

BASIC COMPUTER ENGINEERING

Dr. PRATIK GITE

Assistant Professor

Department of Computer Science & Engineering

IPS ACADEMY : INSTITUTE OF ENGINEERING & SCIENCE

INDORE, MADHYA PRADESH, INDIA

BASIC COMPUTER ENGINEERING

Copyright © : Dr. Pratik Gite
Publishing Right (P) : VSRD Academic Publishing
A Division of Visual Soft India Private Limited

ISBN-13: 978-93-87610-40-8
FIRST EDITION, JUNE 2019, INDIA

Printed & Published by:
VSRD Academic Publishing
A Division of Visual Soft India Private Limited

Disclaimer: The author(s) are solely responsible for the contents compiled in this book. The publishers or its staff do not take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the Authors or Publishers to avoid discrepancies in future.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the Publishers & Author.

Printed & Bound in India

VSRD ACADEMIC PUBLISHING

A Division of Visual Soft (India) Pvt. Ltd.

REGISTERED OFFICE

154, Tezabmill Campus, Anwarganj, KANPUR – 208 003 (UP) (INDIA)
Mob.: +91 9899926803 || Web.: www.vsrdpublishing.com || Email: vsrdpublishing@gmail.com

MARKETING OFFICE

340, First Floor, Adarsh Nagar, Oshiwara, Andheri(W), MUMBAI – 400 053 (MH) (INDIA)
Mob.: +91 9956127040 || Web.: www.vsrdpublishing.com || Email: vsrdpublishing@gmail.com

PREFACE

This reference book meets the requirement of students of engineering, professional and other courses. This book is useful to refer the syllabus of Indian Universities.

“Basic Computer Engineering” takes a thorough approach to introduce the basic concepts of the Basic Computer Engineering. It covers the key features of network and advanced topics such as security issues, Applications of DBMS etc

The book is organized in a systematic way to cover various topics with numerous examples. The goal of this book is to make the students to understand the concepts of Basic Computer Engineering.

This book will help the students to understand the concepts of Basic Computer Engineering in a simple and easy way. This book is for beginners who wish to know about introductory part of Basic Computer Engineering. This book is written by assuming that the reader need not be an expert of Basic Computer Engineering.

The book has been provided summary and review questions which will be useful to the reader of the book. While writing this reference book, I have worked actively with the matter of the book to ensure that the book is technically correct, although it is hoped all material in this book is accurate, the possibility exists that some omissions or errors may present. It will be grateful if I receive suggestions from the users of this book and if they communicate to me for any errors they discover. It will help me to improve the future editions of this book. Suggested improvements should be mail at pratikgite135@gmail.com.

Dr. Pratik Gite

ACKNOWLEDGEMENT

I am grateful to Dr. Sanjay Thakur, Principal, L.K.C.T. Indore, for his encouragement and suggestions in carrying out this book.

I am very much thankful to Dr. Archana Keerti Chowdhary, Principal, IES-IPS Academy Indore, for her continuous motivation and advice for this book. I would like to express my gratitude to Dr. Namrata Tapaswi, H.O.D., Computer Science and Engineering, IES-IPS Academy Indore, for her valuable comments and support. I express my sincere thanks to Dr. Ashish Moyade for their help throughout completion of this book.

I am very much thankful to my parents Mr. Rajendra Gite and Mrs. Sunita Gite for their personal attention and care. I am grateful to my Elder Brothers Mr. Sandeep Gite and Mr. Kapil Gite for inspiring me for this book. I want to thank my wife Mrs. Rajeshwari Gite for her patience and motivation.

I like to remember the motivation initiated by my respected Father in Law Mr. Rameshwar Tare and Mother in Law Anusuiya Tare.

I wish to thank faculty members of CSE department of IES-IPS Academy, Indore for their constant co-operation, directly inspiration and encouragement.

I deeply express my heartfelt thanks to the VSRD Academic Publishing (A Division of Visual Soft India Private Limited) for publishing this book in such a beautiful getup and well in time.

Dr. Pratik Gite

Dedicated to

**My Parents,
Wife, Brothers, Shivay**

&

All Students

and

Teachers

KEY FEATURES

- *Easy language used for better understanding.*
- *Key concepts are mentioned at the beginning of each chapter.*
- *Each chapter contains summary and review questions.*
- *Reader friendly presentation for easy grasp.*
- *Thoroughly discussed the important topics of Information Technology.*
- *List of definitions for better understanding of technical terms.*
- *Topics are covered with real life examples.*
- *Technical terms are explained with pictorial presentation and screen shots.*
- *Includes notes and remarks for quick review.*
- *Some important points to be remembered are mentioned separately.*

ABBREVIATION

IEEE	Institute of Electrical and Electronics Engineers
LAN	Local Area Network
MAN	Metropolitan Area Network
WAN	Wide Area Network
OSI	Open System Interconnection
DBMS	Database Management System
MAC	Media Access Control
TCP	Transmission Control Protocol
UDP	User Datagram Protocol
NS-2	Network Simulator
OOP	Object Oriented Programming
IaaS	Infrastructure as a Service
Paas	Platform as a Service
SaaS	Software as a Service

DEFINITIONS

Computer: It is an electronic device that can accept, store and process information to produce the required result.

