Rayat Shikshan Sanstha’s

Karmaveer Bhaurao Patil College Vashi, Navi Mumbai

Autonomous College

[University of Mumbai]

Syllabus for Approval

Sr. No.	Heading	Particulars
1	**Title of Course**	**T.Y.B.Sc. Mathematics**
2	**Eligibility for Admission**	**S.Y.B.Sc. (with Mathematics as one of the subject)**
3	**Passing Marks**	
4	**Ordinances/Regulations (if any)**	
5	**No. of Years/Semesters**	**One year/Two semester**
6	**Level**	**U.G.**
7	**Pattern**	**Semester**
8	**Status**	**Revised**
9	**To be implemented from Academic year**	**2020-2021**

Date: ________________

Signature: __________________

Name of BOS Chairman: ____

AC- / /

Item No-

Rayat Shikshan Sanstha’s
KARMAVEER BHAURAO PATIL COLLEGE, VASHI. NAVI MUMBAI

Sector-15- A, Vashi, Navi Mumbai - 400 703

(AUTONOMOUS COLLEGE)

Syllabus for Mathematics

Program: B.Sc.

Course: T.Y.B.Sc. Mathematics

(Choice Based Credit, Grading and Semester System

with effect from the academic year 2020-2021)

Objectives

The objective of this paper is to introduce various concepts of programming to the students using Python. The objective of this paper is to explore the style of structured programming to give the idea to the students how programming can be used for designing real-life applications by reading/writing to files, GUI programming, interfacing database/networks and various other features.

SEMESTER V
Python-I
Course Code UGMT50AC5

Learning Outcomes:

1. Understand why Python is a useful scripting language for developers.
2. Apply the problem solving skills using syntactically simple language i.e. Python (version: 3.X or higher)
3. Learn how to design and program Python applications.
4. Learn how to identify Python object types.
5. Define the structure and components of Python program.
6. Learn how to write loops and decision statements in Python.
7. Learn how to write functions and pass arguments in Python.
8. Use lists, tuples and dictionaries in Python programs.
9. Use indexing and slicing to access data in Python programs.
10. Learn how to read and write files in python.
11. Design object-oriented programs with Python classes.
12. Use class inheritance in Python for reusability.
13. Use exception handling in Python application and error handling.
14. Work with the Python standard library.
15. Describe data with statistics, and visualize it with line graphs and scatter plots.
16. Apply Python's symbolic math functions to solve algebraic problems.

UNIT I: PYTHON 3.1 (20 LECTURES)

1.Introduction: The Python Programming Language, History, features, Installing Python. Running Code in the Interactive Shell, IDLE. Input, Processing, and Output , Editing, Saving, and Running a Script, Debugging : Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging.

2.Data types and expressions: Variables and the Assignment Statement, Program Comments and Doc strings . Data Types-Numeric integers & Floating-point numbers. Boolean, string. Mathematical operators +, - *, ** , %. PEMDAS. Arithmetic expressions, Mixed-Mode Arithmetic and type Conversion, type( ). Input( ), print( ), program comments. id( ), int( ), str( ), float( ).

3.Loops and selection statements: Definite Iteration: The for Loop, Executing statements a given number of times, Specifying the steps using range( ), Loops that count down, Boolean and Comparison operators and Expressions, Conditional and alternative statements- Chained and Nested Conditionals: if, if-else, if-elif-else, nested if, nested if-else. Compound Boolean Expressions , Conditional Iteration: The while Loop –with True condition, the break Statement. Random Numbers. Loop Logic, errors, and testing.

Reference Fundamentals of Python First programs 2nd edition by Kenneth A Lambert chapter 1,2,3.

Unit II: STRINGS, LIST AND DICTIONARIES. (20 LECTURES)

1. Strings, Lists, Tupleand Dictionary: Accessing characters, indexing, slicing,replacing.Concatenation (+), Repetition (*).Searching a substring with the 'in' Operator, Traversing string using while and for. String methods- find, join, split, lower, upper. len( ).

2. Lists – Accessing and slicing, Basic Operations (Comparison, +),List membership and for loop. Replacing element (list is mutable). List methods- append, extend, insert, pop, sort. Max( ), min( ). Tuples. Dictionaries-Creating a Dictionary, Adding keys and replacing Values , dictionary – key( ), value( ), get( ), pop( ) , Traversing a Dictionary. Math module: sin(), cos(),exp(), sqrt(), Constants- pi, e.

3. Design with functions: Defining Simple Functions- Parameters and Arguments, the return Statement, tuple as return value. Boolean Functions. Defining a main function. Defining and tracing Recursive functions.

4. Exception handling: try- except.

Reference Fundamentals of Python First programs 2nd edition by Kenneth A Lambert chapters 4,5,6.

<u>UNIT III</u> :DOING MATH WITH PYTHON (20 LECTURES)

1. **Working with Numbers:** Calculating the Factors of an Integer, Generating Multiplication Tables, converting units of Measurement ,Finding the roots of a Quadratic Equation
2. **Algebra and Symbolic Math with SymPy:** symbolic math using the SymPy library. Defining Symbols and Symbolic Operations, factorizing and expanding expressions, substituting in Values, Converting strings to mathematical expressions. Solving equations, Solving Quadratic equations, Solving for one variable in terms of others, solving a system of linear equations, Plotting using SymPy, Plotting expressions input by the user, Plotting multiple functions.

