

INFORMATICS PRACTICES



11149

TEXTBOOK FOR CLASS XI



विद्यया ऽ मृतमश्नुते



एन सी ई आर टी
NCERT

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

ISBN 978-93-5292-148-5

First Edition

August 2019 Shravana 1941

PD 50T BS

© **National Council of Educational
Research and Training, 2019**

₹ 140.00

Printed on 80 GSM paper with NCERT
watermark

Published at the Publication Division
by the Secretary, National Council
of Educational Research and
Training, Sri Aurobindo Marg, New
Delhi 110016 and printed at Swan
Press, 308 & 309, Sector-7 Manesar,
Gurugram - 122050, Haryana.

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OFFICES OF THE PUBLICATION

DIVISION, NCERT

NCERT Campus
Sri Aurobindo Marg
New Delhi 110 016 Phone : 011-26562708

108, 100 Feet Road
Hosdakere Halli Extension
Banashankari III Stage
Bengaluru 560 085 Phone : 080-26725740

Navjivan Trust Building
P.O. Navjivan
Ahmedabad 380 014 Phone : 079-27541446

CWC Campus
Opp. Dhankal Bus Stop
Panihati
Kolkata 700 114 Phone : 033-25530454

CWC Complex
Maligaon
Guwahati 781 021 Phone : 0361-2674869

Publication Team

Head, Publication Division : *M. Siraj Anwar*

Chief Editor : *Shveta Uppal*

Chief Business Manager : *Bibash Kumar Das*

Chief Production Officer : *Arun Chitkara*

Editor : *Bijnan Sutar*

Production Assistant : *Mukesh Gaur*

Cover Design and Layout

Meetu Sharma (Contractul)

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 'Informative 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
July 2019

PREFACE

In the present education system of our country, specialised/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 the secondary stage, as an optional subject. 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 the higher secondary stage, the curriculum of IP introduces the basics of database management systems and data processing. The book has eight chapters covering the following broader themes:

- Basic understanding of computer systems and their evolution, introduction to software and their categorisation, computer memory, awareness of emerging trends in the field of information and communication technology.
- Basic constructs of a program using Python programming language — program structure, identifiers, variables, flow of control, advanced data types like Lists and Dictionaries.
- Handling data using specialised Python library called NumPy — concept of single and multi-dimensional Array.
- Concepts of data, database, and relational database management system using MySQL. Structured query language — data definition, data manipulation and data querying.

Python programming language and NumPy are introduced using both the interactive and script mode. A number of hands-on examples are given in Python, NumPy and MySQL to gradually explain the methodology to solve different types of problems and handle data. The programming and database related examples as well as the exercises in those chapters are required to be solved in a computer and verified with the given outputs.

The chapters in this book have two additional components — activities for self assessment and ‘think and reflect’ to generate further interest in the learner.

Group projects through case studies are proposed to solve complex problems. Some exercises have been made in case-study form to promote problem-finding and problem-solving skills.

These chapters have been written by involving practicing teachers as well as subject experts. These have been iteratively peer-reviewed. Several iterations have resulted into this book. Thanks to the authors and reviewers for their valuable contribution.

Comments and suggestions are welcome to make this endeavour par excellence.

Dr. Rejaul Karim Barbhuiya
Assistant Professor,
Department of Education in
Science and Mathematics, NCERT

NBCampus

TEXTBOOK DEVELOPMENT COMMITTEE

MEMBERS

Anuradha Khattar, *Assistant Professor*, Miranda House, University of Delhi, Delhi

Chetna Khanna, *Freelance Educationist*, Delhi

Gurpreet Kaur, *PGT (Computer Science)*, GD Goenka Public School, Delhi

Harita Ahuja, *Assistant Professor*, Acharya Narendra Dev College, University of Delhi, Delhi

Mudasir Wani, *Assistant Professor*, Govt. Degree College for Women, Srinagar, Jammu and Kashmir

Om Vikas, *Professor (Retd.)*, Formerly Director, ABV-IIITM, Gwalior, Madhya Pradesh

