

Computer Engineering

1. Which of the following is considered the first electronic digital computer?
 - A) ENIAC
 - B) EDVAC
 - C) UNIVAC
 - D) MARK-I

Answer: A) ENIAC

Explanation: ENIAC (Electronic Numerical Integrator and Computer), completed in 1945, was the first large-scale, general-purpose electronic digital computer.

2. A machine learning model that learns by trial and error through receiving rewards or penalties is using:
 - A) Supervised Learning
 - B) Unsupervised Learning
 - C) Reinforcement Learning
 - D) Transfer Learning

Answer: C) Reinforcement Learning

Explanation: Reinforcement learning is a paradigm where an agent learns to make decisions by performing actions in an environment to maximize cumulative reward.

3. The part of the CPU that coordinates the activities of all other computer components is the:
 - A) ALU
 - B) Register
 - C) Control Unit
 - D) System Clock

Answer: C) Control Unit

Explanation: The Control Unit fetches instructions from memory, decodes them, and directs the flow of data between the CPU and other devices.

4. A RAID configuration that provides disk mirroring for fault tolerance is:
 - A) RAID 0

B) RAID 1

C) RAID 5

D) RAID 10

Answer: B) RAID 1

Explanation: RAID 1 (mirroring) writes identical data to two or more drives, providing data redundancy. If one drive fails, the other can be used.

5. The process of organizing columns and tables in a relational database to minimize data redundancy is called:

A) Indexing

B) Normalization

C) Query Optimization

D) Transaction Control

Answer: B) Normalization

Explanation: Normalization involves dividing larger tables into smaller, well-structured tables and defining relationships between them to reduce redundant data.

6. A memory management scheme where a process is swapped out of main memory to secondary storage and then brought back in for continued execution is:

A) Paging

B) Segmentation

C) Swapping

D) Fragmentation

Answer: C) Swapping

Explanation: Swapping is a mechanism used by the operating system to increase the utilization of the CPU by moving idle processes to secondary storage.

7. A system that captures and processes the data generated during an organization's day-to-day business operations is a(n):

A) Decision Support System (DSS)

B) Executive Information System (EIS)

C) Transaction Processing System (TPS)

D) Knowledge Management System (KMS)

Answer: C) Transaction Processing System (TPS)

Explanation: A TPS is focused on capturing and processing high volumes of operational data, such as sales orders, payroll, and inventory changes.

8. The process of identifying the requirements of a new system and developing a plan to create it is:

- A) System Maintenance
- B) System Implementation
- C) System Analysis and Design
- D) System Testing

Answer: C) System Analysis and Design

Explanation: This phase of the SDLC involves understanding the business needs ("what" the system should do) and then defining the technical approach ("how" it will do it).

9. In DOS, which command is used to display the version of the operating system?

- A) VER
- B) VERSION
- C) ABOUT
- D) INFO

Answer: A) VER

Explanation: The `VER` command is a simple utility that prints the version number of the MS-DOS or Windows command-line environment.

10. In Unix, what is the 'pipe' ('|') operator used for?

- A) To redirect output to a file.
- B) To redirect input from a file.
- C) To send the output of one command as the input to another command.
- D) To run a command in the background.

Answer: C) To send the output of one command as the input to another command.

Explanation: Piping is a powerful feature that allows for the creation of complex command chains, for example, `ls -l | grep .txt`.

11. The core principle of a "lights-out" manufacturing environment, where factories are fully automated, is known as:

- A) Computer-Aided Design (CAD)
- B) Computer-Integrated Manufacturing (CIM)
- C) Lean Manufacturing
- D) Six Sigma

Answer: B) Computer-Integrated Manufacturing (CIM)

Explanation: CIM is a manufacturing approach that uses computers to control the entire production process, aiming for high levels of automation and integration.

12. In Linux, which command is used to terminate a running process?

- A) stop
- B) kill
- C) end
- D) terminate

Answer: B) kill

Explanation: The `kill` command sends a signal to a process, typically the TERM (terminate) signal, allowing the process to shut down gracefully.

13. The number system that uses a base of 16 is:

- A) Binary
- B) Octal
- C) Decimal
- D) Hexadecimal

Answer: D) Hexadecimal

Explanation: Hexadecimal uses 16 distinct symbols, 0-9 and A-F, to represent numbers. It is commonly used in computing to represent binary data more concisely.

14. De Morgan's Law in Boolean algebra states that the complement of a product of variables is equal to the:

- A) Product of the complements.
- B) Sum of the complements.
- C) Complement of the sum.
- D) Sum of the variables.

Answer: B) Sum of the complements.

Explanation: De Morgan's Law has two forms: $(A \cdot B)' = A' + B'$ and $(A+B)' = A' \cdot B'$.

