Computer Engineering

- -

1. The brain of any computer system is the:

   A) ALU

   B) Memory

   C) CPU

   D) Control Unit

   Answer: C) CPU

   Explanation: The Central Processing Unit (CPU) performs most of the processing inside a computer, making it the "brain" of the system.

2. A computer program that converts an entire program into machine language at one time is called a/an:

   A) Interpreter

   B) Simulator

   C) Compiler

   D) Commander

   Answer: C) Compiler

   Explanation: A compiler scans the entire source code and translates it as a whole into machine code. An interpreter translates one line at a time.

3. The primary goal of Artificial Intelligence is to:

   A) Create human-like consciousness.

   B) Create systems that can perform tasks that typically require human intelligence.

   C) Replace all human jobs with robots.

   D) Build complex databases.

   Answer: B) Create systems that can perform tasks that typically require human intelligence.

   Explanation: AI focuses on simulating intelligent behavior like problem-solving, learning, and perception in machines, not necessarily creating consciousness.

4. A search algorithm that explores all the neighbor nodes at the present depth prior to moving on to the nodes at the next depth level is known as:

A) Depth-First Search (DFS)

B) Breadth-First Search (BFS)

C) Hill Climbing

D) A* Search

Answer: B) Breadth-First Search (BFS)

Explanation: BFS is a graph traversal algorithm that explores the graph layer by layer, making it ideal for finding the shortest path in an unweighted graph.

5. Which of the following is a volatile memory?

A) ROM

B) EPROM

C) SSD

D) RAM

Answer: D) RAM

Explanation: Random Access Memory (RAM) is volatile, meaning its contents are lost when the computer's power is turned off.

6. A bus that connects the CPU to the main memory is known as the:

A) System Bus

B) Data Bus

C) Address Bus

D) Control Bus

Answer: A) System Bus

Explanation: The System Bus is the main communication pathway between the CPU and main memory, and it consists of the data, address, and control buses.

7. In the context of a relational database, a row is also known as a:

A) Attribute

B) Tuple

C) Relation

D) Field

Answer: B) Tuple

Explanation: In the relational model, a table is a relation, a column is an attribute, and a row is a tuple, representing a single record.

8. The database language used to define the database schema is:

   A) DML (Data Manipulation Language)

   B) DCL (Data Control Language)

   C) DDL (Data Definition Language)

   D) TCL (Transaction Control Language)

   Answer: C) DDL (Data Definition Language)

   Explanation: DDL commands like CREATE, ALTER, and DROP are used to define and manage the structure of the database objects.

9. The state of a process after it has finished its execution is called:

   A) Running

   B) Waiting

   C) Ready

   D) Terminated

   Answer: D) Terminated

   Explanation: Once a process completes its task and its resources are deallocated by the operating system, it enters the terminated state.

10. A semaphore is used for:

   A) Memory management

   B) Process synchronization

   C) File I/O

   D) CPU scheduling

   Answer: B) Process synchronization

   Explanation: Semaphores are variables used to control access to common resources by multiple processes in a concurrent system to avoid race conditions.

11. A system that supports executive-level decision making by providing data and analysis tools is a(n):

   A) Transaction Processing System (TPS)

B) Decision Support System (DSS)

C) Executive Information System (EIS)

D) Management Information System (MIS)

Answer: C) Executive Information System (EIS)

Explanation: An EIS is specifically tailored for senior executives, providing high-level summaries and drill-down capabilities to analyze business performance.

12. The primary purpose of a Management Information System (MIS) is to:

A) Process daily business transactions.

B) Provide routine information to managers for decision-making.

C) Develop new software.

D) Automate the manufacturing process.

Answer: B) Provide routine information to managers for decision-making.

Explanation: MIS processes data from operations to create structured reports that help managers with planning, controlling, and decision-making.

13. Which DOS command is used to copy the contents of one diskette to another?

A) COPY

B) DISKCOPY

C) XCOPY

D) MOVE

Answer: B) DISKCOPY

Explanation: The DISKCOPY command is used to make an exact, sector-by-sector copy of a floppy disk.

14. The 'DELTREE' command in DOS is used to:

A) Delete a file.

B) Delete a directory.

C) Delete a directory and all its subdirectories and files.

D) Delete a tree structure from a drawing.

Answer: C) Delete a directory and all its subdirectories and files.

Explanation: DELTREE is a powerful command that recursively removes an entire directory tree.

15. The first phase of the System Development Life Cycle (SDLC) is:

   A) System Design

   B) System Analysis

   C) Preliminary Investigation/Planning

   D) System Implementation

   Answer: C) Preliminary Investigation/Planning

   Explanation: The SDLC begins with the planning phase, which involves identifying the problem or opportunity and determining the objectives for the new system.

