**Chapter 1 Introduction**

What does the von Neumann model define as a computer?

A)The von Neumann model is a data processing machine that is capable of receiving data, processing it, and outputting results..

B)The von Neumann model focuses on the fact that computers can store data in many different states.

C)The von Neumann model refers to the network of connections.

D)The von Neumann model only handles text and images.

Explain:

1. correct correct because the von Neumann model defines a computer as a data processing machine capable of receiving data, processing and outputting results. (The book mentions this in section 1.3.2. DATA, page 6).wrong because the von Neumann model does not focus on the computer being able to store data in different states but emphasizes the data processing.
2. wrong because the von Neumann model does not mention the network connection.
3. wrong because computers not only process text and images but can also process audio, video, etc.

**Chapter 2 Number Systems**

Which number system is used by computers to store data?

A) Decimal

B) Octal

C) Binary

D) Hexadecimal

ANSWER: C

Explanation: Page 20 in the book, 2.2.3 The hexadecimal system (base 16)

Option A) is incorrect because computers do not store data in this system, as electronic hardware is not suitable for representing 10 different states.

Option B) is incorrect because it is sometimes used in programming (especially on Unix systems) to represent binary values in a more compact form, but computers do not directly store data in this system.

Option D) is incorrect because it is used in programming to represent memory addresses and color codes. However, data in computers is still stored in binary form; the hexadecimal system only makes it easier for humans to read.

**Chapter 3 Data Storage**

Which of the following is NOT a characteristic of an algorithm?

A) Finiteness

B) Ambiguity

C) Determinism

D) Efficiency

ANSWER: B

Explanation: Page 45 of the book

Option A) is incorrect because it is a characteristic of an algorithm to have a finite number of steps. It must terminate after a certain number of operations. If an algorithm lacks finiteness, it may run indefinitely without producing a result.

Option C) is incorrect because an algorithm must have the property of determinism, meaning that for a given input, it must always produce the same output. Each step of the algorithm must be precisely defined to ensure there is no randomness in the execution process.

Option D) is incorrect because it is a characteristic of an algorithm, but it is not a mandatory condition for an algorithm to be considered valid. An algorithm can be correct but not efficient. However, in computer science, efficiency is often an important factor when designing algorithms.

**Chapter 4 Operations on Data**

Which data structure follows the LIFO (Last In, First Out) principle?

A) Queue

B) Stack

C) Linked List

D) Tree

ANSWER: B

Explanation: Page 90 in book

Option A) is incorrect because a **Queue** follows the **FIFO (First In, First Out)** principle, meaning the element that is added first will be removed first.

Option C) is incorrect because a **Linked List** is a flexible data structure that does not strictly follow **LIFO (Last In, First Out)** or **FIFO (First In, First Out)** principles. The way elements are accessed depends on the type of linked list (singly linked, doubly linked, circular, etc.).

Option D) is incorrect because a **Tree** is a hierarchical data structure that does not follow the **LIFO (Last In, First Out)** principle. Tree traversal can be performed in pre-order, in-order, post-order, or level-order.

**Chapter 5 Computer Organization**

What is the primary function of the CPU?

A) Store data

B) Process instructions

C) Display images

D) Connect to the internet

ANSWER: B

Giải thích: Page 92 in book

Option A is incorrect because data storage is a function of RAM, hard drives (HDD, SSD), or external storage, not the primary task of the CPU. The CPU only processes data, it does not store it long-term.

Option C is incorrect because displaying images is the task of the GPU (Graphics Card) and the monitor. The CPU can assist in processing some related tasks, but it is not the primary component responsible for image display.

Option D is incorrect because Internet connection is established through a Network Interface Card (NIC) or a Wi-Fi adapter. The CPU can process network data, but it does not directly connect to the Internet.

**chapter 6 Computer Networks and Internet**

What is the purpose of an IP address?

A) To identify a network

B) To identify a device on a network

C) To route data packets

D) To provide security

**Giải thích:**

ANSWER: B Page 152 in book

The remaining answers are wrong because:

A) To identify a network: This is the function of a network address.

C) To route data packets: This is the function of the router.

D) To provide security: This is the function of firewalls and security protocols.

**chapter 7 Operating Systems**

What is the purpose of a process in an operating system?

A) To store data

B) To execute a program

C) To manage hardware devices

D) To provide a user interface

**Giải thích:**

ANSWER: B Page 196 in book

The remaining answers are wrong because:

A) To store data: This is the function of the file system and memory.

