

QUICK REVISION

Hand Book

Thoroughly Revised & Updated

Computer Science & Information Technology

*By
Team of
Engineers Academy*

 **EAPublications**

ENGINEERS ACADEMY PUBLICATIONS

Log on to : www.eapublications.org | Ph. : 08094441777



Publisher and Distributor

Engineers Academy Publications

100-102, Ram Nagar, Bambala Puliya, Toll Tax,
Tonk Road, Pratap Nagar, Jaipur (Rajasthan)-302033
E-Mail : engineers.academy.india@gmail.com

All Rights Reserved :

This book or part there of cannot be translated or reproduced in any form (except for review or criticism) without the written permission from the Publishers.

First Edition	:	2014
Second Edition	:	2015
Third Edition	:	2016
Fourth Edition	:	2017
Fifth Edition	:	2021
Sixth Edition	:	2026

Without prior written permission of publisher and author, no person/publisher/institute should use full part of the text/design/question/material of the book. If any body/publisher/institute is found in default legal action will be taken accordingly.

Price : ₹ 715.00

Although every effort has been made to avoid mistakes and omissions, there may be possibility some mistakes been left inadvertently. This book is released with the understanding that neither author nor publisher will be responsible in any manner for mistakes/premissions in the book. Dispute, if any, shall be subject to Jaipur (Rajasthan) Jurisdiction only.



DIRECTOR'S *Message*

To reach heights one must start climbing and if the journey is difficult then perseverance is the key to success. As a teacher we have realized over past years that success in any competitive exam requires hard work and proper guidance. **Engineers Academy** with its unique teaching methodologies has always proved that we meet the expectations of thousands of students and parents to make their dreams come true. With changing patterns, we have adapted ourselves to deliver the best and ensure better results.

This book has been organized and executed with a lot of care, dedication and passion for lucidity. A conscious attempt has been made to simplify the concepts to facilitate better understanding of the subject.

Engineers Academy has many successful stories of students who secured All India Rank in ESE, GATE, PSU's and JEn. Now we invite you to become a part of Engineers Academy to explore and achieve ultimate goal of your life. We promise to provide you quality guidance with competitive environment which is far advanced and ahead than the reach of other institution.

We would feel satisfied if the book meets the needs of the students for whom it is meant.

Lastly, we are thankful to all the engineers, authors whose work has been the source of enlightenment, inspiration and guidance in presenting this book.

It is hoped that the book in its new form will enjoy its ever increasing popularity.

Regards

Dr. Pantaj Goyal



Preface

This book has been written to meet the growing requirements of candidates appearing for Basic and Senior Computer Instructor Examinations. Though every candidate has ability to succeed but competitive environment, in-depth knowledge, quality guidance, time management and good source of study is required to achieve goals.

This book includes short notes which works as a mock exam practice for the reader. Questions of all the subject have been organized in systematic, concepts oriented and error less manner so that it become easy and interesting for even a beginner to understand. It is a very convenient book and must be solved by candidate aiming for competitive exams.

After solving this booklet students can feel encouraged and develop confidence to attempt each and every type of numerical as well as theoretical problems. Each problems explains solving approach so that at the end, so the reader is well equipped to be able to apply any type of problem solving requirement and distinctly choose one strategy or type from the other.

We hope this book will be proved an important tool to succeed in Basic and Senior Computer Instructor Examinations.

It is earnestly hoped that with the extensive additions and revisions, the present edition will facilitate the students not only in preparing themselves for competitive examinations but also in preparing for their regular examinations and prove more useful to the students than the earlier editions.

Even though, enough readings were given for correcting the error and printing mistakes, due to human tendency there could be some minor types in the book. If any such types found, they will be highly appreciated and in corporated in the next edition. Also, please provide your valuable suggestions at : engineers.academy.india@gmail.com

Wish you all the best. Have a nice reading.

Team of
Engineers Academy Publications

Welcome Message

Welcome to the Engineers Academy.

You have taken the first step toward shaping a powerful and successful future. This book is not just a collection of computer science concepts, but a guide to building your confidence, skills, and innovative thinking for various academic and competitive examinations.