16. A graphical representation of the flow of data through an information system is called a:

   A) Flowchart

   B) Data Flow Diagram (DFD)

   C) Entity-Relationship Diagram (ERD)

   D) Use Case Diagram

   Answer: B) Data Flow Diagram (DFD)

   Explanation: A DFD shows how data enters and leaves the system, what changes the information, and where the data is stored.

17. In Unix, the 'chmod' command is used to:

   A) Change the file owner.

   B) Change the file's access permissions.

   C) Change the modification time.

   D) Mount a device.

   Answer: B) Change the file's access permissions.

   Explanation: 'chmod' allows the user to set read, write, and execute permissions for the owner, group, and others.

18. The core of the Unix operating system is called the:

   A) Shell

   B) Kernel

   C) Library

D) API

Answer: B) Kernel

Explanation: The kernel is the central component of the OS that manages system resources and communication between hardware and software.

19. A system where a process is controlled by a computer, especially a continuous process, is known as:

A) Office Automation

B) Process Control System

C) Transaction Processing System

D) Management Information System

Answer: B) Process Control System

Explanation: Process control systems, a part of automation, use sensors and feedback loops to manage and control physical processes in industries like manufacturing.

20. A Programmable Logic Controller (PLC) is a specialized computer used for:

A) General purpose computing.

B) Industrial automation and control.

C) Database management.

D) Artificial intelligence research.

Answer: B) Industrial automation and control.

Explanation: PLCs are ruggedized digital computers adapted for the control of manufacturing processes, such as assembly lines or robotic devices.

21. In Linux, which command is used to display the contents of a file?

A) ls

B) cat

C) grep

D) cd

Answer: B) cat

Explanation: The 'cat' (concatenate) command is commonly used to read data from files and display it as output.

22. The superuser in a Linux system is named:

A) admin

B) user

C) guest

D) root

Answer: D) root

Explanation: 'root' is the administrative user account that has unrestricted access to all commands and files on a Linux or other Unix-like system.

23. A logic gate that produces a high output only when all of its inputs are high is a(n):

A) OR gate

B) NOT gate

C) AND gate

D) XOR gate

Answer: C) AND gate

Explanation: The AND gate implements logical conjunction; its output is true (1) if and only if all of its inputs are true (1).

24. The binary equivalent of the decimal number 10 is:

A) 1010

B) 1100

C) 1001

D) 0110

Answer: A) 1010

Explanation: In binary, 10 is represented as $(1 * 8) + (0 * 4) + (1 * 2) + (0 * 1)$, which is 8 + 2 = 10.

25. The OSI model has how many layers?

A) 5

B) 6

C) 7

D) 8

Answer: C) 7

Explanation: The Open Systems Interconnection (OSI) model describes seven layers that computer systems use to communicate over a network: Physical, Data Link, Network, Transport, Session, Presentation, and Application.

26. A device that connects two or more networks and forwards packets between them is a:

A) Hub

B) Switch

C) Router

D) Repeater

Answer: C) Router

Explanation: A router operates at the Network Layer (Layer 3) of the OSI model to direct traffic between different IP networks.

27. A semiconductor device with three terminals, called the emitter, base, and collector, is a:

A) Diode

B) Resistor

C) Capacitor

D) Transistor

Answer: D) Transistor

Explanation: A Bipolar Junction Transistor (BJT) is a key component in electronic circuits used for amplification and switching.

28. The property of a semiconductor that decreases as temperature increases is its:

A) Resistance

B) Conductivity

C) Doping level

D) Bandgap energy

Answer: A) Resistance

Explanation: In semiconductors, increasing temperature excites more electrons into the conduction band, which increases conductivity and therefore decreases resistance.

29. The file system used by default in Windows NT and later versions is:

A) FAT16

B) FAT32

C) HPFS

D) NTFS

Answer: D) NTFS

Explanation: The New Technology File System (NTFS) provides improvements over FAT, including better performance, security, and reliability.

30. In Windows NT, the HAL is the:

A) Hardware Abstraction Layer

B) High Availability Library

C) Host Access Login

D) Hardware Acceleration Logic

Answer: A) Hardware Abstraction Layer

Explanation: The HAL is a layer of software that hides hardware differences from the rest of the operating system, making it more portable.

31. A program that translates assembly language into machine code is called a(n):

A) Compiler

B) Interpreter

C) Assembler

D) Linker

Answer: C) Assembler

Explanation: An assembler is a specific type of translator that converts low-level assembly language mnemonics into their corresponding machine language instructions.

