Class : 9th

Subject : Computer Science

Chapter : 1

Book Exercise Complete Solved

✅ **Multiple Choice Questions (Solved with Explanation)**

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1. What is the primary function of a system?
a) To work independently
✅ **b) To achieve a common goal**
c) To create new systems
d) To provide entertainment
Explanation:
A system's main purpose is to have all its parts working together to **achieve a common goal**.

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2. What is one of the fundamental concepts of any system?
a) Its size
✅ **b) Its objective**
c) Its age
d) Its price
Explanation:
Every system is built to **achieve a specific objective**, which makes "objective" a core concept.

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3. What is an example of a simple system?
a) A human body
b) A computer network
✅ **c) A thermostat regulating temperature**
d) The Internet
Explanation:
A **thermostat** is a simple system that uses a sensor to regulate temperature.

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4. What type of environment remains unchanged unless the system provides an output?

a) Dynamic

✓ **b) Static**

c) Deterministic

d) Non-deterministic

Explanation:

A **static environment** does not change unless the system interacts with it.

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5. What are the basic components of a system?

a) Users, hardware, software

✓ **b) Objectives, components, environment, communication**

c) Inputs, outputs, processes

d) Sensors, actuators, controllers

Explanation:

Systems include **objectives (goals), components (parts), environment (outside factors), and communication (interaction)**.

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6. What concept does the theory of systems aim to understand?

a) Hardware design

✓ **b) System interactions and development over time**

c) Software applications

d) Network security

Explanation:

Systems theory studies how systems behave, interact, and evolve with time.

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7. What role does the Operating System (OS) play in a computer?

a) It performs calculations and executes instructions

b) It temporarily stores data and instructions for the CPU

✓ **c) It receives input from interface components and decides what to do with it**

d) It provides long-term storage of data and software

Explanation:

The **OS** controls hardware, manages input/output, and **coordinates tasks** in the computer.

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8. Which of the following describes the Von Neumann architecture's main characteristic?

a) Separate memory for data and instructions

b) Parallel execution of instructions

✓ **c) Single memory store for both program instructions and data**

d) Multiple CPUs for different tasks

Explanation:
Von Neumann architecture uses **one memory** for storing both data and instructions.

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9. What is a disadvantage of the Von Neumann architecture?
a) Complex design due to separate memory spaces
b) Difficult to modify programs stored in memory
✓ **c) Bottleneck due to single memory space for instructions and data**
d) Lack of flexibility in executing instructions
Explanation:
Because both instructions and data share the **same memory and bus**, it slows down the system (bottleneck).

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10. Which of the following transports data inside a computer among different components?
a) Control Unit
✓ **b) System Bus**
c) Memory
d) Processor
Explanation:
The **System Bus** transfers data between CPU, memory, and I/O devices.

📝 Short Questions – Answers

1. Define a system. What are its basic components?

Answer:
A **system** is a set of interrelated components working together to achieve a specific goal.
Basic components:

1. **Objectives** – The goal of the system.
2. **Components** – Parts or units working together.
3. **Environment** – External factors affecting the system.
4. **Communication** – Interaction between components.

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2. Differentiate between natural and artificial systems.

Answer:

Natural System	Artificial System
Occurs in nature	Created by humans
Example: Solar system, human body	Example: Computer, automobile

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3. Describe the main components of a computer system.

Answer:

1. **Input Unit** – Takes user data (keyboard, mouse).
2. **Processing Unit (CPU)** – Processes data (ALU + CU).
3. **Memory Unit** – Stores data and instructions.
4. **Output Unit** – Displays results (monitor, printer).
5. **Storage** – Saves data permanently (hard drive, SSD).

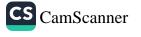4. List and describe the types of computing systems.

Answer:

1. **Personal Computers (PCs)** – For individual use.
2. **Embedded Systems** – Inside devices like microwave ovens.
3. **Workstations** – Powerful PCs for professional use.
4. **Servers** – Provide services/data to other computers.
5. **Supercomputers** – Used for complex scientific tasks.

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5. What are the main components of the Von Neumann architecture?

Answer:

1. **Input Unit**
2. **Memory Unit**
3. **Arithmetic Logic Unit (ALU)**
4. **Control Unit (CU)**
5. **Output Unit**

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6. What is the Von Neumann computer architecture? List its key components.

Answer:
Von Neumann Architecture is a computer design model using a **single memory** for both

instructions and data.
Key Components:

- Input Unit
- Memory
- ALU
- Control Unit
- Output Unit

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7. What are the four main steps in the Von Neumann architecture's instruction cycle?

Answer:

1. **Fetch** – Get instruction from memory
2. **Decode** – Understand the instruction
3. **Execute** – Perform the instruction
4. **Store** – Save the result if needed

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8. What is the Von Neumann bottleneck?

Answer:
It is the **slowdown** that occurs because both instructions and data use the **same bus and memory**, causing a delay in execution.

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9. What is a key advantage of the Von Neumann architecture?

Answer:
It uses **one memory** for both data and instructions, making the system **simpler and cheaper** to design.

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10. What are the three main requirements for a computing system to function?

