

Computer Engineering

1. The Analytical Engine, a design for a mechanical general-purpose computer, was conceptualized by:

- A) Blaise Pascal
- B) Charles Babbage
- C) Alan Turing
- D) John von Neumann

Answer: B) Charles Babbage

Explanation: Charles Babbage is considered a "father of the computer" for originating the concept of a programmable computer with his Analytical Engine design in the 19th century.

2. A type of machine learning where the algorithm is given a dataset without explicit labels and must find structure or patterns on its own is called:

- A) Supervised Learning
- B) Unsupervised Learning
- C) Reinforcement Learning
- D) Semi-supervised Learning

Answer: B) Unsupervised Learning

Explanation: Unsupervised learning is used for tasks like clustering and dimensionality reduction, where the goal is to discover hidden patterns in unlabeled data.

3. The practice of fetching instructions or data from memory before they are actually needed is known as:

- A) Caching
- B) Pipelining
- C) Prefetching
- D) Multithreading

Answer: C) Prefetching

Explanation: Prefetching is a technique used by computer processors to boost execution time by attempting to fetch instructions and data from memory into the cache ahead of time.

4. The physical components of a computer system, such as the monitor, keyboard, and hard drive, are collectively referred to as:

- A) Software
- B) Firmware
- C) Hardware
- D) Middleware

Answer: C) Hardware

Explanation: Hardware refers to the tangible, physical parts of a computer that you can see and touch.

5. An ACID-compliant transaction in a database is one that is:

- A) Atomic, Consistent, Isolated, Durable
- B) Authorized, Concurrent, Indexed, Distributed
- C) Active, Committed, Integrated, Done
- D) Asynchronous, Controlled, Independent, Dynamic

Answer: A) Atomic, Consistent, Isolated, Durable

Explanation: The ACID properties guarantee that database transactions are processed reliably, ensuring data integrity even in the event of errors or power failures.

6. The part of the operating system that is responsible for managing memory, processes, and files is the:

- A) Shell
- B) Kernel
- C) API
- D) GUI

Answer: B) Kernel

Explanation: The kernel is the central component of an operating system that has complete control over everything in the system.

7. A system that is designed to help middle managers make tactical decisions by providing summary and exception reports is a(n):

- A) Transaction Processing System (TPS)
- B) Management Information System (MIS)

C) Executive Information System (EIS)

D) Office Automation System (OAS)

Answer: B) Management Information System (MIS)

Explanation: MIS synthesizes data from TPS to create routine reports that help managers monitor and control the business.

8. In system design, 'Coupling' refers to the degree of:

- A) Interdependence between software modules.
- B) Strength of the relationship between elements within a module.
- C) Reusability of a module.
- D) Complexity of a module.

Answer: A) Interdependence between software modules.

Explanation: Good software design aims for low coupling, meaning modules are as independent as possible, which makes the system easier to maintain.

9. What is the purpose of the `AUTOEXEC.BAT` file in MS-DOS?

- A) To load device drivers.
- B) To set system environment variables.
- C) To execute a sequence of commands automatically at startup.
- D) To configure the mouse and keyboard.

Answer: C) To execute a sequence of commands automatically at startup.

Explanation: This batch file was automatically run by the operating system after booting to set up the user's environment and run initial programs.

10. In Unix, the command `whoami` is used to:

- A) Display who is currently logged into the system.
- B) Display the current user's username.
- C) Display the system's hostname.
- D) Display information about a specific user.

Answer: B) Display the current user's username.

Explanation: It prints the effective user ID of the current user.

11. A robot that can perform tasks without continuous human guidance is considered:

- A) A teleoperator
- B) An autonomous robot
- C) A humanoid robot
- D) An industrial robot

Answer: B) An autonomous robot

Explanation: Autonomous robots use sensors and AI to perceive their environment and make decisions on their own to accomplish a goal.

12. In Linux, the `pwd` command is used to:

- A) Change the current user's password.
- B) Print the working directory.
- C) List the contents of the current directory.
- D) Power down the system.

Answer: B) Print the working directory.

Explanation: `pwd` displays the full pathname of the current directory you are in.