32. The process of combining object files generated by a compiler into a single executable file is performed by the:

A) Loader

B) Linker

C) Assembler

D) Preprocessor

Answer: B) Linker

Explanation: The linker resolves references to external symbols and libraries and arranges the code and data into a final executable file.

33. A specialized server that manages network resources and provides centralized authentication for users is a:

A) File Server

B) Print Server

C) Web Server

D) Domain Controller

Answer: D) Domain Controller

Explanation: In Windows Server environments like Windows 2000, a Domain Controller is responsible for authenticating users and enforcing security policies for a domain.

34. Active Directory, introduced with Windows 2000, is a:

A) File system

B) Web server

C) Directory service

D) Database engine

Answer: C) Directory service

Explanation: Active Directory stores information about network resources (like users, computers, and printers) and provides services for locating and managing those resources.

35. The bundling of data and the methods that operate on that data into a single unit is known as:

A) Inheritance

B) Encapsulation

C) Polymorphism

D) Abstraction

Answer: B) Encapsulation

Explanation: Encapsulation, a fundamental principle of OOP, hides the internal state of an object and requires all interaction to be performed through the object's methods.

36. In C++, what is the output of the following code?

<!-- end list -->

```cpp
#include <iostream>
int main() {
    int x = 5;
    std::cout << x++ << " " << ++x;
    return 0;
}
```

A) 5 7

B) 6 7

C) 5 6

D) Undefined behavior

Answer: D) Undefined behavior

Explanation: The C++ standard does not define the order of evaluation for the arguments to the `<<` operator. Modifying a variable more than once between sequence points results in undefined behavior.

37. A function that has the same name as the class and is executed when an object is created is called a:

   A) Destructor

   B) Constructor

   C) Friend function

   D) Virtual function

   Answer: B) Constructor

   Explanation: A constructor is a special member function used to initialize the state of an object when it is instantiated.

38. The ability of an object to take on many forms is a core OOP concept known as:

A) Inheritance

B) Encapsulation

C) Polymorphism

D) Abstraction

Answer: C) Polymorphism

Explanation: Polymorphism allows objects of different classes to be treated as objects of a common superclass, most often implemented through virtual functions.

39. The memory that stores the BIOS (Basic Input/Output System) on a motherboard is:

A) RAM

B) Cache

C) ROM

D) Virtual Memory

Answer: C) ROM

Explanation: Read-Only Memory (ROM) is non-volatile and contains the firmware needed to boot the computer and initialize hardware.

40. An expert system is a type of AI that:

A) Learns from experience like a neural network.

B) Emulates the decision-making ability of a human expert.

C) Can understand natural language.

D) Is designed for playing games like chess.

Answer: B) Emulates the decision-making ability of a human expert.

Explanation: Expert systems use a knowledge base of expert knowledge and an inference engine to solve problems in a specific domain.

41. In a database, a key that uniquely identifies a record in a table is called a:

A) Foreign Key

B) Secondary Key

C) Primary Key

D) Composite Key

Answer: C) Primary Key

Explanation: The primary key must contain unique values and cannot contain NULL values, ensuring that each record can be uniquely identified.

42. A situation where two or more processes are waiting indefinitely for an event that can only be caused by one of the waiting processes is known as:

A) Starvation

B) Deadlock

C) Race Condition

D) Paging

Answer: B) Deadlock

Explanation: Deadlock is a specific state where a set of processes is blocked because each process is holding a resource and waiting for another resource acquired by another process.

43. Which command in Linux/Unix is used to search for a pattern in a file?

A) find

B) search

C) grep

D) cat

Answer: C) grep

Explanation: 'grep' (Global Regular Expression Print) is a powerful command-line utility for searching plain-text data sets for lines that match a regular expression.

44. A flip-flop is a bistable multivibrator, which means it has:

A) One stable state

B) Two stable states

C) Three stable states

D) No stable states

Answer: B) Two stable states

Explanation: A flip-flop can store one bit of information (either 0 or 1) and is a fundamental building block of sequential logic circuits like memory and counters.

45. The IP address 127.0.0.1 is known as the:

A) Broadcast address

B) Multicast address

C) Gateway address

D) Loopback address

Answer: D) Loopback address

Explanation: This address, also known as localhost, is used to direct traffic back to the local machine for testing and troubleshooting purposes.

46. What does the acronym 'URL' stand for?

A) Uniform Resource Locator

B) Universal Record Link

C) Uniform Record Locator

D) Universal Resource Link

Answer: A) Uniform Resource Locator

Explanation: A URL is the address of a resource on the World Wide Web, specifying its location and the protocol to retrieve it.