15. A network topology where all devices are connected to a central hub or switch is called:

- A) Bus Topology
- B) Ring Topology
- C) Star Topology
- D) Mesh Topology

Answer: C) Star Topology

Explanation: In a star topology, all traffic passes through the central device, which makes it easy to manage and isolate faults.

16. Which layer of the TCP/IP model is responsible for logical addressing and routing?

- A) Application Layer
- B) Transport Layer
- C) Internet Layer
- D) Network Interface Layer

Answer: C) Internet Layer

Explanation: The Internet Layer, corresponding to the Network Layer in the OSI model, handles packet addressing (IP addresses) and routing through the network.

17. A Zener diode is specifically designed to operate in which region of its characteristic curve?

- A) Forward bias region
- B) Reverse breakdown region
- C) Saturation region
- D) Cut-off region

Answer: B) Reverse breakdown region

Explanation: Zener diodes are used for voltage regulation because they exhibit a constant voltage drop when operated in reverse breakdown.

18. What is the main function of a rectifier circuit?

- A) To convert AC to DC.

B) To convert DC to AC.

C) To amplify a signal.

D) To regulate voltage.

Answer: A) To convert AC to DC.

Explanation: A rectifier uses diodes to block or redirect alternating current, resulting in a pulsating direct current output that can then be smoothed.

19. In Windows NT, the system that manages user accounts, security policies, and resources in a network is the:

A) File System

B) Domain

C) Workgroup

D) Registry

Answer: B) Domain

Explanation: A Windows NT Domain provides centralized administration and security for a network of computers, managed by a Domain Controller.

20. A program that is in a state of execution is called a:

A) Program

B) Process

C) Thread

D) Task

Answer: B) Process

Explanation: A process is an instance of a computer program that is being executed. It contains the program code and its current activity.

21. In Windows 2000 Server, which service is responsible for automatically assigning IP addresses to clients on a network?

A) DNS (Domain Name System)

B) WINS (Windows Internet Name Service)

C) DHCP (Dynamic Host Configuration Protocol)

D) NAT (Network Address Translation)

Answer: C) DHCP (Dynamic Host Configuration Protocol)

Explanation: A DHCP server simplifies network administration by leasing IP addresses and other configuration information to devices as they join the network.

22. The ability of a programming language to have multiple functions with the same name but different parameter lists is called:

- A) Function Overriding
- B) Function Overloading
- C) Operator Overloading
- D) Polymorphism

Answer: B) Function Overloading

Explanation: Function overloading allows for the creation of several functions with the same name which perform similar tasks on different types or numbers of arguments.

23. In C++, a variable that is declared with the `static` keyword inside a function:

- A) Is accessible from other files.
- B) Retains its value between function calls.
- C) Must be initialized with a constant value.
- D) Is allocated on the heap.

Answer: B) Retains its value between function calls.

Explanation: A static local variable is initialized only once and persists for the lifetime of the program, unlike regular local variables which are destroyed on function exit.

24. What will be the output of the following C++ code?

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

```
```cpp
#include <iostream>

int main() {
 for (int i = 0; i < 5; i++) {
 if (i == 2) {
 continue;
 }
 cout << i;
 }
}
```

