



**2025
EDITION**

Textbook for CBSE Class XI

Computer Science

— With —

Python

As per Latest Syllabus

PREETI ARORA

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DOEACC 'A' level, M.Sc-IT, M.Tech-IT
Sr. Computer Science Teacher

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PREFACE

This thoroughly revised and enriched edition of **Computer Science with Python** for **Class XI (083)** aims at providing an in-depth understanding of the CBSE curriculum. It strictly adheres to the latest syllabus and guidelines laid down by the Board.

The book focuses on teaching Python language to help students learn programming concepts and develop problem-solving skills. With easy-to-understand examples, flowcharts, self-explanatory diagrams and other such tools in the book, students will learn to design the logic of a program and implement that program using Python. The book contains ample concise and practical example programs along with diagrams and instances from real-life situations. Besides Objective Type Questions and Case-based/Source-based Integrated Questions, Assertion-Reasoning and Competency-based Questions too have been included. The book contains tested, debugged and error-free codes with screenshots.

Based on the CBSE curriculum, the book has been divided into three units:

- **Unit 1:** Computer Systems and Organization—Chapters 1 and 2
- **Unit 2:** Computational Thinking and Programming-1—Chapters 3 to 9
- **Unit 3:** Society, Law and Ethics—Chapters 10 and 11

The book includes ample Viva Voce Questions, a Model Test Paper (Solved) based on the CBSE Sample Paper and a Practice Paper. CTM (Commit to Memory), Points to Remember for easy recall of important terms and concepts and Learning Tips are other notable features of the book.

Besides, Presentation on Python, Practical File, Chapter-wise Program Codes, Viva-Voce, Python Software Dump, Model Test Papers and Practice Papers are available online and can be accessed at sultan-chand.com/ws/python11.

I am sure this book will be of immense help to students and teachers alike. Constructive feedback for the improvement of the book will be highly appreciated and gratefully acknowledged.

My special thanks are due to Mrs Rinku Kumari for her valuable suggestions during the course of my writing this book.

Last but not the least, I take this opportunity to thank my esteemed publishers, **Sultan Chand & Sons (P) Ltd**, for their patience, encouragement and assistance in bringing out this book.

AUTHOR

Syllabus

COMPUTER SCIENCE CLASS XI Code No. 083

Distribution of Marks:

Unit No.	Unit Name	Marks	Periods	
			Theory	Practical
I	COMPUTER SYSTEMS AND ORGANIZATION	10	10	10
II	COMPUTATIONAL THINKING AND PROGRAMMING – 1	45	80	60
III	SOCIETY, LAW AND ETHICS	15	20	—
	Total	70	110	70

Unit I: COMPUTER SYSTEMS AND ORGANIZATION

- Basic computer organization: Introduction to computer system, hardware, software, input device, output device, CPU, memory (primary, cache and secondary), units of memory (Bit, Byte, KB, MB, GB, TB, PB)
- Types of software: system software (operating systems, system utilities, device drivers), programming tools and language translators (assembler, compiler & interpreter), application software
- Operating system (OS): functions of operating system, OS user interface
- Boolean logic: NOT, AND, OR, NAND, NOR, XOR, truth table, De Morgan's laws and logic circuits
- Number system: Binary, Octal, Decimal and Hexadecimal number system; conversion between number systems
- Encoding schemes: ASCII, ISCII and UNICODE (UTF8, UTF32)

