Zed-King
GROUP OF INSTITUTIONS
ISO 9001 : 2015 Certified

EXPERT COMPUTER COURSE

COMPUTER FUNDAMENTALS

Topics Covered:

#	Topic
1	Characteristics of Computer System
2	Basic Applications of Computer
3	Processing Unit (CPU)
4	Input/Output Devices (Keyboard, Mouse, VDU & Others)
5	Computer Memory
6	Hardware and Software Concepts
7	Programming Languages
8	Representation of Data / Information
9	Concept of Data Processing
10	Important MCQ Questions

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SECTION 1: COMPUTER BASICS

1.1 What is a Computer?

> *A computer is an electronic device that accepts data as input, processes it according to a set of instructions (program), and produces meaningful output. It can store, retrieve, and process data.*

Full Form: Commonly Operated Machine Particularly Used in Technical and Educational Research

1.2 Characteristics of a Computer System

Characteristic	Description	Example
Speed	Performs millions of operations per second (measured in MHz/GHz)	Modern CPUs operate at 3-5 GHz
Accuracy	Results are always correct if input and program are correct	No rounding errors in financial software
Automation	Once programmed, works automatically without human intervention	Payroll processing, batch jobs
Storage / Memory	Can store huge amounts of data permanently and temporarily	Terabytes of data on a hard disk
Versatility	Can perform many different types of tasks	Word processing, gaming, research
Diligence	Works 24x7 without fatigue or loss of accuracy	Server running continuously
No Intelligence (IQ)	Cannot think on its own; follows only given instructions	Cannot decide what to do without a program

> **Exam Tip:** Computer has SPEED, ACCURACY, DILIGENCE, STORAGE, VERSATILITY — but NO intelligence or emotions.

1.3 Basic Applications of Computer

Education E-learning, CBT, digital libraries, online exams	**Communication** Email, video conferencing, social media, chat
Banking & Finance ATM, net banking, UPI payments, stock markets	**Science & Research** Data analysis, weather forecasting, simulations
Healthcare / Medical Patient records, MRI, diagnosis, telemedicine	**Defence & Military** Missile guidance, radar systems, surveillance
Business & Commerce Accounting, payroll, ERP, inventory management	**Transportation** Air traffic control, GPS navigation, railway booking
Entertainment Movies, video games, OTT platforms, animation	**Government** E-governance, Aadhaar, census, tax filing

SECTION 2: PROCESSING UNIT (CPU)

2.1 Central Processing Unit (CPU)

> *CPU (Central Processing Unit) is the 'brain' of the computer. It fetches instructions, decodes them, and executes them. All arithmetic, logic, and control operations happen in the CPU.*

Components of CPU

Component	Full Form	Function
ALU	Arithmetic Logic Unit	Performs arithmetic operations (+, -, *, /) and logical operations (AND, OR, NOT, comparisons)
CU	Control Unit	Directs and coordinates all computer operations; fetches, decodes, and executes instructions
Registers	—	Small, ultra-fast temporary storage inside the CPU used during processing (e.g., Accumulator, Program Counter)
Clock	—	Generates pulses that synchronize CPU operations. Speed measured in GHz (Gigahertz)

> **Memory Trick:** ALU = Arithmetic Logic Unit (does the math), CU = Control Unit (does the managing), Registers = CPU's notepad

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SECTION 3: INPUT & OUTPUT DEVICES

3.1 Keyboard

> *A keyboard is the primary input device used to enter text, numbers, and commands into the computer. A standard keyboard has 104 keys.*

- Function Keys (F1–F12): Used for specific software functions
- Control Keys: Ctrl, Alt, Delete, Shift, Caps Lock, Enter
- Numeric Keypad: Digits 0–9 for fast number entry
- Navigation Keys: Arrow keys, Home, End, Page Up, Page Down
- Types: QWERTY (most common), AZERTY (French), Ergonomic, Wireless

3.2 Mouse

> *A mouse is a pointing input device used to move the cursor on screen, select items, and interact with the GUI (Graphical User Interface).*

- Left Click: Select or open items
- Right Click: Open context menu
- Double Click: Open files or run programs
- Scroll Wheel: Scroll up or down in documents/webpages
- Types: Optical Mouse (uses LED), Laser Mouse, Wireless Mouse, Trackball