C) To manage hardware devices: This is the function of device drivers.

D) To provide a user interface: This is the function of the user interface.

**chapter 8 Algorithms**

What is the time complexity of a linear search algorithm in the worst case?

A) O(1)

B) O(log n)

C) O(n)

D) O(n^2)

**Giải thích:**

ANSWER: C Page 230 in book

The remaining answers are wrong because:

A) O(1): This is the complexity of the direct access algorithm.

B) O(log n): This is the complexity of binary search algorithm.

D) O(n^2): This is the complexity of some sorting algorithms like bubble sort.

**chapter 9 Programming Languages**

What is the purpose of a compiler in programming?

A) To execute a program

B) To translate source code into machine code

C) To debug a program

D) To create a user interface

ANSWER: B Page 245 in book

The remaining answers are wrong because:

A) To execute a program: This is the function of the operating system or interpreter.

C) To debug a program: This is the function of the debugger.

D) To create a user interface: This is the function of UI libraries.

**chapter 10 Software Engineering**

What is the purpose of software testing?

A) To write code

B) To design user interfaces

C) To identify and fix defects

D) To manage project timelines

ANSWER: C Page 288 in book

The remaining answers are wrong because:

A) To write code: is the job of the programmer, not the main purpose of testing.

B) To design user interfaces: Interface design belongs to UX/UI design, not directly related to testing.

D) To manage project timelines: Managing project timelines is the job of project management, not software testing.

**chapter 11**

Which data structure uses the Last-In-First-Out (LIFO) principle?

A) Queue

B) Stack

C) Linked list

D) Tree

**Giải thích:**

ANSWER: B Page 320 in book

The remaining answers are wrong because:

**Queue (Hàng đợi) [Sai - A]**:  
 Queue tuân theo nguyên tắc **First-In-First-Out (FIFO)**, nghĩa là phần tử được thêm vào đầu tiên sẽ được lấy ra đầu tiên, giống như khi bạn xếp hàng chờ thanh toán tại siêu thị.

**Linked List (Danh sách liên kết) [Sai - C]**:  
 Linked list là cấu trúc dữ liệu mà các phần tử (node) được liên kết với nhau bằng con trỏ, nhưng nó không có nguyên tắc LIFO rõ ràng như stack. Nó có thể được duyệt theo nhiều cách khác nhau.

**Tree (Cây) [Sai - D]**:  
 Cây là một cấu trúc dữ liệu phân cấp, trong đó mỗi nút có thể có nhiều nút con. Cây không tuân theo nguyên tắc LIFO mà thường sử dụng các thuật toán duyệt như **Preorder, Inorder, Postorder** hoặc **Breadth-First Search (BFS)**.

**chapter 12 Abstract Data Types**

What is the primary purpose of a database?

A) To store and manage data.

B) To run applications.

C) To connect to the internet.

D) To create documents.

**Giải thích:**

ANSWER: A Page 329 in book

The remaining answers are wrong because:

* **B) To run applications [Sai]** → Cơ sở dữ liệu không trực tiếp chạy ứng dụng. Nó chỉ cung cấp dữ liệu cho ứng dụng xử lý. Các phần mềm hoặc máy chủ ứng dụng (như Java, Python, .NET) mới là nơi chạy ứng dụng.
* **C) To connect to the internet [Sai]** → Mặc dù nhiều cơ sở dữ liệu có thể truy cập qua internet, nhưng mục đích chính của chúng không phải là kết nối mạng mà là lưu trữ và quản lý dữ liệu.
* **D) To create documents [Sai]** → Việc tạo tài liệu thường liên quan đến phần mềm như Microsoft Word, Google Docs. Cơ sở dữ liệu có thể chứa nội dung tài liệu nhưng không phải là công cụ để tạo tài liệu.

**chapter 13 File Structure**

Which file structure provides the fastest data retrieval for large datasets with unique keys?

A) Sequential files

B) Indexed files

C) Hashed files

D) Text files

**Giải thích:**

ANSWER: C Page 355 in book

The remaining answers are wrong because:

Sequential files (A) yêu cầu duyệt từ đầu đến cuối, làm chậm tốc độ truy xuất.

Indexed files (B) cải thiện tốc độ nhưng vẫn cần tìm kiếm theo chỉ mục.

Text files (D) không được thiết kế để tối ưu truy xuất nhanh.