Reference: Doing math with Python by AmitSaha (Internet source) chapter 1, 4

References:

1. Programming with Java:A Primer 4th Edition by E.Balagurusamy, Tata McGraw Hill.

2. JavaTheCompleteReference,8thEdition,HerbertSchildt,TataMcGrawHill

3. Fundamentals of Python First programs 2nd edition - Kenneth A Lambert, Cengage Learning India.

4. Doing Math with Python - Amit Saha, No starch ptress,

Additional References:

1. Eric Jendrock, JenniferBall, DCarsonandothers,TheJavaEE5Tutorial, PearsonEducation,Third Edition,2003.
2. Ivan Bay Ross, Web Enabled Commercial Applications Development UsingJava2, BPB Publications, Revised Edition, 2006.
3. Joe Wigglesworth and Paula McMillan, Java Programming: Advanced Topics, Thomson Course Technology (SPD),ThirdEdition,2004.
4. The Java Tutorials of Sun Microsystems Inc. http://docs.oracle.com/javase/tutorial
5. Problem solving and Python programming- E. Balgurusamy, TataMcGrawHill.

Course Code UGMTP503

Suggested Practical:

1. Installing python and setting up environment. Simple statements like printing the names, numbers, mathematical calculations, etc.
2. Simple programs containing variable declaration and arithmetic operations.
3. Programs based on conditional constructs.
4. Programs based on loops.
5. Programs related to string manipulation.
6. Programs related to Lists, Tuples and dictionaries.
7. Programs related to functions
8. Enhanced Multiplication Table Generator, Unit Converter, Fraction Calculator .
9. Factor Finder, Graphical Equation Solver.
10. Summing a Series, Solving Single-Variable Inequalities.

SEMESTER VI
Python-II

Course Code UGMT60AC5

Learning Outcomes:

1. Understand how to read and write files using access modes in python.
2. Create directories and perform various operations on them.
3. Process text using regular expressions.
4. Search text using regular expressions.
5. Understand GUI controls and designing GUI applications.
6. Implement code GUI for Python application.
7. Implement leverage OS services.
8. Make GUI code robust by handling errors and exceptions properly.
9. Access database using python programming.
10. Move the data to/from the application in the database.
11. Connect to computers, read from URL and send email.
12. Interact with network services.
13. Implement algorithm and apply techniques for searching and sorting.

UNITI:Python File Input-Output & Regular Expressions(20 LECTURES)

1. **Python File Input-Output:** Opening and closing files, various types of file modes, reading and writing to files, manipulating directories. Iterables, iterators and their problem solving applications.
2. **Regular Expressions:** Concept of regular expression, various types of regular expressions, using match function.

UNIT II: GUI Programming in Python (using Tkinter/wxPython/Qt)   (20 LECTURES)

1. **GUI Programming in Python (using Tkinter / wxPython/Qt):**What is GUI, Advantages of GUI, introduction to GUI library, Layout management, events and bindings, fonts, colours, drawing on canvas (line, oval, rectangle, etc.) Widgets such as: frame, label, button, checkbutton, entry, listbox, message, radiobutton, text, spinbox etc.

Unit III:Database connectivity in Python,Network connectivity&Algorithm, Searching and sorting(20 LECTURES)

1. **Database connectivity in Python**: Installing MySQL connector, accessing connector module module, using connect, cursor, execute & close functions, reading single & multiple results of query execution, executing different types of statements, executing transactions, understanding exceptions in database connectivity.
2. **Network connectivity**: Socket module, creating server-client programs, sending email, reading from URL
3. **Algorithm, Searching and Sorting –** Searching and sorting techniques, Efficiency of algorithms

Text books:

1.Paul Gries , Jennifer Campbell, Jason Montojo, *PracticalProgramming: An Introduction to Computer Science Using Python 3*, Pragmatic Bookshelf, 2/E 2014

2.James Payne , *Beginning Python: Using Python 2.6 and Python 3,* Wiley India, 2010

Additional References:

1. James Payne , *Beginning Python: Using Python 2.6 and Python 3,* Wiley India, 2010
2. A. Lukaszewski, MySQL for Python: Database Access Made Easy, Pact Publisher, 2010

Links:

https://www.python-course.eu/advanced_topics.php
https://www.slideshare.net/vishnukraj/advanced-python-programming

Course Code UGMTP603

Suggested Practical:

1. Programs to read and write files.
2. Program to demonstrate Iterables, iterators.
3. Program to demonstrate the use of regular expressions.
4. Program to show draw shapes
5. Program to show GUI controls and processing-I
6. Program to show GUI controls and processing-II
7. Program to show database connectivity
8. Program to create server-client and exchange basic information.
9. Program to send email & read contents of URL.
10. Programs to do searching and sorting

Examination Pattern:

Theory: At the end of the semester, examination of Two hours duration and60 marks based on the three units shall be held for each course. Pattern of **Theory question** paper at the end of the semester for **each course**: There shall be **four** compulsoryQuestionsof 15 markseachwith internal option. Question1basedon Unit I, Question 2 based on Unit II, Question 3 based on Unit III, Question 4 based on all three Units combined.

Q1 to Q3 pattern

(a) Attempt any one out of two (07 Marks)
(b) Attempt any two out of four (08 Marks)

Q4 Attempt any three out of six (15 Marks)

Semester End Practical Examination (Total 100 marks):

Semester V&VI: Total evaluation is of 100 marks per semester -

(a) Attempt any two out of three -40 Marks
(b) Project with synopsis -40 marks
(c) Certified Journal -10 Marks
(d) Viva Voce -10 Marks

1. The semester end practical examination on the machine will be of THREE hours.
2. Students should carry a certified journal with minimum of 06 practical (mentioned in the Practicaltopics)at the time of examination.
3. Number of students per batch for the regular practical should not exceed 20.Not more than two students are allowed to do practical experiment on one computer at a time.

Workload

Theory : 4 lectures per week .
Practicals: 2 practicals each of 2 lecture periods per week per batch. Two lecture periods of thepracticals shall be conducted in succession together on a single day.