Unit II: COMPUTATIONAL THINKING AND PROGRAMMING – 1

- Introduction to problem-solving: Steps for problem-solving (analyzing the problem, developing an algorithm, coding, testing and debugging). representation of algorithms using flow chart and pseudo-code, decomposition
- Familiarization with the basics of Python programming: Introduction to Python, features of Python, executing a simple "hello world" program, execution modes: interactive mode and script mode, Python character set, Python tokens (keyword, identifier, literal, operator, punctuator), variables, concept of l-value and r-value, use of comments
- Knowledge of data types: number (integer, floating point, complex), boolean, sequence (string, list, tuple), none, mapping (dictionary), mutable and immutable data types
- Operators: arithmetic operators, relational operators, logical operators, assignment operator, augmented assignment operators, identity operators (is, is not), membership operators (in, not in)
- Expressions, statement, type conversion & input/output: precedence of operators, expression, evaluation of expression, python statement, type conversion (explicit & implicit conversion), accepting data as input from the console and displaying output
- Errors: syntax errors, logical errors, runtime errors
- Flow of control: introduction, use of indentation, sequential flow, conditional and iterative flow control
- Conditional statements: if, if-else, if-elif-else, flowcharts, simple programs, e.g., absolute value, sort 3 numbers and divisibility of a number
- Iterative statements: for loop, range function, while loop, flowcharts, break and continue statements, nested loops, suggested programs: generating pattern, summation of series, finding the factorial of a positive number, etc.
- Strings: introduction, indexing, string operations (concatenation, repetition, membership & slicing), traversing a string using loops, built-in functions: len(), capitalize(), title(), lower(), upper(), count(), find(), index(), endswith(), startswith(), isalnum(), isalpha(), isdigit(), islower(), isupper(), isspace(), lstrip(), rstrip(), strip(), replace(), join(), partition(), split()
- Lists: introduction, indexing, list operations (concatenation, repetition, membership & slicing), traversing a list using loops, built-in functions: len(), list(), append(), extend(), insert(), count(), index(), remove(), pop(), reverse(), sort(), sorted(), min(), max(), sum(); nested lists, suggested programs: finding the maximum, minimum, mean of numeric values stored in a list; linear search on list of numbers and counting the frequency of elements in a list
- Tuples: introduction, indexing, tuple operations (concatenation, repetition, membership & slicing), built-in functions: len(), tuple(), count(), index(), sorted(), min(), max(), sum(); tuple assignment, nested tuple, suggested programs: finding the minimum, maximum, mean of values stored in a tuple; linear search on a tuple of numbers, counting the frequency of elements in a tuple
- Dictionary: introduction, accessing items in a dictionary using keys, mutability of dictionary (adding a new item, modifying an existing item), traversing a dictionary, built-in functions: len(), dict(), keys(), values(), items(), get(), update(), del(), clear(), fromkeys(), copy(), pop(), popitem(), setdefault(), max(), min(), count(), sorted(), copy(); suggested programs: count the number of times a character appears in a given string using a dictionary, create a dictionary with names of employees, their salary and access them
- Introduction to Python modules: Importing module using 'import <module>' and using from statement, Importing math module (pi, e, sqrt, ceil, floor, pow, fabs, sin, cos, tan); random module (random, randint, randrange), statistics module (mean, median, mode)

Unit III: SOCIETY, LAW AND ETHICS

- Digital Footprints
- Digital society and Netizen: net etiquettes, communication etiquettes, social media etiquettes
- Data protection: Intellectual Property Right (copyright, patent, trademark), violation of IPR (plagiarism, copyright infringement, trademark infringement), open source software and licensing (Creative Commons, GPL and Apache)
- Cybercrime: definition, hacking, eavesdropping, phishing and fraud emails, ransomware, preventing cybercrime
- Cyber safety: safely browsing the web, identity protection, confidentiality, cyber trolls and bullying
- Safely accessing websites: malware, viruses, trojans, adware
- E-waste management: proper disposal of used electronic gadgets
- Indian Information Technology Act (IT Act)
- Technology & Society: Gender and disability issues while teaching and using computers

IV: PRACTICAL

S. No.	Unit Name	Marks (TOTAL=30)
1.	Lab Test (12 Marks)	
	Python program (60% logic + 20% documentation + 20% code quality)	12
2.	Report File + Viva (10 marks)	
	Report file: Minimum 20 Python programs	7
	Viva voce	3
3.	Project (8 marks)	
	(that uses most of the concepts that have been learnt)	8

V: Suggested Practical List

Python Programming

- Input a welcome message and display it.
- Input two numbers and display the larger/smaller number.
- Input three numbers and display the largest/smallest number.
- Generate the following patterns using nested loop.

Pattern-1	Pattern-2	Pattern-3
*	1 2 3 4 5	A
**	1 2 3 4	AB
***	1 2 3	ABC
****	1 2	ABCD
*****	1	ABCDE

- Write a program to input the value of x and n and print the sum of the following series:
 - $1 + x + x^2 + x^3 + x^4 + \dots x^n$
 - $1 - x + x^2 - x^3 + x^4 - \dots x^n$
 - $x + \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{4} - \dots \frac{x^n}{n}$
 - $x + \frac{x^2}{2!} - \frac{x^3}{3!} + \frac{x^4}{4!} - \dots \frac{x^n}{n!}$
- Determine whether a number is a perfect number, an armstrong number or a palindrome.
- Input a number and check if the number is a prime or composite number.
- Display the terms of a Fibonacci series.
- Compute the greatest common divisor and least common multiple of two integers.
- Count and display the number of vowels, consonants, uppercase, lowercase characters in string.
- Input a string and determine whether it is a palindrome or not; convert the case of characters in a string.
- Find the largest/smallest number in a list/tuple.
- Input a list of numbers and swap elements at the even location with the elements at the odd location.
- Input a list/tuple of elements, search for a given element in the list/tuple.
- Input a list of numbers and find the smallest and largest number from the list.
- Create a dictionary with the roll number, name and marks of n students in a class and display the names of students who have scored marks above 75.

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* For extra learning

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Answers to Objective Type Questions**Ans.1–Ans.3**