

CHAPTER 1

Introduction to Computer System

CBSE Class 11 Informatics Practices · Unit 1

CBSE · Informatics Practices · Class 11

WHAT THIS CHAPTER DOES



Draw and label the functional block diagram: Input → CPU → Output with Memory.



Distinguish data from information, and RAM from ROM, in one clean line each.

Boards prep that builds confidence, not anxiety.

TODAY'S MISSION

Today's mission

1

Draw and label the functional block diagram: Input → CPU → Output with Memory.

2

Distinguish data from information, and RAM from ROM, in one clean line each.

3

Classify software into system and application, and OS into its key functions.

4

Explain the memory hierarchy and the boot process from power-on to ready.

WHY THIS MATTERS

Why this chapter matters

- 1** It is the vocabulary foundation — every later chapter assumes you know CPU, RAM, OS, software.
- 2** It is a reliable 4-6 mark scorer: definition-and-diagram questions repeat almost verbatim.
- 3** It connects to daily life — your phone and laptop are exactly the systems described here.

TOPIC

A

The functional components of a computer

THEOREM · LOAD-BEARING RESULT

The four functional units

“ A computer system is an organised set of four functional units — the INPUT unit, the CENTRAL PROCESSING UNIT (CPU), the MEMORY unit and the OUTPUT unit — that together accept data, process it, and deliver information.

STATEMENT

INPUT unit accepts data and instructions from the outside world (keyboard, mouse, scanner, microphone) and converts them to a form the machine understands. The CPU processes that data; it

WHY THIS MATTERS

- This block diagram is the single most-drawn diagram of the chapter and the mental model the whole course relies on
- Every question about 'where does X happen' is answered by locating X on this diagram.

WATCH OUT FOR

NOTE The CU does NOT do calculations — that is the ALU's job. The CU only DIRECTS. And the CPU works with PRIMARY memory (RAM); it does not read the hard disk directly — data must first be loaded into RAM.

TOPIC

Inside the CPU and the von Neumann idea

ALU — ARITHMETIC LOGIC UNIT

The ALU performs all the ARITHMETIC operations (addition, subtraction, multiplication, division) and all the LOGICAL operations (comparisons such as greater-than, less-than, equal-to, and the AND/OR/NOT logic). It is where the actual calculation of the machine physically

CU — CONTROL UNIT

The Control Unit is the manager of the CPU. It does NOT calculate anything itself; instead it FETCHES each instruction from memory, DECODES what it means, and then DIRECTS every other unit — telling the ALU to add, telling memory to fetch a value, telling output to display. It controls the sequence

REGISTERS

Registers are very small, extremely fast storage cells located INSIDE the CPU itself. They temporarily hold the specific data and instructions the CPU is working on at this exact moment — the number being added, the memory address being read. Because they sit inside the processor they are

VON NEUMANN / STORED-PROGRAM IDEA

The von Neumann architecture is the design that nearly all computers follow: program INSTRUCTIONS and DATA are stored together in the same memory, and the CPU fetches and executes them one instruction at a time in a fetch–decode–execute cycle. This 'stored-

TOPIC

B

Data, information and memory

THEOREM · LOAD-BEARING RESULT

Data vs information and the memory hierarchy

DATA is raw, unprocessed facts; INFORMATION is processed, meaningful data. Memory is organised as a HIERARCHY trading speed against size — from fastest-smallest registers down to slowest-largest secondary storage.

STATEMENT

DATA → (processing in CPU) → **INFORMATION**; information is data plus context. Memory is measured in bits and bytes: 8 bits = 1 byte; 1 KB = 1024 bytes; 1 MB = 1024 KB; 1 GB = 1024 MB; 1 TB = 1024 GB.

WHY THIS MATTERS

- Memory units and the RAM/ROM and primary/secondary distinctions are the most reliably repeated 1- and 2-mark questions in the chapter
- The hierarchy explains WHY a computer needs several kinds of memory rather than one.

