unit I:** Introduction, propositions, truth table, negation, conjunction and disjunction. Implications, biconditional propositions, converse, contra positive and inverse propositions and precedence of logical operators. Propositional equivalence: Logical equivalences. Predicates and quantifiers: Introduction, Quantifiers, Binding variables and Negations.

**Unit II:** Sets, subsets, Set operations and the laws of set theory and Venn diagrams. Examples of finite and infinite sets. Finite sets and counting principle. Empty set, properties of empty set. Standard set operations. Classes of sets. Power set of a set. Difference and Symmetric difference of two sets. Set identities, Generalized union and intersections. Relation: Product set, Composition of relations, Types of relations, Partitions, Equivalence Relations with example of congruence modulo relation, Partial ordering relations.

#### Books Recommended:

1. R.P. Grimaldi, Discrete Mathematics and Combinatorial Mathematics, Pearson Education, 1998.
2. P.R. Halmos, Naive Set Theory, Springer, 1974.
3. E. Kamke, Theory of Sets, Dover Publishers, 1950.

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## VALUE ADDED COURSE-III

(For the students admitted from the academic year 2023-2024)

### Introduction to Programming with Python

**Course Duration: 30 Hours**

#### Course outcome

The students should be able to

1. Learn the syntax and semantics of Python Programming Language.
2. Understand the python programming basics (operations, control structures, data types, etc.)
3. Readily use the Python programming language.
4. Demonstrate the use of built-in functions to navigate the file system.
5. Apply various data types and control structure.

#### Unit I:

Python variable declaration, Keywords, Indents in Python, Python input/output operations Python's Operators Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Ternary Operator, Operator precedence. Python's Built-in Data types String, List, Tuple, Set, Dictionary (characteristics and methods) Conditional Statements & Loop Conditional Statements (If, If-else, If-elif-else, Nested-if etc.) and loop control statements (for, while, Nested loops, Break, Continue, Pass statements) .

#### Unit II:

Function in python. Introduction to functions, Function definition and calling, Function parameters, Default argument function, Variable argument function, in built functions in python, Scope of variable in python.

#### Reference Books:

1. Al Sweigart, "Automate the Boring Stuff with Python", William Pollock, 2015, ISBN: 978-1593275990.
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
3. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365.
4. Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, "Data Structures and Algorithms in Python", 1st Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126562176.
5. ReemaThareja, "Python Programming using problem solving approach", Oxford University press, 2017. ISBN-13: 978-0199480173
6. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278.

