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Textbook for CBSE Class XII

Computer Science

With

Python

As per Latest Syllabus

PREETI ARORA

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PREFACE

Programming is very important for learning to innovate and create eco-friendly solutions to global problems. Programming is also important in our day-to-day life to enhance the power of computers and internet. An important step towards learning innovative programming solutions is through Python programming which this book has at its core.

Python is a popular object-oriented language used both for stand-alone programs and scripting applications in a variety of domains. This book presents a contemporary approach to programming with stress on principles of good programming, such as clarity, legibility and efficiency in program design. Thus, an interactive programming style has been emphasized/expressed throughout the book.

The thoroughly revised **Computer Science with Python** for **Class XII** provides an in-depth understanding of the latest Computer Science (083) curriculum and strictly adheres to the guidelines laid down by the CBSE. The book deals with advanced concepts of Python Programming Language, Functions in Python, Exception Handling, Data File Handling, Data Structure, Computer Networks, Relational Database Management System (SQL) and Python-MySQL Connectivity. However, an overview of Python Libraries has been included in the Appendices, which may be referred for project work.

The text of the book has been presented in a student-friendly and easy-to-comprehend language. Each chapter provides tested, debugged and error-free codes with screenshots. With easy-to-understand examples, practical implementations, problem-solving and case-based questions, students will learn how to design the logic of programs and implement those programs using Python.

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

Unit I: Computational Thinking and Programming-2 – Chapters 1 – 5

This unit contains five chapters covering a review of Python studied in Class XI, concept of functions and modules in Python, Exception Handling using try-except-finally blocks, Text, Binary file-handling operations involving read, write and append operations and CSV file-handling operations involving reading from a CSV file and writing into a CSV file, Standard input-output and error streams and relative and absolute paths for a file. Besides, implementing Python Data Structures, viz. Stacks using Lists, has also been thoroughly discussed.

Unit II: Computer Networks – Chapter 6

This unit covers the concepts of Computer Networking, Evolution of Networking, Data Communication terminologies, Transmission Media, Network Devices such as Hub, Switch, Repeater, Gateway, Router, Wi-Fi Card, Ethernet Card, etc., Network Topologies and Protocols, Introduction to Web Services such as WWW, Website, Web Server, Web Hosting, DNS, etc., and Setting up a Computer Network.

Unit III: Database Management – Chapters 7 and 8

This unit covers Database Concepts, Relational Database Model, SQL Commands, and Aggregate Functions such as SUM(), AVG(), COUNT(), MAX() and MIN() along with important SQL Clauses such as GROUP BY, HAVING and ORDER BY. It also covers the concept of SQL Joins, viz. Equi-join and Natural join and Python-MySQL Connectivity.

A few topics, though not part of the latest syllabus, have been retained as they would come handy for students while doing CS projects.

Five appendices in the book contain a project on Hotel Management and Room Booking System, an overview of Python Libraries, Viva Voce questions, Model Test Paper (Solved) and a Practice Paper. Besides, CBSE Sample Question Paper with Solutions can be accessed by scanning the relevant QR Code.

As part of our Web Support, Presentations on Python, Chapter-wise Program Codes, Projects based on Python-MySQL Connectivity, Practical File, Viva Voce and Model Test Paper/Practice Paper are available online and can be accessed at sultan-chand.com/ws/python12. Besides, subject-related updates, if any, will also be made available online in due course.

I am confident that students and teachers will benefit immensely by making best use of this book.

Your feedback is important to me. Any suggestions for the improvement of the book will be highly appreciated and duly acknowledged.

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

Last but not the least, I express my deep gratitude to my esteemed publishers, **Sultan Chand & Sons (P) Ltd**, for their patience, guidance and support.

AUTHOR

Syllabus

COMPUTER SCIENCE
CLASS XII Code No. 083

Distribution of Marks

Unit No.	Unit Name	Theory Marks	Periods	
			Theory	Practical
1.	COMPUTATIONAL THINKING AND PROGRAMMING – 2	40	70	50
2.	COMPUTER NETWORKS	10	15	—
3.	DATABASE MANAGEMENT	20	25	20
	Total	**70**	**110**	**70**

Unit 1: COMPUTATIONAL THINKING AND PROGRAMMING – 2

- Revision of Python topics covered in Class XI
- Functions: Types of function (built-in functions, functions defined in module, user-defined functions), creating user-defined function, arguments and parameters, default parameters, positional parameters, function returning value(s), flow of execution, scope of a variable (global scope, local scope)
- Exception Handling: Introduction, handling exceptions using try-except-finally blocks
- Introduction to files, types of files (Text file, Binary file, CSV file), relative and absolute paths
  - Text file: Opening a text file, text file open modes (r, r+, w, w+, a, a+), closing a text file, opening a file using with clause, writing/appending data to a text file using write() and writelines(), reading from a text file using read(), readline() and readlines(), seek and tell methods, manipulation of data in a text file
  - Binary file: Basic operations on a binary file: Open using file open modes (rb, rb+, wb, wb+, ab, ab+), close a binary file, import pickle module, dump() and load() method, read, write/create, search, append and update operations in a binary file
  - CSV file: Import csv module, open/close csv file, write into a csv file using writer(), writerow(), writerows() and read from a csv file using reader()
- Data Structure: Stack, operations on stack (push & pop), implementation of stack using list