**chapter 14 Databases**

Which of the following is NOT an advantage of using a Database Management System (DBMS)?

A) Reduced data redundancy

B) Improved data integrity

C) Increased data inconsistency

D) Enhanced data security

**Giải thích:**

ANSWER: C Page 374 in book

The remaining answers are wrong because:

**DBMS có các lợi ích như giảm dư thừa dữ liệu (A), tăng cường tính toàn vẹn dữ liệu (B), và bảo mật dữ liệu tốt hơn (D)**.

**chapter 15:** In data compression, what is the primary purpose of Huffman coding?  
 A) To encrypt data securely  
 B) To reduce data size by encoding frequently occurring items with shorter codes  
 C) To detect and correct errors in transmission  
 D) To enhance data retrieval speed  
 **ANSWER: B  
 Explanation:** Huffman coding reduces data size by assigning shorter codes to more frequently occurring items, making the overall encoded data more compact. (Page 392)

* A) Wrong: Huffman coding isn’t for encryption.
* C) Wrong: Error detection/correction is done by other techniques like parity checks or Hamming codes.
* D) Wrong: Huffman coding aims at compression, not enhancing retrieval speed.

**Chapter 16:** Which of the following best describes the purpose of a public key in asymmetric encryption?  
 A) To decrypt messages encrypted with the private key  
 B) To encrypt messages that only the private key can decrypt  
 C) To store encrypted data securely  
 D) To generate digital certificates

**ANSWER:** B  
 **Explanation:** In asymmetric encryption, the public key is used to encrypt messages, and only the corresponding private key can decrypt them. This ensures secure communication. (Page 415)

* A) Wrong: The public key is not used for decryption — that’s the private key’s role.
* C) Wrong: Encryption ensures secure storage, but the public key’s primary purpose is encryption.
* D) Wrong: Digital certificates verify identity and contain public keys, but the public key itself doesn’t generate them.

**chapter 17:** In computational theory, the Church-Turing thesis implies that:  
 A) All problems can be solved by a Turing machine  
 B) A problem is solvable if and only if it’s decidable  
 C) Any computation performed by a mechanical process can be simulated by a Turing machine  
 D) The halting problem can be solved with enough computing power  
 **ANSWER:** C  
 **Explanation:** The Church-Turing thesis suggests that any computation that can be performed by a mechanical process can be simulated by a Turing machine. (Page 453)

* A) Wrong: Not all problems are solvable by a Turing machine.
* B) Wrong: Some problems are undecidable even if they’re computable.
* D) Wrong: The halting problem is proven to be undecidable.

**chapter 18:** What is a key characteristic of strong AI compared to weak AI?  
 A) Ability to perform specific tasks  
 B) Reliance on large datasets for training  
 C) Possession of consciousness and understanding  
 D) Use of machine learning algorithms  
 **ANSWER:** C  
 **Explanation:** Strong AI aims to achieve human-like understanding and consciousness, going beyond task-specific automation. (Page 475)

* A) Wrong: Weak AI focuses on performing specific tasks.
* B) Wrong: Both strong and weak AI can use large datasets.
* D) Wrong: Machine learning is a tool used by both strong and weak AI.

**chapter 19:** Which of the following best describes the "network effect" in social media?  
 A) The increase in advertising revenue as more users join a platform  
 B) The reduction in privacy as user connections grow  
 C) The value of the platform increasing as more users join and interact  
 D) The spread of misinformation due to rapid sharing  
 **ANSWER:** C  
 **Explanation:** The "network effect" refers to the phenomenon where a platform becomes more valuable as more people use and contribute to it. (Page 509)

* A) Wrong: Advertising revenue increase is a consequence, not the definition.
* B) Wrong: Privacy reduction isn’t the core concept of the network effect.
* D) Wrong: Misinformation is a side effect, not the defining feature.

**chapter 20:** In ethical considerations of technology, what does the term "digital divide" refer to?  
 A) The increasing reliance on digital technology in daily life  
 B) The separation of digital content into different categories  
 C) The gap between those who have access to digital technology and those who do not  
 D) The distinction between personal and professional use of technology  
 **ANSWER:** C  
 **Explanation:** The "digital divide" highlights the disparity in access to digital technology and the internet, leading to unequal opportunities in education, employment, and social participation. (Page 526)

* A) Wrong: This describes digital integration, not the digital divide.
* B) Wrong: Categorizing digital content is unrelated.
* D) Wrong: Personal vs. professional use doesn’t define the digital divide.