At Engineers Academy, we believe that every student has the potential to become a skilled professional, a problem solver, and a responsible contributor to society. With dedication, curiosity, and continuous practice, you can transform knowledge into achievement.

Let this book motivate you to think beyond limits, explore new possibilities, and face every challenge with courage. Remember, success is not given — it is created by those who are willing to learn, grow, and never give up.

We are proud to walk with you on this journey of learning and success.

— Engineers Academy —

About the Course

This course has been specially structured as a Quick Revision Handbook to support students during exam preparation when time is limited and accuracy is crucial. It presents essential computer science concepts in a concise, precise, and exam-oriented format for fast and effective revision.

The content is carefully organized into short notes, key points, definitions, important codes, syntax examples, algorithms, and concept summaries, enabling learners to recall important topics quickly without unnecessary complexity. The focus is on clarity, relevance, and practical exam applicability.

This course is ideal for engineering students, competitive examination aspirants, and all learners who require a reliable revision companion to strengthen conceptual understanding and boost confidence before examinations.

Built for speed. Designed for success.

— Engineers Academy —

How We Are Different from Others

How We Are Different from Others

At Engineers Academy, education is not limited to subjects; it is about building strong understanding and vision. Our approach trains students to understand concepts deeply and apply them effectively in real exam and career situations. We believe in quality over quantity, concept over cramming, and learning over memorizing. Our training methods, study materials, and academic guidance are designed to match real examination and career demands.

Engineers Academy stands for discipline, innovation, and continuous improvement. We guide students not only to score better, but to grow stronger as learners and professionals.

*We don't follow the crowd —
we create future-ready individuals.*

— Engineers Academy —

एक कदम लक्ष्य की ओर.....

चलो बढे हम लक्ष्य की ओर, रुकना अब स्वीकार नहीं
ज्ञान पथ पर जो अडिग रहे, उसका कल बीमार नहीं
संघर्ष साधना है जीवन की, परिश्रम ही पहचान बनें
जो आज स्वयं को गढ़ लेता, कल वही नया इतिहास रहे



Testimonials



Basic Computer
Instructor Combo Books

Join the Senior Computer Instructor Test Series
and use coupon code SCI50 to get special Discount

— *Engineers Academy* —

CONTENTS

Quick Revision Handbook

1. Fundamental of Computer	1 - 27
2. Operating System	28 - 38
3. Computer Network	39 - 60
4. Software Engineering	61 - 89
5. Computer Organization	90 - 106
6. Data Structure & Algorithm	107 - 135
7. Data Base Management System	136 - 156
8. Programming (C, JAVA & OOPs)	157 - 240
9. Communication	241 - 244
10. Digital Logic System	245 - 255
11. Network Security	256 - 275

FUNDAMENTAL OF COMPUTER

CHAPTER

1

SHORT NOTES

➤ INTRODUCTION AND EVOLUTION OF COMPUTER

The word *Computer* is derived from the Latin term “**Computare**”, which means *to calculate*. A computer is an electronic device that accepts data as input, processes it according to a set of instructions, and produces meaningful information as output.

A computer is widely used in education, research, business, banking, medical science, engineering, and communication due to its high speed, accuracy, and reliability.

➤ EARLY CALCULATING DEVICES

Abacus

Abacus is considered the first calculating device. It consists of beads mounted on rods and was mainly used for addition and subtraction. In Japan, it is known as *Soroban*.

Napier’s Bones

Invented by John Napier in 1617, this device was used to simplify multiplication and division.

Pascaline

Invented by Blaise Pascal in 1642, Pascaline was the first mechanical calculator capable of performing addition and subtraction automatically.

Jacquard Loom

Developed by Joseph Marie Jacquard in 1801, this machine used punched cards and inspired the idea of programmable machines.

➤ FATHER OF COMPUTER

Charles Babbage is known as the Father of Computer.

Difference Engine: Designed in 1822 to perform mathematical calculations automatically.

Analytical Engine: Proposed in 1833, it contained components similar to modern computers such as input unit, output unit, memory, and CPU.