Register: It is temporary storage units within the CPU.

Bus Architecture: A set of parallel conductors which allow the flow of instructions and data between devices.

Instruction Set: An instruction set made up of a combination of an operation code and way of specifying an operand by its location or address in memory.

Computer Memory: It is used to store instructions and data to perform an operation.

C++: It is an object oriented computer language used in the development of enterprise and commercial applications.

Keywords: These are the reserved keywords that have special to the language compiler they cannot use as identifiers in your program.

DBMS: Database Management System is a collection of interrelated data and set of program to access those data.

Computer Network: It is the set of computing devices often connected by some media link through wired or wireless.

Public Key Infrastructure: Public Key Infrastructure is a technology used in modern security mechanisms on the internet. It covers a cryptographic system including encryption, asymmetric key cryptography, message digest and digital signature.

Cryptography: Art and science of achieving security by encoding messages to make them non-readable is known as cryptography.

Cryptanalysis: The technique of decoding messages from a non-readable format back to readable format without knowing how they were initially converted from readable format to non-readable format.

Cryptology: A combination of cryptography and cryptanalysis is known as cryptology.

Plain Text: Any communication in the language that we speak- that is the human language, takes the form of plain text or clear text.

Cipher text: When a plain text message is codified using any suitable scheme, the resulting message is called as cipher text.

Encryption Algorithm: Step by step procedure to convert plaintext into

cipher text and vice versa is known as encryption algorithm.

Key: Stream of bit used in cryptographic algorithm for encryption and decryption is called as a key.

Encryption: The process of encoding plain text message into cipher text message is called as encryption.

Decryption: The process of decoding cipher text message into plain text message is called decryption.

Brute force attack: Brute force attack is a method of defeating a cryptographic scheme by trying a large or all possible number of possibilities.

Symmetric Key Cryptography: In Symmetric Key Cryptography, only one key (same key) is used for both encryption and decryption. Both the parties (sender and receiver) agree upon the key before any transmission begins.

Asymmetric Key Cryptography: In Asymmetric Key Cryptography, a key pair (Two different Keys), is used i.e. one key is used for encryption and only the other corresponding key is used for decryption.

Threat: Any potential event or act that could cause injury to employee or assets.

Risk: The chance of a vulnerability being exploited.

Vulnerability: A cause to security that could permit a threat to make injury.

Digital Signature: A digital signature is used to authenticate the sender of the message and to check the integrity of the message, i.e. that it has not been altered in transit.

Digital Certificate: Digital certificate is a document such as our passport or driving license. It is basically a computer file such as ABC.cer and is certified by a trusted agency called certification Authority (CA).

Secure Socket Layer (SSL): It is an internet protocol used for exchange of information between browser & server developed by Netscape Corporation.

Secure Electronic Transaction (SET): The Secure Electronic Transaction (SET) is an open encryption and security specification that is designed for protecting credit card transactions on the Internet.

Cyber Law: Cyber Law is the law governing computers and the Internet.

Cyber stalking: Cyber stalking is a criminal offense with use of the

Internet or other electronic means to stalk or harass an individual, a group of individuals, or an organization.

Defamation: The term defamation is used to define the injury that is caused to the reputation of a person in the eyes of a third person.

Hacking: Hacking is the practice of modifying the features of a computer system, in order to accomplish a goal outside of the creator's original purpose.

Hacker: A hacker is a person who tries to gain un-authorized access to your computer.

Cracker: A hacker expert at accessing password-protected computers, files, and networks is known as "crackers."

Spam: Spam is any kind of unwanted email sent in bulk by companies

Information theft: Information theft or identity theft is a crime of obtaining the personal or financial information of another person for the sole purpose of assuming that person's name or identity in order to make transactions or purchases.

Denial of Service (DoS): An attack, in which an attacker attempts to prevent legitimate users from accessing information or services, is known as Denial of Service attack.

Logic Bomb: Logic bomb is a malware that is triggered by a response to an event, such as launching an application or when a specific date/time is reached.

Passive Attack: A passive attack does not disrupt proper operation of the network. The attacker snoops the data exchanged in the network without altering it.