13. A logic circuit whose output depends not only on the present value of its inputs but also on the sequence of past inputs is a(n):

- A) Combinational circuit
- B) Arithmetic circuit
- C) Sequential circuit
- D) Analog circuit

Answer: C) Sequential circuit

Explanation: Sequential circuits have memory elements (like flip-flops) that store the state of the circuit, making their output dependent on past history.

14. The 2's complement of a binary number is used to:

- A) Represent negative numbers.
- B) Double the number's value.
- C) Check for errors (parity).
- D) Convert from binary to hexadecimal.

Answer: A) Represent negative numbers.

Explanation: The 2's complement system is the most common method for representing signed integers on computers, as it makes subtraction and addition straightforward.

15. What is the function of the Address Resolution Protocol (ARP)?

- A) To resolve an IP address to a MAC address.
- B) To resolve a MAC address to an IP address.
- C) To resolve a domain name to an IP address.
- D) To assign an IP address to a host.

Answer: A) To resolve an IP address to a MAC address.

Explanation: When a device needs to communicate with another device on the same local network, it uses ARP to find the destination's hardware (MAC) address.

16. A network device that regenerates a signal to extend the distance over which it can travel is a:

- A) Switch
- B) Hub
- C) Bridge
- D) Repeater

Answer: D) Repeater

Explanation: A repeater operates at the Physical Layer (Layer 1) to amplify or regenerate weakened signals, combating attenuation.

17. An operational amplifier (Op-Amp) is a:

- A) High-gain DC differential amplifier.
- B) Digital logic gate.
- C) Power regulator.
- D) High-frequency oscillator.

Answer: A) High-gain DC differential amplifier.

Explanation: Op-amps are fundamental building blocks in analog electronics, used in a vast array of applications like amplifiers, filters, and oscillators.

18. The forward voltage drop across a standard silicon diode is approximately:

- A) 0.3V
- B) 0.7V
- C) 1.2V
- D) 5.0V

Answer: B) 0.7V

Explanation: This is the typical voltage required to forward bias a silicon PN-junction and allow significant current to flow.

19. In Windows NT, a 'thread' is a:

- A) Program in execution.
- B) Security identifier for a user.
- C) Basic unit of CPU utilization.
- D) Connection to a network resource.

Answer: C) Basic unit of CPU utilization.

Explanation: A thread is the smallest sequence of programmed instructions that can be managed independently by a scheduler. A process can have multiple threads.

20. The phase of a compiler that creates a tree-like representation of the source code's grammatical structure is the:

- A) Lexical Analyzer
- B) Syntax Analyzer (Parser)
- C) Semantic Analyzer
- D) Intermediate Code Generator

Answer: B) Syntax Analyzer (Parser)

Explanation: The parser takes the stream of tokens from the lexical analyzer and builds a parse tree (or abstract syntax tree) to verify the code's syntax.

21. In Windows 2000, Group Policy is used to:

- A) Manage user and computer configurations in Active Directory.
- B) Create user groups for file sharing.
- C) Set the IP address for a computer.
- D) Install new software applications.

Answer: A) Manage user and computer configurations in Active Directory.

Explanation: Group Policy is a powerful feature for administrators to enforce settings, deploy software, and manage security across a network of users and computers.

22. In C++, a function declared with the `virtual` keyword in a base class:

- A) Cannot be accessed from outside the class.
- B) Allows for dynamic dispatch or late binding.
- C) Must be defined in the base class.
- D) Cannot be overridden in a derived class.

Answer: B) Allows for dynamic dispatch or late binding.

Explanation: Virtual functions are the mechanism for implementing runtime polymorphism, where the decision on which function to call is made at runtime based on the object's actual type.

23. A C++ class where all members are public by default is a:

- A) `class`
- B) `struct`
- C) `union`
- D) `enum`

Answer: B) `struct`

Explanation: In C++, a `struct` is identical to a `class` except that its members have public access by default, whereas a `class` has private access by default.