It used punched cards for instructions.

Ada Augusta wrote programs for the Analytical Engine and is known as the world's first programmer.

Census Tabulating Machine

Invented by **Herman Hollerith** in 1890 for census data processing. It used punched cards and laid the foundation of modern data processing.

IBM (International Business Machines)

Originally known as CTR (Computing Tabulating Recording Company), it was renamed IBM in 1924. IBM became one of the leading computer manufacturing companies in the world.

ENIAC Computer

ENIAC (Electronic Numerical Integrator and Computer) was developed in 1946 by J. Presper Eckert and John Mauchly.

It was the first electronic digital computer used mainly for scientific and military calculations.

Apple Computers

Apple-I was designed by Steve Wozniak.

Apple-II, launched in 1977, became the first successful personal business computer.

➤ **CHARACTERISTICS OF COMPUTER**

A computer possesses the following important characteristics:

1. Speed

A computer can perform millions of instructions per second.

2. Accuracy

The result is always correct if the input and instructions are correct.

3. Reliability

Computers can work continuously without fatigue.

4. Storage Capacity

Large amount of data can be stored and retrieved when required.

5. Automation

Once instructions are given, the computer works automatically.

6. Versatility

A computer can perform different types of tasks.

7. Diligence

It never becomes tired or bored.

8. Multitasking

Multiple tasks can be performed simultaneously.

9. Flexibility

Programs can be changed easily.

10. Security

Data can be protected using passwords and encryption.

➤ WORKFLOW OF CPU

Input → Processing → Output

The CPU processes data using Arithmetic Logic Unit (ALU) and Control Unit.

➤ LIMITATIONS OF COMPUTER

Despite many advantages, computers have certain limitations:

- No intelligence of their own
- No emotions or feelings
- Cannot take decisions independently
- Dependent on user instructions
- Cannot think creatively
- No learning ability without programming

➤ CLASSIFICATION OF COMPUTER**Based on Hardware Generation**

1. First Generation
2. Second Generation
3. Third Generation
4. Fourth Generation
5. Fifth Generation

Based on Working Principle

1. Analog Computer
2. Digital Computer
3. Hybrid Computer

Based on Size

1. Super Computer
2. Mainframe Computer
3. Mini Computer
4. Micro Computer

First Generation Computers (1942–1955)

Vacuum tubes were used.

Large size, high power consumption, and low reliability.

Examples: ENIAC, EDVAC, UNIVAC.

Second Generation Computers (1956–1964)

Transistors replaced vacuum tubes.

Better speed, smaller size, and improved efficiency.

Third Generation Computers (1965–1975)

Integrated Circuits (IC) were used.

Operating systems and high-level languages became common.

Fourth Generation Computers (1976–1989)

Microprocessors were introduced.

Personal computers became popular.

Fifth Generation Computers (1989–Present)

Artificial Intelligence, multimedia, networking, and advanced software technologies are used.

➤ SUPER COMPUTERS IN INDIA

PARAM Series, AIRAWAT, PARAM Siddhi, PARAM Pravega, PARAM Shivay.

AIRAWAT is India's first AI-based supercomputer.

Important Facts

- Charles Babbage – Father of Computer
- Alan Turing – Father of Modern Computer Science
- John McCarthy – Father of Artificial Intelligence
- Computer speed is measured in FLOPS
- Data processing means converting raw data into meaningful information

➤ BASIC COMPUTER ORGANIZATION

A computer system works on the principle of **IPO Cycle**:

Input ?! Processing ?! Output

All data, instructions, and intermediate results are stored temporarily in memory during processing. The control unit manages the complete operation of the system.

CENTRAL PROCESSING UNIT (CPU)

The CPU is the core component of a computer system responsible for executing instructions. It is called the **brain of the computer**.

The CPU consists of:

1. ALU (Arithmetic Logic Unit)**2. CU (Control Unit)****3. Memory Unit****1. Arithmetic Logic Unit (ALU)**

ALU performs all arithmetic and logical operations such as:

- Addition, subtraction, multiplication, division
- Logical comparisons ($>$, $<$, $=$, $e^?$, $d^?$)
- Bitwise operations

The results produced by ALU are stored back into registers or memory.