Active Attack: An active attack attempts to alter or destroy the data being exchanged in the network, thereby disrupting the normal functioning of the network. It can be classified into two categories external attacks and internal attacks.

External Attack: External attacks are carried out by nodes that do not belong to the network. These attacks can be prevented by using standard security mechanisms such as encryption techniques and firewalls.

Internal Attacks: Internal attacks are carried out by compromised nodes that are actually part of the network. Since the attackers are already part of the network as authorized nodes, internal attacks are more severe and difficult.

CONTENTS

CHAPTER 1 : COMPUTER FUNDAMENTAL	1
1.1. WHAT IS COMPUTER	1
1.2. FEATURES OF COMPUTER.....	2
1.3. LIMITIONS OF COMPUTER	2
1.4. OPERATION PERFORMED BY COMPUTER	2
1.5. VARIOUS FUNCTIONAL UNITS OF A COMPUTER	3
1.6. GENERATION OF COMPUTER.....	3
1.7. TYPES AND CLASSIFICATIONS OF COMPUTER	4
1.8. INSTRUCTION SET	5
1.9. TYPES OF BUSES.....	5
1.10. DIFFERENT TYPES OF MEMORY AND STORAGE.....	6
1.11. GIS AND REMOTE SENSING.....	7
1.12. E-BUSINESS.....	8
1.13. BIOINFORMATICS	9
1.14. PERSONNAL COMPUTER.....	9
1.15. ANIMATION.....	9
1.16. MULTIMEDIA	9
1.17. CATEGORIES OF MULTIMEDIA	10
1.18. COMPUTER ETHICS	12
1.19. GOOD SECURITY HABITS.....	13
1.20. CYBER LAW.....	14
1.21. OPERATING SYSTEM	16
1.22. WHAT YOU LEARNED IN THIS CHAPTER?	17
CHAPTER 2 : OBJECT ORIENTED PROGRAMMING & C++	19
2.1. INTRODUCTION TO C++	19
2.2. CHARACTER SET.....	22
2.3. TOKENS	23
2.4. OPERATOR.....	28
2.5. OPERATOR PRECEDENCE AND ASSOCIATIVITY.....	43
2.6. PROGRAM STRUCTURE.....	45
2.7. DATA TYPES.....	46
2.8. TYPE CHECKING	47
2.9. STRONG TYPING	48
2.10. TYPE COMPATIBILITY	49
2.11. VARIABLE.....	49
2.12. EXPRESSIONS.....	52
2.13. CONTROL STRUCTURE	53
2.14. I/O OPERATIONS	66
2.15. ARRAY	68
2.16. FUNCTIONS.....	76

CHAPTER 3 : OBJECT ORIENTED PROGRAMMING FEATURES	80
3.1. CLASSES AND OBJECT	80
3.2. SCOPE RESOLUTION OPERATOR	89
3.3. CONSTRUCTOR.....	90
3.4. DESTRUCTOR.....	92
3.5. FRIEND FUNCTION.....	93
3.6. INHERITANCE.....	94
3.7. POLYMORPHISM	111
3.8. EXCEPTION HANDLING	119
3.9. STATIC AND STACK BASED MEMORY MANAGEMENT.....	127
3.10. HEAP BASED STORAGE MANAGEMENT	128
3.11. OBJECT ORIENTED PROGRAMMING IN SMALL TALK, C++, JAVA, PHP, PERL.....	128
3.12. INTRODUCTION TO DATA STRUCTURES.....	130
3.13. WHAT YOU LEARNED IN THIS CHAPTER?	134
CHAPTER 4 : COMPUTER NETWORK	138
4.1. INTRODUCTION	138
4.2. NETWORK USES DISTRIBUTED PROCESSING	138
4.3. ADVANTAGES OF DISTRIBUTED PROCESSING	138
4.4. NETWORK CRITERIA	138
4.5. APPLICATION OF COMPUTER NETWORK	139
4.6. OSI MODEL VS TCP/IP.....	139
4.7. OSI MODEL	140
4.8. TCP/IP	145
4.9. TYPES OF ATTACKS	146
4.10. WHAT YOU LEARNED IN THIS CHAPTER?	152
CHAPTER 5 : INTRODUCTION TO DBMS AND CLOUD COMPUTING.....	154
5.1. WHAT IS DATABASE MANAGEMENT SYSTEM.....	154
5.2. ARCHITECTURE OF DBMS	155
5.3. DBA	156
5.4. SCHEMA	156
5.5. CLOUD COMPUTING.....	158
5.6. DEPLOYMENT MODELS.....	160
5.7. WHAT YOU LEARNED IN THIS CHAPTER?	161