3.3 VDU (Visual Display Unit) / Monitor

> *VDU or Monitor is the primary output device that displays visual information (text, images, video) to the user. It produces Softcopy output.*

Type	Full Form	Description
CRT	Cathode Ray Tube	Old, bulky monitors using electron beam. Heavy and consumes more power.
LCD	Liquid Crystal Display	Flat, thin monitors. Low power consumption. Common in laptops.
LED	Light Emitting Diode	Improved LCD using LEDs for backlight. Brighter and more energy efficient.
OLED	Organic LED	Best quality, flexible displays. Used in smartphones and premium monitors.
TFT	Thin Film Transistor	Type of LCD with better image quality. Standard in modern computers.

> **Exam Tip:** Monitor/VDU = Softcopy output (temporary, visible on screen). Printer = Hardcopy output (permanent, on paper).

3.4 Other Input Devices

Device	Description	Use Case
Scanner	Converts physical documents/photos into digital format	Document digitization, photocopying

Device	Description	Use Case
Microphone	Captures voice/sound as input	Voice commands, video calls, recording
Joystick	Pointing device used to control movement	Gaming, flight simulators
Light Pen	Pen-shaped device to draw or point on screen directly	Graphic design, older CAD systems
Barcode Reader	Reads printed barcodes using laser/light	Retail shops, inventory management
OMR	Optical Mark Recognition — detects pencil/pen marks	Exam answer sheets, surveys
OCR	Optical Character Recognition — reads printed text	Digitizing printed books/documents
MICR	Magnetic Ink Character Recognition — reads magnetic ink	Bank cheque processing
Touchscreen	Both input and output — operated by finger touch	Smartphones, ATMs, kiosks
Webcam	Captures video and images as input	Video conferencing, surveillance
Biometric Sensor	Captures fingerprint or facial data	Attendance systems, security
Digitizer/Stylus	Converts hand-drawn lines to digital	Graphic tablets, digital drawing

3.5 Other Output Devices

Device	Description	Output Type
Printer	Prints text/images onto paper (permanent output)	Hardcopy
Speaker	Converts digital audio signals into sound	Softcopy (audio)
Plotter	Draws large diagrams/blueprints using pens on paper	Hardcopy
Projector	Displays computer output on a large screen/wall	Softcopy (projected)
Headphones	Personal audio output device	Softcopy (audio)
Braille Printer	Prints text in Braille format for visually impaired	Hardcopy

3.6 Types of Printers

Category	Type	Working	Example
Impact Printer	Dot Matrix Printer	Strikes ribbon against paper to form characters from dots	Old banking, railway tickets
Non-Impact Printer	Inkjet Printer	Sprays tiny ink droplets onto paper	Home/office use, photos
Non-Impact Printer	Laser Printer	Uses laser beam + toner powder for high-quality fast printing	Office environments

Category	Type	Working	Example
Non-Impact Printer	Thermal Printer	Uses heat to create images on special paper	Receipt printers, ATMs
Special Purpose	3D Printer	Creates three-dimensional objects layer by layer	Prototyping, manufacturing

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SECTION 4: COMPUTER MEMORY

4.1 What is Computer Memory?

> *Memory is the component of a computer that stores data and instructions — either temporarily (during processing) or permanently. Without memory, a computer cannot function.*

4.2 Primary Memory

Type	Full Form	Description	Volatile?
RAM	Random Access Memory	Temporary, fast memory used while computer is ON. Data is lost when power is turned off.	Yes (Volatile)
ROM	Read Only Memory	Permanent memory pre-written by manufacturer. Stores BIOS/firmware. Cannot be changed by user.	No (Non-Volatile)
PROM	Programmable ROM	Can be written once by user using special device. Cannot be erased.	No
EPROM	Erasable Programmable ROM	Can be erased using UV light and reprogrammed.	No
EEPROM	Electrically Erasable ROM	Can be erased and rewritten electrically without removal.	No
Cache Memory	—	Ultra-fast memory between CPU and RAM. Stores frequently used instructions to speed up processing.	Yes (Volatile)
Registers	—	Fastest memory, located inside the CPU itself. Holds data currently being processed.	Yes (Volatile)