Unit 2: COMPUTER NETWORKS

- Evolution of Networking: Introduction to computer networks, evolution of networking (ARPANET, NSFNET, INTERNET)
- Data Communication terminologies: Concept of communication, components of data communication (sender, receiver, message, communication media, protocols), measuring capacity of communication media (bandwidth, data transfer rate), IP address, switching techniques (Circuit switching, Packet switching)
- Transmission Media: Wired communication media (Twisted pair cable, Co-axial cable, Fibre-optic cable), Wireless media (Radio waves, Micro waves, Infrared waves)
- Network Devices (Modem, Ethernet card, RJ45, Repeater, Hub, Switch, Router, Gateway, Wi-Fi card)
- Network Topologies and Network Types: Types of networks (PAN, LAN, MAN, WAN), networking topologies (Bus, Star, Tree)
- Network Protocol: HTTP, FTP, PPP, SMTP, TCP/IP, POP3, HTTPS, TELNET, VoIP
- Introduction to Web Services: www, Hyper Text Markup Language (HTML), Extensible Markup Language (XML), domain names, URL, website, web browser, web servers, web hosting

Unit 3: DATABASE MANAGEMENT

- Database Concepts: Introduction to database concepts and their need
- Relational Data Model: Relation, attribute, tuple, domain, degree, cardinality, keys (candidate key, primary key, alternate key, foreign key)
- Structured Query Language: Introduction, Data Definition Language and Data Manipulation Language, data type (char(n), varchar(n), int, float, date), constraints (not null, unique, primary key), create database, use database, show databases, drop database, show tables, create table, describe table, alter table (add and remove an attribute, add and remove primary key), drop table, insert, delete, select, operators (mathematical, relational and logical), aliasing, distinct clause, where clause, in, between, order by, meaning of null, is null, is not null, like, update command, delete command, aggregate functions (max, min, avg, sum, count), group by, having clause, joins: cartesian product on two tables, equi-join and natural join
- Interface of Python with an SQL database: Connecting SQL with Python, performing insert, update, delete queries using cursor, display data by using connect(), cursor(), execute(), commit(), fetchone(), fetchall(), rowcount, creating database connectivity applications, use of %s format specifier or format() to perform queries

4: PRACTICAL

S. No.	Unit Name	Marks (Total=30)
1.	**Lab Test** • Python program (60% logic + 20% documentation + 20% code quality) • SQL queries (4 queries based on one or two tables)	 **8** **4**
2.	**Report File** • Minimum 15 Python programs • SQL Queries – Minimum 5 sets using one table/two tables • Minimum 4 programs based on Python-SQL connectivity	**7**
3.	Project (using concepts learnt in Classes 11 and 12)	**8**
4.	Viva Voce	**3**

5: SUGGESTED PRACTICAL LIST

Python Programming

- Read a text file line by line and display each word separated by a #.
- Read a text file and display the number of vowels/consonants/uppercase/lowercase characters in the file.
- Remove all the lines that contain the character 'a' in a file and write it to another file.
- Create a binary file with name and roll number. Search for a given roll number and display the name, if not found display appropriate message.
- Create a binary file with roll number, name and marks. Input a roll number and update the marks.
- Write a random number generator that generates random numbers between 1 and 6 (simulates a dice).
- Write a Python program to implement a stack using list.
- Create a CSV file by entering user-id and password, read and search the password for given user-id.

Database Management

- Create a student table and insert data. Implement the following SQL commands on the student table:
  - ALTER table to add new attributes/modify data type/drop attribute
  - UPDATE table to modify data
  - ORDER BY to display data in ascending/descending order
  - DELETE to remove tuple(s)
  - GROUP BY and find the min, max, sum, count and average
- Similar exercise may be framed for other cases
- Integrate SQL with Python by importing suitable module.

6: PROJECT

The aim of the class project is to create something that is tangible and useful using Python file handling/Python-SQL connectivity. This should be done in groups of two to three students and should be started by students at least 6 months before the submission deadline. The aim here is to find a real-world problem that is worthwhile to solve.

Students are encouraged to visit local businesses and ask them about the problems that they are facing. For example, if a business is finding it hard to create invoices for filing GST claims, then students can do a project that takes the raw data (list of transactions), groups the transactions by category, accounts for the GST tax rates, and creates invoices in the appropriate format. Students can be extremely creative here. They can use a wide variety of Python libraries to create user-friendly applications such as games, software for their school, software for disabled fellow students and mobile applications. Of course, to do some of these projects, some additional learning is required and this should be encouraged. Students should know how to teach themselves.

The students should be sensitized to avoid plagiarism and violation of copyright issues while working on projects. Teachers should take necessary measures for this.

CONTENTS

*Not in syllabus but retained for extra learning.

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