Informatics Practices

Textbook for Class XII

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Foreword

Information Technology has continuously been crossing the barriers of access and communication and reaching more and more people. The number of internet users in India has been on the rise. The tremendous growth in computer science, telecommunications and information technology has resulted in automation of various tasks and contributed to the ease of living. Technology has made continuous inroads into diverse areas—be it business, commerce, science, sports, health, transportation or education. Today, we are living in an interconnected world where computer based applications influence the way we learn, communicate, commute, or even socialise.

With so many users of Information and Communication Technology (ICT), huge volumes of data are continuously generated at an unprecedented rate. Many innovative business models are being evolved which utilise such data to reach potential customers in a more targeted way. Government agencies are also using data to deliver services and fast track progress of different programmes, strengthen accountability and to make more informed decisions. This has been creating better opportunities for our youth not only to enter the field of technical education but also in the world of work. NCERT, for the first time, has developed a textbook on 'Informatics Practices' to develop skill sets in students to make use of the opportunities provided by ICT.

This book focuses on the fundamental concepts related to handling of data while opening a window to the emerging areas of data processing. It seeks to address the dual challenges of reducing curricular load as well as introducing the latest development in the field of ICT.

As an organisation committed to systemic reforms and continuous improvement in the quality of its curricular material, NCERT welcomes comments and suggestions to enable us to bring about necessary changes in its further publications.

Hrushikesh Senapaty
Director
National Council of Educational
Research and Training

New Delhi
August 2020

Preface

In the present education system of our country, specialised and 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.

We are living in an era where information drives many of our socio economic decisions. Millions of people are accessing internet round the clock for availing various services and thereby generating vast amount of data. Processing of data is becoming a key skill with applications across the disciplines. Thus, study of basic concepts of data handling and analysis is becoming more and more desirable. 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.

Informatics Practices (IP) at the higher secondary stage of school education is also offered as an optional subject. At this stage, students can take up IP with the aim of pursuing a career in data science or related areas after going through professional courses at higher levels. Therefore, at higher secondary stage, the curriculum of IP introduces basics of database management systems and data processing. The book has seven chapters covering the following broader themes:

- **SQL Queries:** Querying database using the Structured Query Language by applying SQL functions including aggregate functions.
- **Data Handling:** The popular Python library called Pandas has been introduced. The important data structures of Pandas – Series and DataFrame have been covered in details and basic data handling and data analysis using Pandas are included.
- **Data Visualisation:** The Pandas library called Pyplot is introduced. It demonstrates how to generate high quality graphs and charts from Python using the Pyplot tool.
- **Internet and Web:** Introduction to the concepts of Computer networks are given, followed by a brief overview of Internet, its application are given. The concept of web, website, and its hosting is also included.
- **Societal Impact:** Awareness of digital footprints, data privacy and protection, cyber crime, etiquettes, copyright and plagiarism, E-waste in a digital society and their implications on security, privacy, piracy, ethics, values and health concerns.

Each chapter has 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. A number of hands-on examples are given to gradually explain methodology to solve different types of problems across the Chapters. The programming examples as well as the exercises in the chapters are required to be solved in a computer and verify with the given outputs.

Box items are pinned inside the chapters either to explain related concepts or to describe additional information related to the topic covered in that section. However, these box-items are not to be assessed through examinations.

Project Based Learning given at the end includes exemplar projects related to real-world problems. Teachers are supposed to assign these or similar projects to be developed in groups. Working in such projects may promote peer-learning, team spirit and responsiveness.

The chapters have been written by involving practicing teachers as well as subject experts. Several iterations have resulted into this book. Thanks are due to the authors and reviewers for their valuable contribution. I would like to place on record appreciation for *Professor* Om Vikas for leading the review activities of the book as well as for his guidance and motivation to the development team throughout. Comments and suggestions are welcome.

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