4.3 Secondary Memory (Storage)

Storage Device	Type	Description	Capacity
Hard Disk Drive (HDD)	Magnetic	Traditional storage with spinning platters. Slower but affordable.	500 GB – 10 TB+
Solid State Drive (SSD)	Electronic (Flash)	No moving parts, much faster than HDD, more durable.	128 GB – 4 TB
Pen Drive / USB Flash	Flash Memory	Portable, plug-and-play storage. Easy to carry.	4 GB – 256 GB
CD (Compact Disc)	Optical	Read-only disc. Stores about 700 MB of data.	700 MB
DVD	Optical	Higher capacity than CD. Used for movies and software.	4.7 GB – 8.5 GB
Blu-ray Disc	Optical	High definition optical disc for HD movies.	25 GB – 100 GB
SD Card / Memory Card	Flash Memory	Used in cameras, phones, and embedded devices.	2 GB – 1 TB

Storage Device	Type	Description	Capacity
Cloud Storage	Network-based	Remote servers accessed via internet (Google Drive, OneDrive)	Unlimited (paid)

4.4 Memory Hierarchy

> *Memory is organized in a hierarchy based on speed and cost. Faster memory is more expensive and smaller in size.*

Level	Memory Type	Speed	Size	Cost
Level 1 (Fastest)	CPU Registers	Extremely Fast	Bytes	Very High
Level 2	Cache Memory (L1, L2, L3)	Very Fast	KB – MB	High
Level 3	RAM (Main Memory)	Fast	4 GB – 64 GB	Medium
Level 4 (Slowest)	Secondary Storage (HDD/SSD)	Slow to Medium	500 GB – 10 TB	Low

4.5 Memory Units

Unit	Symbol	Equivalent Value
Bit	b	Smallest unit — 0 or 1
Nibble	—	4 Bits
Byte	B	8 Bits (1 character = 1 byte)
Kilobyte	KB	1024 Bytes
Megabyte	MB	1024 KB = 1,048,576 Bytes
Gigabyte	GB	1024 MB
Terabyte	TB	1024 GB
Petabyte	PB	1024 TB

> **Exam Tip:** 1 KB = 1024 Bytes (NOT 1000). This is because computers use binary (base 2), and 2^10 = 1024.

SECTION 5: HARDWARE AND SOFTWARE

5.1 Hardware vs Software

Basis	Hardware	Software
Definition	Physical, tangible parts of a computer that you can touch	Set of programs/instructions that tell hardware what to do
Examples	CPU, RAM, keyboard, monitor, hard disk, printer	Windows OS, MS Word, Chrome browser, Python
Can be touched?	Yes — physical components	No — logical/virtual
Manufactured?	Yes — physically assembled in factories	Yes — written by programmers
Failure type	Wear and tear, physical damage	Bugs, viruses, corruption
Relationship	Hardware needs software to function	Software needs hardware to run

5.2 Types of Software

A. System Software

> *System Software manages and controls the hardware and provides a platform for application software to run. Users do not directly interact with most system software.*

Type	Description	Examples
Operating System (OS)	Most important system software. Manages hardware resources, provides user interface, runs other programs.	Windows 11, Linux, macOS, Android, iOS
Device Drivers	Software that allows OS to communicate with hardware devices.	Printer driver, graphics card driver, USB driver
Utility Software	Performs maintenance and optimization tasks.	Antivirus, Disk Cleanup, Defragmenter, File Manager
Language Translators	Converts programming code into machine language.	Compilers, Interpreters, Assemblers

B. Application Software

> *Application Software is designed to perform specific tasks for end users. It runs on top of the operating system.*

Category	Description	Examples
Word Processor	For creating and editing text documents	MS Word, LibreOffice Writer, Google Docs
Spreadsheet	For calculations, data analysis, charts	MS Excel, LibreOffice Calc, Google Sheets
Database Management	For storing and managing structured data	MS Access, MySQL, Oracle
Presentation	For creating slide shows and presentations	MS PowerPoint, Google Slides, Canva

Category	Description	Examples
Web Browser	For browsing the internet	Chrome, Firefox, Edge, Safari
Accounting Software	For financial management and bookkeeping	Tally ERP 9, QuickBooks, Busy
Graphic Design	For image editing and design	Adobe Photoshop, CorelDRAW, GIMP
Media Player	For playing audio and video files	VLC, Windows Media Player