24. What is the output of the following C++ code?

```
<!-- end list -->
```

```
```cpp
```

```
#include <iostream>

int main() {
 int arr[] = {10, 20, 30};
 int *ptr = arr;
 std::cout << *(ptr + 1);
```

```
 return 0;
}
...
```

- ...
- A) 10
  - B) 20
  - C) 30
  - D) A memory address

Answer: B) 20

Explanation: `ptr` points to the first element of the array. `ptr + 1` moves the pointer to the next element, and the dereference operator `\*` retrieves its value, which is 20.

...

25. A computer's ability to learn and adapt without being explicitly programmed is a characteristic of:

- A) Database Systems
- B) Operating Systems
- C) Machine Learning
- D) Computer Graphics

Answer: C) Machine Learning

Explanation: Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions.

26. A small, very fast memory located inside the CPU is called:

- A) RAM
- B) ROM
- C) Cache
- D) Registers

Answer: D) Registers

Explanation: Registers are at the top of the memory hierarchy, providing the fastest way for the CPU to access data.

27. An SQL constraint that ensures all values in a column are different is:

- A) `NOT NULL`
- B) `CHECK`
- C) `UNIQUE`
- D) `DEFAULT`

Answer: C) `UNIQUE`

Explanation: The `UNIQUE` constraint prevents two records from having identical values in a particular column.

28. In operating systems, the 'thrashing' phenomenon occurs when:

- A) The CPU is overloaded with too many processes.
- B) The system spends more time paging than executing.
- C) A process is blocked for a long time.
- D) The hard disk is fragmented.

Answer: B) The system spends more time paging than executing.

Explanation: Thrashing is a state of high-page fault activity, which drastically reduces system performance as the OS is constantly swapping pages between RAM and disk.

29. Which command in Linux/Unix is used to create a new directory?

- A) `newdir`
- B) `crdir`
- C) `mkdir`
- D) `makedir`

Answer: C) `mkdir`

Explanation: The `mkdir` (make directory) command is the standard utility for creating new directories in the file system.

30. Which system development model is characterized by a sequential, non-iterative approach?

- A) Agile Model
- B) Spiral Model
- C) Waterfall Model

D) Prototyping Model

Answer: C) Waterfall Model

Explanation: The Waterfall model is a classic SDLC model where each phase (requirements, design, implementation, etc.) must be fully completed before the next phase begins.

31. In Linux, a symbolic link is:

- A) A copy of a file.
- B) A file that acts as a pointer to another file.
- C) A compressed version of a file.
- D) A temporary file.

Answer: B) A file that acts as a pointer to another file.

Explanation: A symbolic link (or symlink) is like a shortcut in Windows; it's a special file that contains a path to the target file or directory.

32. The process of converting analog signals into digital signals is called:

- A) Modulation
- B) Demodulation
- C) Sampling
- D) Encoding

Answer: C) Sampling

Explanation: Sampling is the first step in digitization, where the value of an analog signal is measured at regular intervals.

33. Which protocol provides a connection-oriented, reliable service for data transmission?

- A) UDP (User Datagram Protocol)
- B) TCP (Transmission Control Protocol)
- C) IP (Internet Protocol)
- D) ICMP (Internet Control Message Protocol)

Answer: B) TCP (Transmission Control Protocol)

Explanation: TCP ensures reliable delivery by establishing a connection, using sequence numbers to order packets, and acknowledging received packets.

34. A thyristor, or Silicon-Controlled Rectifier (SCR), is a semiconductor device primarily used for:

- A) High-frequency amplification.
- B) Controlling high power and voltage.
- C) Generating radio waves.
- D) Digital logic operations.

Answer: B) Controlling high power and voltage.

Explanation: SCRs act as switches that can handle large amounts of power, making them common in motor controllers, dimmers, and power supplies.

35. The part of a language processor that takes the output of the parser and checks it for logical consistency is the:

- A) Lexical Analyzer
- B) Code Optimizer
- C) Semantic Analyzer
- D) Code Generator

Answer: C) Semantic Analyzer

Explanation: The semantic analyzer checks the parse tree for meaning, for example, by ensuring that variables are declared before use and that types are compatible in operations.

36. In C++, a special member function that is automatically called when an object goes out of scope or is explicitly deleted is the:

- A) Constructor
- B) Destructor
- C) Copy Constructor
- D) Friend Function

Answer: B) Destructor

Explanation: The destructor is used to deallocate memory and perform other cleanup for a class object when it is destroyed. Its name is the class name preceded by a tilde ('~').

37. A class that cannot be instantiated and is typically used as a base class is called a(n):