Priti Rai Jain, *Assistant Professor*, Miranda House, University of Delhi, Delhi

Rinku Kumari, *PGT (Computer Science)*, Kendriya Vidyalaya, Sainik Vihar, Delhi

Sharanjit Kaur, *Associate Professor*, Acharya Narendra Dev College, University of Delhi, Delhi

Tapasi Ray, *Formerly Global IT Director*, Huntsman Corporation, Singapore

MEMBER-COORDINATOR

Rejaul Karim Barbhuiya, *Assistant Professor*, DESM, NCERT, Delhi

ACKNOWLEDGEMENTS

The National Council of Educational Research and Training acknowledges the valuable contributions of the individuals and organisation involved in the development of Informatics Practices textbook for Class XI.

The council expresses its gratitude to the syllabus development team including MPS Bhatia, *Professor*, Netaji Subhas Institute of Technology, Delhi; T V Vijay Kumar, *Professor*, School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi; Zahid Raza, *Associate Professor*, School of Computer and Systems Sciences, Jawaharlal Nehru University, New Delhi; Vipul Shah, *Principal Scientist*, Tata Consultancy Services, and the CSpathshala team; Smruti Ranjan Sarangi, *Associate Professor*, Department of Computer Science and Engineering, Indian Institute of Technology Delhi; Vikram Goyal, *Associate Professor*, Indraprastha Institute of Information Technology (IIIT) Delhi; Vandana Tyagi, *PGT*(Computer Science), Kendriya Vidyalaya, JNU, Delhi and Mamur Ali, *Assistant Professor*, Central Institute of Educational Technology, NCERT, New Delhi.

The council is thankful to the following resource persons for their contribution in editing, reviewing, and refining the manuscript of this book: D.N. Sansanwal, *Retd. Professor*, Devi Ahilya Vishwavidyalaya, Indore; Veer Saini Dixit, *Assistant Professor*, Atma Ram Sanatan Dharma College, University of Delhi, Delhi; Mukesh Kumar, *Teacher*, DPS RK Puram, Delhi; Gautam Sarkar, *Teacher*, Modern School, Barakhamba Road, Delhi; Aswin K. Dash, *Teacher*, Mother's International School, Delhi; Nancy Sehgal, *Teacher*, Mata Jai Kaur Public School, Delhi; Neelima Gupta, *Professor*, Department of Computer Science, University of Delhi; Anamika Gupta, *Assistant Professor*, Shaheed Sukhdev College of Business Studies, University of Delhi. The council further acknowledges the contribution of Anuja Krishn, *freelance editor*, for refining the chapters from language point of view.

The council is grateful to Dinesh Kumar, *Professor and Head*, DESM for his valuable cooperation and support throughout the development of this book.

The council also gratefully acknowledges the contributions of Meetu Sharma, *Graphic Designer*; Kanika Walecha, *DTP Operator*; Pooja, *Junior Project Fellow*; Hari Darshan Lodhi and Junaid Ahmed, *DTP Operator* (Contractual); Chanchal Chauhan, *Proofreader* (Contractual) and Aishwarya Bhattacharyya, *Assistant Editor* (Contractual), in shaping this book. The contributions of the office of the APC, DESM and Publication Division, NCERT, New Delhi, in bringing out this book are also duly acknowledged.



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COMPUTER SYSTEM

CHAPTER 1

“A computer would deserve to be called intelligent if it could deceive a human into believing that it was human.”

— Alan Turing

In this chapter

- » Introduction to Computer System
- » Evolution of Computer
- » Computer Memory
- » Software

1.1 INTRODUCTION TO COMPUTER SYSTEM

A computer is an electronic device that can be programmed to accept data (input), process it and generate result (output). A computer along with additional hardware and software together is called a computer system.

A computer system primarily comprises of a central processing unit, memory, input/output devices, and storage devices. All these components function together as a single unit to deliver the desired output. A computer system comes in various forms and sizes. It can vary