5.3 Programming Languages

> *A programming language is a formal set of instructions that a programmer uses to write programs. Programming languages are categorized by generation level.*

Generation	Name	Characteristics	Examples
1GL	Machine Language	Binary code (0s and 1s). Directly understood by CPU. Machine-dependent.	01001010 11001101
2GL	Assembly Language	Uses mnemonics (short codes). Converted to machine code by Assembler. Slightly easier.	MOV AX, 5 / ADD BX, AX
3GL	High Level Language	English-like syntax. Easy to learn. Needs Compiler/Interpreter to run.	C, C++, Java, Python, BASIC
4GL	Very High Level Language	Used for databases, reports, and rapid development. Closer to natural language.	SQL, MATLAB, R, dBASE
5GL	Natural Language / AI	Uses AI and NLP. User states the problem; computer finds the solution.	PROLOG, Mercury, LISP

Language Translators

Translator	Definition	Used For
Compiler	Translates the ENTIRE program at once into machine code. Faster execution. Shows all errors together.	C, C++, Pascal, FORTRAN
Interpreter	Translates and executes program LINE BY LINE. Slower but easier to debug. Stops at first error.	Python, JavaScript, BASIC, Ruby
Assembler	Converts Assembly Language (mnemonics) into Machine Language (binary code).	Assembly Language programs

> **Exam Tip:** Compiler = whole program translated at once (C, C++). Interpreter = line by line (Python). Assembler = Assembly to Machine code.

SECTION 6: REPRESENTATION OF DATA & DATA PROCESSING

6.1 Data vs Information

Basis	Data	Information
Definition	Raw, unprocessed facts and figures	Processed, organized, meaningful data
Example	85, 70, 90 (marks of students)	Average marks = 81.67
Meaning	Has no meaning on its own	Has meaning and is useful for decision making
Form	Unstructured	Structured and meaningful
Input/Output	Input to the computer system	Output of data processing

6.2 Data Processing Cycle (IPO Cycle)

> *IPO Cycle: Input → Process → Output. This is the fundamental model of how a computer handles data.*

Stage	Description	Example
Input	Raw data is entered into the computer using input devices	Typing student marks using keyboard
Process	CPU performs calculations and operations on the input data	Calculating total and average marks
Output	Processed results are displayed or stored as information	Printing the result sheet
Storage	Data and results are stored for future use	Saving the result in a database

6.3 Number Systems

> *Computers work with only Binary (0 and 1) internally. Other number systems are used by programmers and engineers for convenience.*

Number System	Base	Digits Used	Example	Conversion of Decimal 10
Binary	2	0, 1	1010	1010_2
Octal	8	0, 1, 2, 3, 4, 5, 6, 7	17	12_8
Decimal	10	0 to 9	10	10_{10}
Hexadecimal	16	0–9 and A, B, C, D, E, F	1A	A_{16}

- Binary 0 = Electrical signal OFF, Binary 1 = Electrical signal ON
- Hexadecimal A = 10, B = 11, C = 12, D = 13, E = 14, F = 15
- Decimal 10 = Binary 1010 = Octal 12 = Hex A

6.4 Character Coding — ASCII and Unicode

> *To store text, computers assign a numeric code to each character. ASCII (American Standard Code for Information Interchange) is the most common standard.*

Standard	Bits Used	Characters Supported	Details
ASCII	7 bits	128 characters	Basic English letters, digits, special symbols
Extended ASCII	8 bits	256 characters	Includes accented characters used in European languages
Unicode (UTF-8)	8–32 bits	1,000,000+ characters	Supports all world languages — Hindi, Chinese, Arabic, etc.
EBCDIC	8 bits	256 characters	Used by IBM mainframe computers

Important ASCII Values

Character	ASCII Value	Character	ASCII Value
'A' (Capital A)	65	'a' (Small a)	97
'B' (Capital B)	66	'b' (Small b)	98
'Z' (Capital Z)	90	'z' (Small z)	122
'0' (Zero digit)	48	Space	32
'1' (One digit)	49	Enter (CR)	13

> **Exam Tip:** Difference between Capital and Small letters in ASCII = 32. So 'A'=65, 'a'=97 (65+32=97). Digit '0' starts at 48.

