COMPUTER SCIENCE

TEXTBOOK FOR CLASS XI

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FOREWORD

Computer science as a discipline has evolved over the years and has emerged as a driving force for socio-economic activities. It has made continuous inroads into diverse areas — be it business, commerce, science, technology, sports, health, transportation or education. With the advent of computer and communication technologies, there has been a paradigm shift in teaching learning at the school level. The role and relevance of this discipline is in focus because the expectations from the school pass-outs have grown to be able to meet the challenges of the twenty-first century. Today, we are living in an interconnected world where computer-based applications influence the way we learn, communicate, commute or even socialise!

There is a demand for software engineers in various fields like manufacturing, services, etc. Today, there are a large number of successful startups delivering different services through software applications. All these have resulted in generating interest for this subject among students as well as parents.

Development of logical thinking, reasoning and problem-solving skills are fundamental building blocks for knowledge acquisition at the higher level. Computer plays a key role in problem solving with focus on logical representation or reasoning and analysis.

This book focuses on the fundamental concepts and problem-solving skills while opening a window to the emerging and advanced areas of computer science. The newly developed syllabus has dealt with the dual challenge of reducing curricular load as well as introducing this ever evolving discipline.

As an organisation committed to systemic reforms and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to revise the content of the textbook.

HRUSHIKESH SENAPATY
Director
National Council of Educational
Research and Training

New Delhi
8 August 2018

PREFACE

In the present education system of our country, specialised or discipline-based courses are introduced at the higher secondary stage. This stage is crucial as well as challenging because of the transition from general to discipline-based curriculum. The syllabus at this stage needs to have sufficient rigour and depth while remaining mindful of the comprehension level of the learners. Further, the textbook should not be heavily loaded with content.

Computers have permeated in every facet of life. Study of basic concepts of computer science has been desirable in education. There are courses offered in the name of Computer Science, Information and Communication Technology (ICT), Information Technology (IT), etc., by various boards and schools up to secondary stage, as optional. These mainly focus on using computer for word processing, presentation tools and application software.

Computer Science (CS) at the higher secondary stage of school education is also offered as an optional subject. At this stage, students usually opt for CS with an aim of pursuing a career in software development or related areas, after going through professional courses at higher levels. Therefore, at higher secondary stage, the curriculum of CS introduces basics of computing and sufficient conceptual background of Computer Science.

The primary focus is on fostering the development of computational thinking and problem-solving skills. This book has 11 chapters covering the following broader themes:

- Fundamentals: basic understanding of computer system, hardware components and software, data representation, number system, encoding as well as awareness of emerging trends in computer science.
- Problem-solving: problem analysis, algorithm, flowchart, implementation, testing and maintenance.
- Programming: basic constructs of a program using Python programming language — program structure, identifiers, variables, flow of control, advanced data types, functions.
- Societal impact: awareness of digital footprints, data privacy and protection, cyber crime, etiquettes in a digital society and implications on security, privacy, piracy, ethics, values and health concerns.
- Chapters 1, 2, 3, 4 and 11 have two additional components — (i) activities and (ii) think and reflect for self assessment while learning as well as to generate further interest in the learner.

Python programming language is introduced that is easy to learn in interactive and script mode. A number of hands-on examples are given to gradually explain methodology to solve different types of problems across the Chapters 5 to 10. The programming examples as well as the exercises in these chapters are required to be solved in a computer and verify with the given outputs.