47. In C++, a class from which other classes are derived is called a:

A) Child Class

B) Derived Class

C) Subclass

D) Base Class

Answer: D) Base Class

Explanation: The base class (or superclass) provides the initial members (data and functions) that are inherited by the derived class.

48. The `auto` keyword in modern C++ (C++11 and later) is used for:

A) Automatic memory management.

B) Declaring a variable with automatic storage duration.

C) Type inference for variable declarations.

D) Creating an autonomous function.

Answer: C) Type inference for variable declarations.

Explanation: The compiler automatically deduces the type of the variable from its initializer, making the code cleaner and less prone to type errors.

49. Which phase of the SDLC involves creating the actual system based on the design specifications?

  A) Analysis

  B) Design

  C) Implementation/Development

  D) Testing

  Answer: C) Implementation/Development

  Explanation: During this phase, programmers write the code for the system's components based on the detailed design documents.

50. The file 'CONFIG.SYS' in DOS is used to:

  A) Execute a batch of commands at startup.

  B) Load device drivers and configure system settings.

  C) Format the hard disk.

  D) Set the system date and time.

  Answer: B) Load device drivers and configure system settings.

  Explanation: This configuration file is read during the boot process to set up hardware and system parameters before the command prompt appears.

51. A full adder is a digital circuit that adds:

  A) Two bits.

  B) Three bits.

  C) Two 4-bit numbers.

  D) Two bytes.

  Answer: B) Three bits.

  Explanation: A full adder takes three inputs (A, B, and a Carry-in) and produces two outputs (a Sum and a Carry-out), allowing them to be chained together to add larger numbers.

52. The mechanism in an OS that allows a user-level process to request services from the kernel is a:

  A) System Call

B) Library Function

C) Interrupt

D) Context Switch

Answer: A) System Call

Explanation: System calls provide the interface between a process and the operating system, allowing programs to perform privileged operations like file I/O.

53. Which of the following is an example of a non-preemptive CPU scheduling algorithm?

A) Round Robin

B) Shortest Remaining Time First (SRTF)

C) Priority Scheduling (Preemptive)

D) First-Come, First-Served (FCFS)

Answer: D) First-Come, First-Served (FCFS)

Explanation: In non-preemptive scheduling, once the CPU has been allocated to a process, it keeps the CPU until it releases it either by terminating or by switching to the waiting state.

54. The process of converting data into a format that cannot be easily understood by unauthorized parties is known as:

A) Compression

B) Encryption

C) Normalization

D) Authentication

Answer: B) Encryption

Explanation: Encryption uses an algorithm (a cipher) and a key to transform plaintext into ciphertext, providing data confidentiality.

55. In C++, if a base class has a virtual function, and a derived class provides its own implementation of that function, it is known as:

A) Function Overloading

B) Function Overriding

C) Operator Overloading

D) Function Hiding

Answer: B) Function Overriding

Explanation: Function overriding is a key part of runtime polymorphism, allowing the correct version of a function to be called based on the actual type of the object.

56. The `this` pointer in a C++ member function points to:

A) The base class object.

B) The derived class object.

C) The object that invoked the function.

D) The next object in memory.

Answer: C) The object that invoked the function.

Explanation: `this` is an implicit parameter to all non-static member functions that holds the memory address of the current object.

57. A machine learning approach where the algorithm learns from labeled data is called:

A) Unsupervised Learning

B) Supervised Learning

C) Reinforcement Learning

D) Deep Learning

Answer: B) Supervised Learning

Explanation: In supervised learning, the algorithm is trained on a dataset where the input data is paired with the correct output, allowing it to learn a mapping function.

58. The part of the computer hardware that performs arithmetic and logical operations is the:

A) Control Unit (CU)

B) Arithmetic Logic Unit (ALU)

C) Register Array

D) Main Memory

Answer: B) Arithmetic Logic Unit (ALU)

Explanation: The ALU is a fundamental component of the CPU that carries out all the mathematical calculations and logical comparisons.

59. In the Linux file system, the top-level directory is denoted by:

A) /home

B) /root

C) /

D) /bin

Answer: C) /

Explanation: The forward slash `/` represents the root directory, which is the base of the entire file system hierarchy.

60. The SQL keyword used to retrieve data from a database is:

A) GET

B) FETCH

C) RETRIEVE

D) SELECT

Answer: D) SELECT

Explanation: The `SELECT` statement is the primary Data Query Language (DQL) command used to query a database and return a result set.