- A) Friend Class
- B) Inner Class
- C) Abstract Class

D) Static Class

Answer: C) Abstract Class

Explanation: An abstract class contains at least one pure virtual function, and it serves as a blueprint for derived classes.

38. The Turing Test is a test of a machine's ability to:

- A) Perform complex calculations.
- B) Exhibit intelligent behavior equivalent to, or indistinguishable from, that of a human.
- C) Learn from a large dataset.
- D) Play a game of chess at a grandmaster level.

Answer: B) Exhibit intelligent behavior equivalent to, or indistinguishable from, that of a human.

Explanation: Proposed by Alan Turing, it is a test of artificial intelligence where a human evaluator judges natural language conversations between a human and a machine.

39. The virtual memory system is implemented by the:

- A) Hardware only.
- B) Operating system only.
- C) A combination of the operating system and hardware (MMU).
- D) Application software.

Answer: C) A combination of the operating system and hardware (MMU).

Explanation: The Memory Management Unit (MMU) is a hardware component that translates virtual addresses to physical addresses, while the OS manages the page tables and handles page faults.

40. In DOS, what is the function of the `ATTRIB` command?

- A) To change the attributes of a file (e.g., read-only, hidden).
- B) To associate a file extension with a program.
- C) To sort the contents of a file.
- D) To display the contents of a file.

Answer: A) To change the attributes of a file (e.g., read-only, hidden).

Explanation: `ATTRIB` allows a user to view or modify file attributes like Read-only (R), Archive (A), System (S), and Hidden (H).

41. In Linux, the `df` command is used to:

- A) Find files.
- B) Display disk-free space.
- C) Show directory usage.
- D) Differentiate between two files.

Answer: B) Display disk-free space.

Explanation: The `df` (disk free) utility reports the amount of available disk space on file systems.

42. A multiplexer (MUX) is a combinational logic circuit that:

- A) Selects one of several input signals and forwards it to a single output.
- B) Distributes one input signal to one of several outputs.
- C) Adds two binary numbers.
- D) Stores one bit of data.

Answer: A) Selects one of several input signals and forwards it to a single output.

Explanation: A multiplexer acts like a digital switch, controlled by select lines that determine which input is routed to the output.

43. Which protocol is used for securely accessing a remote computer?

- A) Telnet
- B) FTP
- C) SSH (Secure Shell)
- D) HTTP

Answer: C) SSH (Secure Shell)

Explanation: SSH provides a secure, encrypted connection over an unsecured network, unlike Telnet which sends data in plaintext.

44. In C++, what is the purpose of the `::` operator?

- A) Ternary conditional operator.
- B) Pointer-to-member operator.
- C) Scope Resolution Operator.
- D) Member access operator.

Answer: C) Scope Resolution Operator.

Explanation: It is used to access a global variable when there is a local variable with the same name, or to access static members of a class.

45. The command to compile a C++ program named `hello.cpp` using the GNU compiler is:

- A) `gcc hello.cpp -o hello`
- B) `g++ hello.cpp -o hello`
- C) `compile hello.cpp`
- D) `make hello`

Answer: B) `g++ hello.cpp -o hello`

Explanation: `g++` is the command for the GNU C++ compiler. The `-o hello` part specifies that the output executable file should be named `hello`.

46. In a relational database, the property that ensures that a foreign key value must match an existing primary key value or be NULL is known as:

- A) Entity Integrity
- B) Domain Integrity
- C) Referential Integrity
- D) User-defined Integrity

Answer: C) Referential Integrity

Explanation: This integrity constraint prevents "orphan" records by ensuring that relationships between tables are always valid.

47. In C++, a `template` is used to:

- A) Create a blueprint for a function or class that can work with any data type.
- B) Define a constant variable.
- C) Handle exceptions.
- D) Define a user interface layout.

Answer: A) Create a blueprint for a function or class that can work with any data type.

Explanation: Templates enable generic programming, allowing you to write code that is type-independent, which improves reusability.

48. A network that connects computers over a large geographical area, such as a city or country, is a:

- A) LAN (Local Area Network)

- B) PAN (Personal Area Network)
- C) MAN (Metropolitan Area Network)
- D) WAN (Wide Area Network)

Answer: D) WAN (Wide Area Network)

Explanation: A WAN is a network that is not tied to a single location but spans a large area. The Internet is the largest example of a WAN.

49. An operating system kernel that includes only the basic functionalities and where other services are implemented in user space is a:

- A) Monolithic Kernel
- B) Microkernel
- C) Hybrid Kernel
- D) Nanokernel

Answer: B) Microkernel

Explanation: The microkernel approach aims to improve reliability and security by minimizing the amount of code running in the privileged kernel mode.

50. The DMA (Direct Memory Access) controller's function is to:

- A) Manage virtual memory.
- B) Allow I/O devices to access main memory directly, without involving the CPU.
- C) Control the flow of data on the system bus.
- D) Perform arithmetic calculations.

Answer: B) Allow I/O devices to access main memory directly, without involving the CPU.

Explanation: DMA is a feature that speeds up data transfer between peripherals and memory, freeing up the CPU to perform other tasks.

51. The "waterfall" of activities in the System Development Life Cycle (SDLC) includes which of the following?

- A) Planning, Analysis, Design, Implementation, Maintenance
- B) Concept, Development, Testing, Deployment
- C) Inception, Elaboration, Construction, Transition
- D) Requirements, Build, Test, Release

Answer: A) Planning, Analysis, Design, Implementation, Maintenance

Explanation: This represents the classic sequence of phases in the Waterfall model of system development.

52. A universal logic gate is one which can be used to implement any Boolean function. Which of the following is a universal gate?

- A) AND
- B) OR
- C) XOR
- D) NAND

Answer: D) NAND

Explanation: Both NAND and NOR gates are universal gates because any other logic function (AND, OR, NOT) can be created using only NAND gates or only NOR gates.

53. In Linux, which file contains information about the users of the system?

- A) `/etc/shadow`
- B) `/etc/passwd`
- C) `/etc/group`
- D) `/etc/hosts`

Answer: B) `/etc/passwd`

Explanation: The `/etc/passwd` file is a plain text file that stores a list of the system's accounts, along with basic user information like user ID, group ID, and home directory.

54. The process of arranging data on a disk in contiguous blocks to improve performance is known as:

- A) Formatting
- B) Partitioning
- C) Defragmentation
- D) Compression

Answer: C) Defragmentation

Explanation: Defragmentation reorganizes fragmented data so that related pieces are stored together, which reduces seek time and speeds up file access.

55. In Windows 2000/NT, a security identifier (SID) is:

- A) A unique name assigned to a user account.
- B) A password used for logging in.
- C) A unique value used to identify a user, group, or computer account.
- D) A permission level assigned to a file.

Answer: C) A unique value used to identify a user, group, or computer account.

Explanation: The SID is the primary identifier for a security principal within the Windows security model.

56. The C++ Standard Library provides containers, algorithms, and iterators as part of the:

- A) Standard Template Library (STL)
- B) C++ Core Language
- C) Boost Libraries
- D) Windows API

Answer: A) Standard Template Library (STL)

Explanation: The STL is a powerful set of template classes and functions that provides generic programming components for C++.

57. A member function of a class in C++ that is declared with the `const` keyword at the end:

- A) Cannot be called.
- B) Can only be called by constant objects.
- C) Cannot modify any non-static member variables of the object.
- D) Returns a constant value.

Answer: C) Cannot modify any non-static member variables of the object.

Explanation: This is a promise that the function will not change the state of the object, which allows it to be called on `const` objects.

58. What is the main purpose of a 'cookie' in web browsing?

- A) To store viruses.
- B) To store user information and track browsing activity.
- C) To speed up website loading times.
- D) To display advertisements.

Answer: B) To store user information and track browsing activity.

Explanation: Cookies are small pieces of data sent from a website and stored on the user's computer to remember stateful information like login status or shopping cart items.

59. The 'von Neumann architecture' is a computer architecture based on the concept of:

- A) Having separate memory for data and instructions.
- B) A stored-program computer.
- C) A parallel processing system.
- D) A graphical user interface.

Answer: B) A stored-program computer.

Explanation: The key concept is that both program instructions and the data they operate on are stored in the same read-write memory.

60. An SQL view is:

- A) A physical copy of a table.
- B) An index on a table.
- C) A virtual table based on the result-set of an SQL statement.
- D) A log of all transactions.

Answer: C) A virtual table based on the result-set of an SQL statement.

Explanation: A view contains rows and columns just like a real table, but it does not store data itself. It's a saved query that can be used like a table.