2. Control Unit (CU)

The Control Unit:

- Fetches instructions from memory
- Decodes instructions
- Controls execution sequence
- Coordinates with ALU, memory and I/O devices
- Acts as an interface between hardware and software

3. Memory Unit

Memory stores:

- Data
- Instructions
- Intermediate results
- Final output

➤ Types of Memory**1. Primary Memory**

- RAM (Volatile)
- ROM (Non-Volatile)

2. Secondary Memory

- Hard Disk
- SSD
- Pen Drive
- CD/DVD

➤ MOTHERBOARD

The motherboard is the main circuit board of the computer system. All components such as CPU, RAM, ROM, storage devices, ports, and expansion cards are connected to it.

It is also known as:

- Main Board
- Logic Board
- System Board
- Printed Circuit Board (PCB)

➤ COMPUTERBUS

A computer bus is a communication pathway that transfers data between components.

It is called the **Data Highway** of a computer.

➤ Types of Computer Bus

1. Internal Bus (System Bus)

Used for communication inside the motherboard.

It includes:

- Address Bus
- Data Bus
- Control Bus

Address Bus

Transfers memory addresses from CPU.

Data Bus

Transfers actual data between CPU and memory.

Control Bus

Transfers control signals such as read, write, interrupt.

2. External/Expansion Bus

Used to connect peripheral devices like:

Keyboard, Mouse, Monitor, Printer, Scanner

➤ PERIPHERAL DEVICES

Peripheral devices are external devices used for input, output, or storage.

Examples:

- Keyboard
- Mouse

- Printer
- Scanner
- Speaker
- Webcam
- Hard Disk

➤ **CONNECTOR PORTS**

Ports are used to connect external devices to the computer system.

Serial Port

- Transfers 1 bit at a time
- Used for modem, printer
- Also called RS-232 or COM port

Parallel Port

- Transfers multiple bits simultaneously
- 25-pin connector
- Used mainly for printers

➤ **USB Port**

- Universal Serial Bus
- Connects multiple devices
- Hot-plug supported
- Fast data transfer

➤ **PS/2 Port**

- Used for keyboard and mouse

VGA Port

- Used to connect monitor or projector
- Developed by IBM

➤ **HDMI Port**

- Transfers both audio and video
- High-definition digital interface
- Used for TV, monitor, projector

Ethernet Port

- Used for LAN connection
- RJ-45 connector

Audio Port

- Used for microphone, headphone, speaker

SMPS (Switched Mode Power Supply)

SMPS converts AC power into DC power and supplies power to:

- Motherboard
- CPU
- RAM
- Hard Disk
- Peripheral devices

➤ CMOS

CMOS stores:

- System clock
- Boot sequence
- Date and time
- Hardware configuration

It works with a small battery to preserve data even when power is off.

➤ BOOTING

Booting is the process of starting the computer system.

Types of Booting**Cold Booting**

System starts from power off condition.

Warm Booting

System restarts without switching off power.

➤ BIOS (Basic Input Output System)

BIOS is firmware stored in ROM. It:

- Initializes hardware
- Performs POST
- Loads operating system
- Controls input and output devices

➤ POST (Power On Self Test)

POST checks:

- RAM
- Keyboard

- Hard Disk
- CPU
- Display

If any fault is found, beep sounds are generated.

