

# Computer Science and Informatics Practices

with

# Python

for



Class XI



Dr. Ashwin I. Mehta

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# Computer Science and Informatics Practices with Python for CBSC Class XI

by Dr. Ashwin I. Mehta

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# Chapter 1. Why Learn Python

Python is a modern programming language developed by Guido van Rossum in the 1990s. It is perfect to learn Python as the first computer language, because its strengths make it a good choice for many situations.

**Python is easy to use:** Students and programmers familiar with traditional languages, like C, C++, Java, etc. will find it easy to use Python. All of the familiar constructions such as loops, conditional statements, arrays, and so forth are included, but many are easier to use in Python.

- ❖ Syntax rules are very simple.
- ❖ Python typically operates at a much higher level of abstraction.
- ❖ All data types are associated with objects.
- ❖ Python is user as well as developer friendly.

There are many more reasons why Python is easy to use. As we go through the learning curve, students and professionals will realize the strengths of being a Pythonist.

**Python is expressive:** Python is a very expressive language. ‘Expressive’ in this context means that a single line of Python code can do more than a single line of code in most other languages. The advantages of a more expressive language are obvious - you need to write, maintain and debug fewer lines of code.

**Python is easy to learn:** The basic Python code can be learned at break-neck speed. However, becoming an expert will take hard work and hard work only (especially when you learn from Dr. Ashwin I Mehta).

**Python is readable:** One of the main advantages of Python is that it's easy to read. In all situations, the easier the code is to read and understand, the better it is. It makes the code easier to understand, debug, maintain, and modify. Python's main advantage in this department is its use of **indentation**.

**Python is complete—“batteries included”:** Python has a vast amount of libraries included, when it is downloaded. On installing Python, Python standard library comes with modules for handling email, web pages, databases, operating system calls, GUI development, and more.

**Python is a cross-platform language:** Python is also an excellent cross-platform language. Python runs on many different platforms: Windows, Mac, Linux, UNIX, Ubuntu and so on. A platform can be defined as a particular combination of hardware and software.

**Python is free:** Python is also free. Python was originally, and continues to be, developed under the open source model, and it's freely available. You can download and install practically any version of Python and use it to develop software for commercial or personal applications, and you don't need to pay a rupee.

## Compiler and Interpreter

I cannot speak of “compiled language” versus “interpreted language”. The difference lies not in the language itself but in how the language has been implemented.

A **compiler** translates the source code of the program into another language format that can be directly executed by a lower-level machine (hardware). This can be an abstract machine (such as .NET or the Java Virtual Machine) or the actual machine. In the latter case, the language format that is the target of the compiler, is machine code (it is also called Byte Code). The translation from source code into lower-level code depends on the abstract syntax and on the operational semantics of the programming languages.

An **interpreter** executes the source code directly; informally, it may help to think of the interpreter as executing the program line by line. A more correct understanding is that the interpreter walks through the abstract syntax tree generated by the parser and executes each node in this tree. If a node is a leaf, the leaf is executed. If a node is an internal node, each subtree is visited and executed. Exactly how this is to be done depends on the abstract syntax and on the underlying semantics of the programming language.

## Summary

Python is a modern, high-level language, with many features:

- ❖ Dynamic typing
- ❖ Simple, consistent syntax and semantics
- ❖ Multiplatform
- ❖ Highly modular and fit for both rapid development and large-scale programming
- ❖ Easy access to various GUI toolkits
- ❖ Built-in advanced features such as persistent object storage, advanced hash tables, expandable class syntax, universal comparison functions, and so forth
- ❖ Powerful libraries such as numeric processing, image processing, user interfaces, web scripting, and others
- ❖ Supported by a dynamic Python community and can be integrated with a number of other languages to let you take advantage of the strengths of both while obviating their weaknesses.

## Exercise 1

1. Write the attributes of Python as a middle level language.
2. By ‘Googling’, find out which domains Python is currently used in industry.
3. Explain the concept of formal language and informal language.
4. Differentiate between compiled and interpreter language with examples.



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## About the Book

This book will introduce CBSE class xi students to the coding skills of Python language and RDBMS operations. It is aimed at beginning computer user to learn first computer programming language as Python. If students have some previous programming experience in any formal computer language, his skill set will be enhanced further.

The book is introduction to all topics of the syllabus, taking small steps from the basics to more involved and varied topics. I have mixed tutorials, guide, Q&A, cookbook and pocket reference styles to explain new terms and ideas. I have also taken care that not too many new concepts are introduced at once.

In our examination system, often definitions of basic terms are asked. Most exam oriented definitions have been given in bold letters. Many topics where students are expected to answer pointwise, explanations have been given with bullets.

All codes, given here, have been run and successful output have been checked. Some selected examples have been presented with screen shot, which should give students confidence of running these programs on their own. Even though this is an introduction, I include some topics that might seem advanced. For example, NoSQL databases, and variable length arguments (tuple) in Python. These topics have been included because they can solve some problems in easier way.

Theoretical concept of computer architecture, scales of data, and cloud, with cyber laws and ethical online behavior are discussed.

This book is for students, teachers, and professionals for computing language and RDBMS. The book does not require previous knowledge of any computing language except some mathematical skills are essential.

The book has been divided in to four separate units as the syllabus. This will help to prepare for examinations.

## About the Author

**Dr. Ashwin I. Mehta** is M.Sc. from University of Mumbai and Ph.D. from Bhabha Atomic Research Centre in the Nuclear Physics Division (BARC) under the guidance of late Dr. N. Satyamurthy and Dr. K. Usha Dennis. His earliest encounter with computers was writing programs in FORTRAN with BESM-6 mainframe machine and later PDP-11. Subsequently he joined Halliburton and was involved in various technologies of data acquisition, storing and interpretation of oil field data. At Halliburton, he worked in Kuwait, Italy, United States of America and many other countries across the globe. He has several research papers to his credit in national and international journals. After leaving behind a hectic lifestyle in the oil field, he entered Information Technology (I.T.) academics. Since then, his interests include programming languages, web technologies, design architecture, big data and Python. He has 20+ years of experience that includes corporate training in Halliburton as well as in different academic institutions. He has authored a number of books including “Data Warehousing for beginners”, “Web Technologic” and “Advanced Java” published by Shroff Publishers and Distributors Pvt. Ltd. and “Python Programming” published by Himalaya Publications. Dr. Mehta can be contacted at [mehtaashwin2007@yahoo.com](mailto:mehtaashwin2007@yahoo.com) for your valuable comments and suggestions.



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