WATCH OUT FOR

NOTE 1 KB is 1024 bytes, not 1000 (memory uses powers of 2). RAM is volatile and is erased on power-off; the hard disk is SECONDARY storage, not the computer's main memory.

TOPIC

The memory family at a glance

RAM — RANDOM ACCESS MEMORY

RAM is the computer's PRIMARY working memory. It is VOLATILE, meaning everything stored in it vanishes the instant power is removed. While you run a program, both the program itself and the data it is using sit in RAM so the CPU can reach them quickly. More RAM

ROM — READ ONLY MEMORY

ROM is NON-VOLATILE primary memory — its contents survive a power-off. It stores the permanent start-up firmware (the bootstrap loader / BIOS) that runs the moment you press the power button and begins loading the operating system into RAM. Because the data is

SECONDARY STORAGE

Secondary storage keeps data PERMANENTLY and in large amounts — hard disk drives (HDD), solid-state drives (SSD), pen drives, memory cards and optical discs (CD/DVD). The CPU cannot use it directly; data must first be copied from it into RAM before the processor can work on it. It is slower than primary

UNITS OF MEMORY

The smallest unit is the BIT (a single 0 or 1). Eight bits make one BYTE, which can store a single character. Larger units each multiply by 1024 (which is 2 to the power 10): 1 KB = 1024 bytes, 1 MB = 1024 KB, 1 GB = 1024 MB, and 1 TB = 1024 GB. Knowing this table lets you answer 'how many bytes are in 2

TOPIC

C

Software and the operating system

THEOREM · LOAD-BEARING RESULT

Software classification and the OS

“ SOFTWARE is the set of programs that tell the hardware what to do. It splits into SYSTEM software, which runs the machine, and APPLICATION software, which does a job for the user. The OPERATING SYSTEM is the most important system software — the interface between user and hardware.

STATEMENT

SYSTEM SOFTWARE includes: the OPERATING SYSTEM (Windows, Linux, macOS, Android); LANGUAGE PROCESSORS that translate human-written code to machine code — the

WHY THIS MATTERS

- Software classification plus operating-system functions together carry the largest mark share in this chapter
- The system-vs-application distinction and the list of OS functions are near-certain exam content.

WATCH OUT FOR

NOTE Windows is the OPERATING SYSTEM, hence SYSTEM software — not application software. 'Free' in FOSS means freedom (open source), not merely zero price; freeware can be free of cost yet still proprietary.

WORKED EXAMPLE

Tracing what happens when you switch on a computer

- 1** SCENARIO: You press the power button on a laptop. Trace, in order, what makes it usable.
- 2** STEP 1 — ROM runs first: a small permanent program in ROM (the bootstrap loader / BIOS) executes immediately, because RAM is empty at power-on and only ROM keeps its contents.
- 3** STEP 2 — POST: the firmware runs a Power-On Self Test, checking that essential hardware (RAM, keyboard, disk) is present and working; errors here usually produce beeps or an on-screen message.
- 4** STEP 3 — Locate and load the OS: the bootstrap finds the operating system on SECONDARY storage (the disk) and copies it into RAM, because the CPU can only run code that is in primary memory.
- 5** STEP 4 — OS takes control: once the OS is in RAM it takes over, presents the user interface (login/desktop), and begins managing processes, memory, files and devices. Now the machine is ready. A start from power-off is a COLD boot; a restart without cutting power is a WARM boot.