6.5 Data Types

Data Type	Description	Example
Numeric	Numbers used for calculations	23, 3.14, -100
Alphabetic / Text	Letters and characters	'Hello', 'Ajay'
Alphanumeric	Mix of letters, numbers, and special characters	'ABC123', 'Pin@2024'
Logical / Boolean	True or False only (1 or 0)	Is logged in: True / False
Date and Time	Calendar dates and times	'27-May-2026', '10:30 AM'

SECTION 7: QUICK REVISION POINTS

Key Points to Remember for Exam

Computer Characteristics

- Speed — measured in MHz / GHz
- Accuracy — GIGO: Garbage In = Garbage Out (error is user's fault)
- Diligence — works 24x7 without fatigue
- Versatility — can do many different types of tasks
- NO intelligence — cannot think or decide on its own

CPU

- CPU = Brain of computer = ALU + CU + Registers
- ALU = does math and logic operations
- CU = controls and coordinates all computer activities
- Clock Speed measured in GHz — higher GHz = faster CPU

Memory

- RAM = Volatile, temporary (data lost on power off)
- ROM = Non-volatile, permanent (BIOS stored here)
- Cache = Fastest memory after registers, between CPU and RAM
- 1 Byte = 8 Bits | 1 KB = 1024 Bytes | 1 MB = 1024 KB | 1 GB = 1024 MB
- Primary Memory (RAM, ROM) is directly accessed by CPU
- Secondary Memory (HDD, SSD) is permanent storage

Software

- System Software = OS, Drivers, Utilities (manages hardware)
- Application Software = MS Office, Tally, Chrome (user tasks)
- Compiler = whole program at once (C, C++, Java)
- Interpreter = line by line (Python, BASIC, JavaScript)
- Assembler = Assembly Language to Machine Code

Data & Number Systems

- Data (raw) → Process → Information (meaningful output)
- Binary = Base 2 (only 0 and 1) — what CPU uses internally
- Decimal 10 = Binary 1010 = Octal 12 = Hex A
- ASCII 'A' = 65, 'a' = 97, '0' = 48, Space = 32
- Unicode supports all world languages (Hindi, Chinese, Arabic, etc.)

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SECTION 8: IMPORTANT MCQ QUESTIONS

Multiple Choice Questions (MCQs)

> *These questions are commonly asked in exams. Correct answers are marked with ✓ and an explanation is provided.*

Q1. Which of the following is called the 'brain' of the computer?

(a) RAM
(b) CPU ✓
(c) Hard Disk
(d) Monitor

Explanation: *CPU (Central Processing Unit) is called the brain of the computer. It performs all calculations, logic operations, and controls all other components.*

Q2. RAM stands for:

(a) Read Access Memory
(b) Random Access Memory ✓
(c) Read All Memory
(d) Random All Memory

Explanation: *RAM = Random Access Memory. It is the primary (main) volatile memory of the computer. Data is lost when the computer is switched off.*

Q3. Which of the following is a non-volatile memory?

(a) RAM
(b) Cache Memory
(c) ROM ✓
(d) Register

Explanation: *ROM (Read Only Memory) is non-volatile — data is retained even when power is switched off. RAM, Cache, and Registers are all volatile.*

Q4. 1 Kilobyte (KB) is equal to:

(a) 100 Bytes
(b) 1000 Bytes
(c) 1024 Bytes ✓
(d) 512 Bytes

Explanation: *1 KB = 1024 Bytes. This is because computers use binary (base 2), and 2^10 = 1024, not 1000.*

Q5. Which device is used for input as well as output?

(a) Keyboard
(b) Printer
(c) Touchscreen ✓
(d) Scanner

Explanation: *Touchscreen functions as both an input device (takes finger touch as input) and an output device (displays information). It is both input and output.*

Q6. VDU stands for:

(a) Video Display Unit
(b) Visual Data Unit
(c) Visual Display Unit ✓
(d) Video Data Unit

Explanation: *VDU = Visual Display Unit, commonly known as Monitor. It produces Softcopy output (temporary, visible on screen only).*

Q7. Which printer strikes the ribbon against paper to print?