➤ **DATA PROCESSING SERIES**

Data → Information → Knowledge → Wisdom

➤ **INSTRUCTION CYCLE**

Instruction Cycle is also called:

Fetch → Decode → Execute Cycle

➤ **IMPORTANT FACTS**

- CPU speed is measured in MIPS
- UPS provides backup power supply
- RFID is used for tracking
- Plug and Play automatically detects devices
- Computer works electronically using EDP (Electronic Data Processing)
- Data must be arranged logically for accurate results
- Sound card is an expansion card

➤ **LIMITATIONS OF COMPUTER**

- No intelligence
- No emotions
- No independent thinking
- User dependent
- No creativity
- No learning power

➤ **CLASSIFICATION OF COMPUTER**

Based on Generation

1. First Generation
2. Second Generation
3. Third Generation
4. Fourth Generation
5. Fifth Generation

Based on Working

1. Analog
2. Digital
3. Hybrid

Based on Size

1. Super
2. Mainframe
3. Mini
4. Micro

COMPUTER ORGANIZATION & MEMORY

(Professional Final Notes)

1. Basic Computer Organization

A computer system works on the **IPO Cycle**:

Input → Processing → Output

All instructions, data, and results are temporarily stored in memory during processing. The Control Unit supervises the complete execution.

2. Central Processing Unit (CPU)

CPU is the brain of the computer system. It executes instructions and controls system operations.

Components of CPU**(a) ALU (Arithmetic Logic Unit)****(b) Control Unit (CU)****(c) Registers / Memory Unit****➤ ALU Functions**

- Arithmetic operations (+, −, ×, ÷)
- Logical operations (AND, OR, NOT, comparisons)
- Stores intermediate results in registers

➤ Control Unit Functions

- Fetches instructions
- Decodes instructions
- Controls execution
- Synchronizes hardware components
- Acts as interface between hardware and software

3. Instruction Cycle

Instruction Cycle = **Fetch → Decode → Execute**

4. Motherboard

The motherboard is the main circuit board that connects all components such as:

CPU, RAM, ROM, Storage, BIOS, Ports, Expansion cards.

It is also called:

- Main Board
- Logic Board
- PCB
- System Board

5. Computer Bus

A bus is a communication pathway for data transfer.

Types of Bus

Internal Bus

- Address Bus
- Data Bus
- Control Bus

External/Expansion Bus

Used for peripheral devices.

6. Peripheral Devices

Peripheral devices are external I/O or storage devices.

Examples:

Keyboard, Mouse, Printer, Scanner, Webcam, Speaker, Hard Disk.

7. Ports and Connectors

Port	Use
Serial Port	Modem, printer
Parallel Port	Printer
USB Port	Multiple devices
PS/2 Port	Keyboard, Mouse
VGA Port	Monitor
HDMI Port	Audio + Video
Ethernet Port	LAN
Audio Port	Mic, Speaker

8. SMPS

SMPS converts AC into DC and supplies power to all components.

9. CMOS

CMOS stores:

- System time & date
- Boot sequence
- Hardware configuration

10. Booting

Booting is the process of starting the computer.

Types

- Cold Boot
- Warm Boot

11. BIOS

BIOS is firmware stored in ROM. It performs:

- POST
- Hardware initialization
- OS loading

12. POST

POST checks RAM, CPU, keyboard, display, storage.

13. Data Processing Series

Data '!' Information '!' Knowledge '!' Wisdom

MEMORY SYSTEM**14. Units of Memory**

1 KB = 1024 Bytes

1 MB = 1024 KB

1 GB = 1024 MB

1 TB = 1024 GB

1 PB = 1024 TB

1 EB = 1024 PB

1 ZB = 1024 EB

1 YB = 1024 ZB

15. Types of Memory

1. Register Memory
2. Cache Memory
3. Primary Memory
4. Secondary Memory

16. Register Memory

Fastest memory inside CPU.

Types

- MAR
- MDR

- IR
- DR
- Index Register
- Accumulator

17. Cache Memory

Cache memory improves CPU performance.

Principles

Locality of Reference

Levels

- L1 Cache
- L2 Cache
- L3 Cache

18. Primary Memory

Primary memory is directly accessed by CPU.

Types

RAM (Volatile)

- SRAM – Fast, costly, no refresh
- DRAM – Slow, cheap, refresh required

ROM (Non-volatile)

- PROM
- EPROM
- EEPROM
- Flash ROM

ROM stores firmware.

19. Secondary Memory

Permanent storage with large capacity.

Examples

- Hard Disk
- SSD
- Pen Drive
- Memory Card
- CD/DVD
- Blu-ray
- Magnetic Tape