TOPIC

D

Application software and software licensing

TOPIC

Application software and how software is licensed

GENERAL-PURPOSE APPLICATION SOFTWARE

General-purpose application software can be used for MANY different tasks rather than one fixed job. A word processor writes letters, essays, reports and notices; a spreadsheet handles budgets, marksheets and any tabular calculation; a web browser opens any

SPECIFIC-PURPOSE APPLICATION SOFTWARE

Specific-purpose application software is built to do ONE particular job extremely well and nothing else. A railway reservation system only books and cancels train tickets; a payroll package only computes salaries and deductions; a hospital management system only handles

PROPRIETARY SOFTWARE

Proprietary software is owned by a company that keeps its SOURCE CODE secret and controls how the program may be used, copied or modified. Users usually buy a licence and must accept the restrictions written in an End User Licence Agreement before they can install it. Microsoft

FREE AND OPEN SOURCE SOFTWARE (FOSS)

FOSS publishes its source code openly so that anyone may study how it works, modify it for their own needs, and redistribute it freely. The word 'free' here means freedom, not merely zero price. Linux (an operating system), LibreOffice (an office suite) and Mozilla Firefox (a web browser)

TOPIC

E

Mobile systems versus desktop systems

TOPIC

How mobile and desktop systems compare

HARDWARE AND PORTABILITY

A DESKTOP system is a stationary computer with separate large components — a tower, monitor, keyboard and mouse — drawing mains power and built for sustained heavy work. A MOBILE system (smartphone or tablet) packs the processor, memory, storage, screen

OPERATING SYSTEM AND INPUT

Desktops run desktop operating systems such as Windows, macOS or a Linux distribution, and you interact mainly through a physical keyboard and mouse. Mobile systems run mobile operating systems — Android or iOS — designed around a TOUCHSCREEN, with on-

POWER, STORAGE AND PERFORMANCE

Desktops have powerful processors, large amounts of RAM and big internal hard disks or SSDs, and they never run out of battery, so they suit gaming, video editing and programming. Mobiles use power-efficient processors and smaller storage, relying on cloud services and

TYPICAL USES AND UPGRADEABILITY

Desktops are chosen for office work, software development, design and any task needing a big screen and a comfortable keyboard for hours; their parts (RAM, disk, graphics card) can be swapped and upgraded. Mobiles excel at communication, photography, navigation,

TRY IT · SOLVE BEFORE YOU PEEK

Quick self-test

Work it out before you flip the answer.

SOLUTION

TOPIC

Data vs information

TRAP → TRUTH

× **MISTAKE** Data and information are the same thing.

✓ **CORRECT** DATA is raw, unprocessed facts and figures with no context — for example the numbers 42, 78, 91. INFORMATION is data that has been processed, organised, or given context so it becomes meaningful — for example 'the average marks of the class is 70.3'. The relationship is: data goes INTO a computer, processing happens inside the CPU, and information comes OUT. Information is data + meaning. Examiners reward an example: '42, 78, 91' (data) becoming 'the class average is 70.3' (information).

TOPIC

RAM vs ROM volatility

TRAP → TRUTH

- × **MISTAKE** RAM and ROM both keep their contents when the power is switched off.
- ✓ **CORRECT** RAM (Random Access Memory) is VOLATILE — its contents are ERASED the moment power is cut. It is the computer's temporary working area while programs run. ROM (Read Only Memory) is NON-VOLATILE — it retains its contents permanently even without power, and stores the start-up firmware (the BIOS/bootstrap) that runs the moment you press the power button. Mixing these up is the single most common 1-mark loss in this chapter.

TOPIC

Primary vs secondary memory

TRAP → TRUTH

× **MISTAKE** The hard disk is the computer's main memory.

✓ **CORRECT** PRIMARY memory (RAM + ROM) is directly accessible by the CPU, is fast, and is comparatively small and (for RAM) volatile. SECONDARY memory (hard disk, SSD, pen drive, DVD) is NOT directly accessed by the CPU — data must first be loaded into RAM. It is slower but large and non-volatile, used for permanent storage. The CPU works with RAM, not the hard disk directly; the hard disk is storage, not main memory.

TOPIC

System software vs application software

TRAP → TRUTH

× **MISTAKE** Microsoft Windows and Microsoft Word are both application software.