(a) Laser Printer
(b) Inkjet Printer
(c) Dot Matrix Printer ✓
(d) Thermal Printer

Explanation: *Dot Matrix Printer is an Impact Printer that physically strikes an inked ribbon against paper to form characters from dots. It is used for multi-part forms.*

Q8. What is the smallest unit of data in a computer?

(a) Byte
(b) Nibble
(c) Bit ✓
(d) Kilobyte

Explanation: *A Bit (Binary Digit) is the smallest unit of data. It can hold only one of two values: 0 (off) or 1 (on).*

Q9. Which of the following is System Software?

(a) MS Word
(b) Google Chrome
(c) Windows Operating System ✓
(d) Adobe Photoshop

Explanation: *Windows Operating System is System Software. MS Word, Chrome, and Photoshop are Application Software designed for specific user tasks.*

Q10. A compiler differs from an interpreter in that:

(a) Compiler is faster to write
(b) Compiler translates the whole program at once ✓
(c) Interpreter translates the whole program at once
(d) Both are the same

Explanation: *A Compiler translates the entire program at once into machine code. An Interpreter translates and executes the program line by line. Compilers produce faster-running programs.*

Q11. Which number system uses only digits 0 and 1?

(a) Octal
(b) Decimal
(c) Hexadecimal
(d) Binary ✓

Explanation: *Binary Number System (Base 2) uses only two digits: 0 and 1. Computers use binary internally because electronic circuits have two states: on (1) and off (0).*

Q12. Decimal number 10 in Binary is:

(a) 1100
(b) 1010 ✓
(c) 1001
(d) 0110

Explanation: *Decimal 10 = Binary 1010. Breakdown: 8 + 2 = 10. So the 8-position (bit 4) and 2-position (bit 2) are ON: 1010.*

Q13. ASCII value of capital letter 'A' is:

(a) 97
(b) 65 ✓
(c) 48
(d) 90

Explanation: *In ASCII, 'A' = 65. Small 'a' = 97 (difference of 32). Digit '0' = 48. These are important values to remember for exams.*

Q14. Full form of OMR is:

(a) Optical Mark Recognition ✓
(b) Online Mark Reader
(c) Output Mark Recognition
(d) Optical Memory Reader

Explanation: *OMR = Optical Mark Recognition. It detects pencil or pen marks on specially designed sheets. Used for MCQ answer sheets and surveys.*

Q15. Which of the following is an output device?

(a) Keyboard
(b) Mouse
(c) Scanner
(d) Plotter ✓

Explanation: *A Plotter is an output device that prints large drawings, graphs, and blueprints. Keyboard, Mouse, and Scanner are all input devices.*

Q16. The operating system is responsible for:

(a) Only running antivirus
(b) Managing hardware resources and running applications ✓
(c) Only printing documents
(d) Only internet browsing

Explanation: *The Operating System manages all hardware resources (CPU, memory, storage, I/O), provides a user interface, and allows other programs (applications) to run.*

Q17. Which memory is directly accessible by the CPU?

(a) Hard Disk
(b) CD-ROM
(c) RAM (Primary Memory) ✓
(d) USB Flash Drive

Explanation: *RAM (Primary Memory) is directly accessible by the CPU. Secondary storage (HDD, CD, USB) must first be loaded into RAM before the CPU can use the data.*

Q18. The full form of MICR is:

(a) Magnetic Ink Character Recognition ✓
(b) Manual Input Character Reader
(c) Magnetic Input Card Reader
(d) Machine Input Character Recognition

Explanation: *MICR = Magnetic Ink Character Recognition. It reads special magnetic ink characters printed on bank cheques for automated processing.*

Q19. High Level Programming Languages like Python need which translator?

(a) Assembler
(b) Linker
(c) Compiler or Interpreter ✓
(d) Loader

Explanation: *High Level Languages (Python, Java, C) require either a Compiler (translates all at once) or Interpreter (line by line) to convert code to machine language.*

Q20. Which of the following correctly describes the IPO Cycle?

(a) Output → Process → Input
(b) Input → Output → Process
(c) Input → Process → Output ✓

(d) Process → Input → Output

Explanation: *IPO Cycle = Input → Process → Output. Raw data (Input) is processed by CPU (Process), and the result is shown as Information (Output). This is the basic working model of a computer.*

Best of Luck for Your Exam!

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