Answer:

1. **Input** – Data provided by user
2. **Processing** – Performed by CPU
3. **Output** – Results shown to user

1. Define and describe the concept of a system. Explain the fundamental components, objectives, environment, and methods of communication within a system.

Answer:
A **system** is a group of **interrelated components** working together to achieve a **common goal**. Every system takes **input**, processes it, and provides **output**.

Fundamental Components of a System:

1. **Objectives:**
   o Every system has a specific goal or purpose.
   o Example: A school system's objective is to provide education.
2. **Components:**
   o These are parts that work together (input unit, CPU, memory, etc.).
3. **Environment:**
   o External factors that affect the system (like users or networks).
4. **Communication:**
   o Interaction between components via signals or data transfer paths.
   o In computers, buses are used for communication.

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2. Differentiate between natural and artificial systems. Discuss their characteristics, functions, and purposes with relevant examples.

Answer:

Feature	Natural System	Artificial System
Created By	Nature	Humans
Examples	Solar system, human body	Computer system, car, washing machine
Purpose	Survival, balance of nature	Problem-solving, efficiency
Control	Self-regulated	Human-controlled
Change/Update	Evolves naturally	Can be updated or modified

Explanation:

- **Natural systems** are found in nature and work automatically.
- **Artificial systems** are designed by humans for specific tasks.

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3. Examine the relationship between systems and different branches of science, including natural science, design science, and computer science.

Answer:

1. Natural Science:

- Studies **natural systems** like the ecosystem, weather system, human body, etc.
- Uses system theory to understand how these parts interact.

Example: Respiratory system works as a system of lungs, airways, and oxygen exchange.

2. Design Science:

- Involves creating **artificial systems** like machines, vehicles, or control systems.
- Engineers use system theory to improve performance.

Example: Traffic control system – sensors, lights, and signals work together.

3. Computer Science:

- Computers are complex systems of hardware and software.
- Uses system theory to design efficient, secure, and reliable computing models.

Example: Operating system is a software system managing hardware resources.

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4. Explore the different types of computing systems such as computers, software systems, computer networks, and the internet.

Answer:

1. Computer Systems:

- Physical devices like desktop, laptop, tablets.
- Input, process, store, and output data.

2. Software Systems:

- Programs that control computers (e.g., Windows, MS Word).
- Two types:
    - **System software** (OS)
    - **Application software** (MS Word)

- A group of connected computers.
- Share data, files, printers (e.g., LAN, WAN).

4. Internet:

- Global network that connects millions of computers.
- Used for browsing, communication, cloud services, etc.

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5. Describe the main characteristics of a computer as a system, including its objectives, components, and interactions among these components.

Answer:

Objective:

- Process input data into useful output.
- Perform calculations, store and retrieve information.

Main Components:

1. **Input Unit:**
   o Accepts data (keyboard, mouse).
2. **Processing Unit (CPU):**
   o Performs calculations and decisions.
3. **Memory Unit:**
   o Temporarily stores data (RAM).
4. **Storage Unit:**
   o Permanently stores data (hard disk, SSD).
5. **Output Unit:**
   o Shows results (monitor, printer).

Interaction:

- Components interact through **system bus** (data, address, control buses).
- Example: User gives input → CPU processes → Output displayed.

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6. Explain the Von Neumann architecture of a computer. Include a discussion on the main components, their functions, and the step-by-step process of how the architecture operates.

Answer:

Von Neumann Architecture:

Proposed by **John Von Neumann** in 1945. Uses a **single memory** for both instructions and data.

Main Components:

1. **Input Unit:** Enters data/instructions.
2. **Memory Unit:** Stores data and programs.
3. **Control Unit (CU):** Controls flow of instructions.
4. **ALU (Arithmetic Logic Unit):** Performs calculations.
5. **Output Unit:** Displays results.

Instruction Cycle:

1. **Fetch:** Get instruction from memory.
2. **Decode:** Understand the instruction.
3. **Execute:** Perform the operation.
4. **Store:** Save the result if needed.

Key Feature:

- Uses a **single bus and memory** (data + instructions together)
- Causes **Von Neumann Bottleneck**

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7. Provide a detailed explanation of how a computer interacts with its environment. Include examples of user input, network communication, and power supply.

Answer:

1. User Input:

- User types using keyboard or clicks using a mouse.
- Input devices send data to CPU for processing.

2. Network Communication:

- Internet or LAN used to communicate with other devices.
- Example: Sending an email or downloading a file.

3. Power Supply:

- Converts AC power into usable DC power.
- Ensures smooth working of components.

Other Examples:

- Printer (output to environment)
- Microphone (receives sound input from environment)

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8. Describe the process of retrieving and displaying a file using a computer. Provide a step-by-step explanation.

Answer:

Step-by-Step Process:

1. **Input:**
   o User clicks on file icon using a mouse.
2. **Request Sent to OS:**
   o OS locates the file in memory/storage.
3. **File Loaded:**
   o Data is loaded into RAM.
4. **CPU Processes File:**
   o Instructions are executed (open in software).
5. **Output Displayed:**
   o Content is shown on screen (monitor).

Explanation:

- All components (input, memory, CPU, output) work as a **system**.
- OS manages the complete file access process.