✓ **CORRECT** SYSTEM software manages and runs the computer itself — the operating system (Windows, Linux, macOS, Android), language processors (compiler, interpreter, assembler) and utilities (antivirus, disk cleanup). APPLICATION software helps the USER do a specific task — Word, a browser, a game, a calculator app. Windows is the OS = system software; Word runs ON Windows = application software. Rule of thumb: if it runs the machine it is system software; if it does a job for you it is application software.

TOPIC

What the CPU actually contains

TRAP → TRUTH

× **MISTAKE** The CPU only does calculations.

✓ **CORRECT** The CPU has THREE parts working together: the ALU (Arithmetic Logic Unit) does arithmetic (+, -, ×, ÷) and logical comparisons (>, <, =, AND, OR); the CU (Control Unit) does NOT calculate — it DIRECTS, fetching instructions and telling every other part what to do and when; and REGISTERS are tiny ultra-fast storage cells inside the CPU that hold the data being worked on right now. Saying 'the CPU only calculates' ignores the control function that makes the whole machine work.

TOPIC

Free and open-source software

TRAP → TRUTH

× **MISTAKE** Free software just means software that costs zero rupees.

✓ **CORRECT** FOSS (Free and Open Source Software) is about FREEDOM, not only price — the source code is openly available so anyone may study, modify and redistribute it (Linux, LibreOffice, Mozilla Firefox). PROPRIETARY software (Windows, MS Office) keeps its source code secret and restricts copying. 'Free' in FOSS means 'free as in freedom', not merely 'free of cost' — some proprietary software is also free of cost (freeware) but is still NOT open source.

TOPIC

The booting process

TRAP → TRUTH

× **MISTAKE** Booting is just the computer taking a long time to switch on.

✓ **CORRECT** BOOTING is the specific start-up sequence that loads the operating system into RAM and readies the machine for use. The moment you press power, a small program in ROM (the bootstrap loader / BIOS) runs first, performs a POST (Power-On Self Test) to check hardware, then locates and loads the OS from secondary storage into RAM. Only after the OS is in RAM is the machine usable. Cold boot = from power-off; warm boot = a restart without cutting power.

TOPPER TEMPLATE · MARK-BY-MARK

2 marks: Distinguish between data and information with one example each.

1 DEFINE BOTH WITH THE PROCESSING LINK

1 m

DATA is raw, unprocessed facts and figures that on their own carry no meaning. INFORMATION is data that has been PROCESSED, organised or given context so that it becomes meaningful. The link is: data is the INPUT, processing happens inside the CPU, and information is the OUTPUT — Information = Data + Meaning.

2 GIVE A CLEAN CONTRASTING EXAMPLE

1 m

Example: the marks 42, 78, 91 are DATA (just numbers). When processed into 'the average marks of the class is 70.3', that is INFORMATION because it now answers a meaningful question. Always pair one data example with the information it becomes — examiners give the second mark only for the example.

TOPPER TEMPLATE · MARK-BY-MARK

3 marks: Classify software into system and application software. Give two examples of each

**1 SYSTEM SOFTWARE —
DEFINE + EXAMPLES****1.5 m**

SYSTEM SOFTWARE manages and operates the computer itself — it sits between the hardware and the user. It includes the OPERATING SYSTEM (e.g. Windows, Linux), LANGUAGE PROCESSORS (compiler, interpreter, assembler) and UTILITIES (antivirus, disk cleanup). Two examples: Microsoft Windows (an OS) and a C++ compiler (a language processor).

**2 APPLICATION
SOFTWARE — DEFINE +
EXAMPLES****1.5 m**

APPLICATION SOFTWARE helps the USER perform a specific task; it runs ON TOP of the system software. It is divided into GENERAL-purpose (word processor, spreadsheet — many uses) and SPECIFIC-purpose (a railway reservation system, a payroll package — one job). Two examples: Microsoft Word (general purpose) and a school fee-management package (specific purpose).

TOPPER TEMPLATE · MARK-BY-MARK

3 marks: What is an operating system? List any four of its functions.

1 DEFINE THE OS**1 m**

An OPERATING SYSTEM is the most important system software — it acts as an INTERFACE between the user and the computer hardware, and manages all the hardware and software resources of the machine. Without it, the computer cannot be used. Examples: Windows, Linux, macOS, Android.

2 LIST FOUR FUNCTIONS CLEARLY**2 m**

Any FOUR of: (1) PROCESS MANAGEMENT — schedules and runs programs; (2) MEMORY MANAGEMENT — allocates RAM to programs and reclaims it; (3) FILE MANAGEMENT — organises files and folders on storage; (4) DEVICE / I-O MANAGEMENT — controls input and output devices via drivers; (5) USER INTERFACE — provides a GUI or command line; (6) SECURITY — manages users, passwords and access. Write them as a numbered list; one mark for every two correct functions.

PYQ PATTERNS

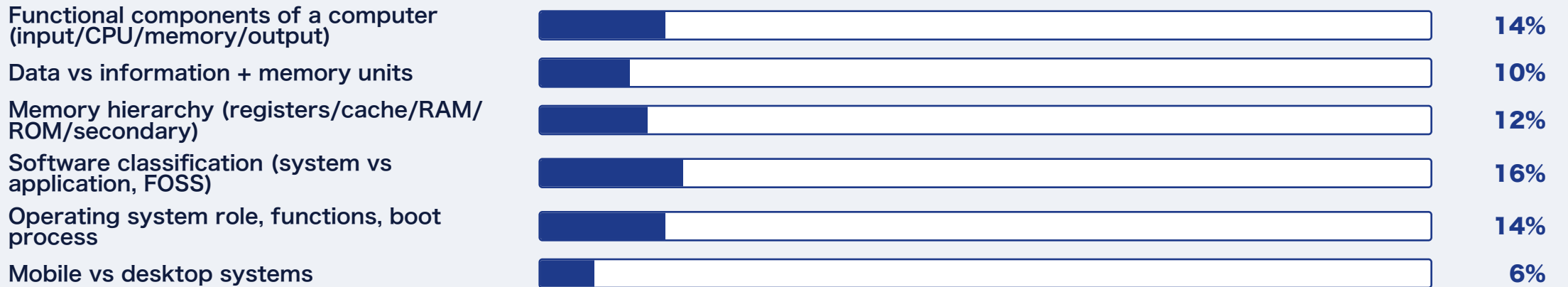
Top PYQ patterns to drill

#1	Distinguish between data and information with one example each. (2 marks)	Annual
#2	Differentiate RAM and ROM (volatile vs non-volatile). (2 marks)	Annual
#3	Name and explain the two units of the CPU (ALU and CU). (2-3 marks)	Annual
#4	Classify software into system and application; give two examples of each. (3 marks)	Most years
#5	List any four functions of an operating system. (3 marks)	Most years

MARKS DISTRIBUTION

10-year marks distribution

10-YEAR PYQ MARKS DISTRIBUTION



RECAP · MEMORISE THESE

Recap — what you must know cold

1 Functional units —
Input → CPU →
Output, with Memory.
CPU = ALU + CU +
Registers; ALU
calculates, CU directs.

2 Data vs information —
Data = raw facts;
Information =
processed,
meaningful data.
Information = data +
context.

3 Memory units — 8
bits = 1 byte; ×1024
up the ladder: KB →
MB → GB → TB.
Powers of 2, not
1000.

4 Memory hierarchy —
Registers → Cache →
Primary (RAM volatile,
ROM non-volatile) →

5 Software — System
(OS, language
processors, utilities)
vs Application

6 Operating system —
Interface + manager.
Functions: process,
memory, file, device,

WHAT'S NEXT

What's next

- Chapter 2 — Emerging Trends / next NCERT IP Class 11 chapter.
- Sit the 15-MCQ Quick Drill for this chapter.
- Then the full School-Pattern Paper — 30 marks.

You now know what a computer IS.

Components · memory · software · OS · booting — now prove it on the paper.

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