```
 }
 std::cout << i << " ";
}
return 0;
}
...
```

A) 0 1 2 3 4

B) 0 1 3 4

C) 0 1

D) 0 1 2

Answer: B) 0 1 3 4

Explanation: The `continue` statement skips the rest of the loop's body for the current iteration (when `i` is 2) and proceeds to the next iteration.

25. The field of AI concerned with enabling computers to understand and process human language is:

A) Computer Vision

B) Robotics

C) Natural Language Processing (NLP)

D) Expert Systems

Answer: C) Natural Language Processing (NLP)

Explanation: NLP is a subfield of AI that deals with the interaction between computers and humans using natural language.

26. Cache memory works on the principle of:

A) Locality of Reference

B) First-In, First-Out (FIFO)

C) Last-In, First-Out (LIFO)

D) Hashing

Answer: A) Locality of Reference

Explanation: This principle states that recently accessed data or nearby data is likely to be accessed again soon. Cache stores this data for faster access.

27. The SQL command to remove a table from a database is:

- A) DELETE TABLE
- B) REMOVE TABLE
- C) DROP TABLE
- D) ERASE TABLE

Answer: C) DROP TABLE

Explanation: `DROP TABLE` is a DDL command that permanently deletes a table, including its structure, data, and indexes.

28. The technique of dividing main memory into fixed-size blocks is called:

- A) Paging
- B) Segmentation
- C) Partitioning
- D) Spooling

Answer: A) Paging

Explanation: In paging, both main memory (as frames) and a process's logical address space (as pages) are divided into equal-sized blocks to facilitate non-contiguous memory allocation.

29. The command `cd ..` in DOS/Unix/Linux is used to:

- A) Change to the root directory.
- B) Change to the previous directory you were in.
- C) Change to the parent directory (one level up).
- D) Create a new directory.

Answer: C) Change to the parent directory (one level up).

Explanation: `..` is a special directory entry that represents the parent directory in the file system hierarchy.

30. In system design, a diagram that shows the relationships between different entities in a system is a(n):

- A) Data Flow Diagram (DFD)

B) Flowchart

C) Entity-Relationship Diagram (ERD)

D) Structure Chart

Answer: C) Entity-Relationship Diagram (ERD)

Explanation: An ERD is a key tool in database design that visually represents the database's entities (tables) and the relationships between them.

31. In Linux, the `/etc` directory is primarily used for:

A) User home directories.

B) System configuration files.

C) Essential user command binaries.

D) Temporary files.

Answer: B) System configuration files.

Explanation: The `/etc` directory contains most of the system-wide configuration files and shell scripts that are run at boot time.

32. The smallest unit of information a computer can process is a:

A) Byte

B) Bit

C) Nibble

D) Word

Answer: B) Bit

Explanation: A bit (binary digit) is the most basic unit and can have a value of either 0 or 1.

33. Which protocol is used to send email?

A) HTTP (Hypertext Transfer Protocol)

B) FTP (File Transfer Protocol)

C) SMTP (Simple Mail Transfer Protocol)

D) POP3 (Post Office Protocol 3)

Answer: C) SMTP (Simple Mail Transfer Protocol)

Explanation: SMTP is the standard protocol for sending email from an email client to an email server. POP3 and IMAP are used for retrieving email.

34. A PN junction diode allows current to flow primarily:

- A) In both directions.
- B) From the N-type to the P-type material.
- C) From the P-type to the N-type material.
- D) When it is reverse biased.

Answer: C) From the P-type to the N-type material.

Explanation: A diode acts as a one-way gate for current. When forward-biased (positive voltage on P-type), it conducts easily; when reverse-biased, it blocks current.

35. The part of a compiler that performs tasks like removing comments and expanding macros is the:

- A) Lexical Analyzer
- B) Parser
- C) Code Generator
- D) Preprocessor

Answer: D) Preprocessor

Explanation: The preprocessor is the first step in compilation, which processes directives (like `#include` and `#define` in C++) before the actual compilation begins.

36. In object-oriented programming, creating a new class by acquiring the properties of an existing class is called:

- A) Encapsulation
- B) Polymorphism
- C) Inheritance
- D) Abstraction

Answer: C) Inheritance

Explanation: Inheritance promotes code reuse by allowing a new class (derived class) to be based on an existing class (base class).

37. A constructor that takes no arguments is called a:

- A) Parameterized Constructor
- B) Copy Constructor

C) Default Constructor

D) Friend Constructor

Answer: C) Default Constructor

Explanation: A default constructor is called when an object is created without any arguments. If you don't provide one, the compiler may generate one for you.

38. A neural network is a type of AI model inspired by:

A) The human brain.

B) Genetic evolution.

C) Swarm behavior.

D) Statistical mechanics.

Answer: A) The human brain.

Explanation: Artificial neural networks are composed of interconnected nodes (neurons) that process information in a way that is loosely analogous to the human brain.

39. The process of the operating system saving the state of the currently running process and restoring the state of the next process is known as:

A) Context Switch

B) Interrupt

C) System Call

D) Spooling

Answer: A) Context Switch

Explanation: A context switch is an essential feature of a multitasking operating system that allows multiple processes to share a single CPU.

40. Which DOS command is used to format a disk and create a new file system?

A) CHKDSK

B) FORMAT

C) DEFrag

D) SCANDISK

Answer: B) FORMAT

Explanation: The `FORMAT` command prepares a storage medium, like a floppy disk or hard drive partition, for use by erasing all data and setting up a file system.

41. The standard shell for most Linux distributions is:

- A) C Shell (csh)
- B) Korn Shell (ksh)
- C) Bourne Shell (sh)
- D) Bash (Bourne Again Shell)

Answer: D) Bash (Bourne Again Shell)

Explanation: Bash is an enhanced version of the original Bourne shell and has become the de facto standard for interactive use on Linux systems.

42. A Karnaugh map (K-map) is a graphical method used for:

- A) Designing logic circuits.
- B) Simplifying Boolean expressions.
- C) Analyzing network traffic.
- D) Visualizing data structures.

Answer: B) Simplifying Boolean expressions.

Explanation: A K-map is a tool used to simplify Boolean algebra expressions by visually grouping terms to find the simplest logical form.

43. A MAC address is a unique identifier assigned to a:

- A) Network
- B) Router
- C) Network Interface Card (NIC)
- D) IP Packet

Answer: C) Network Interface Card (NIC)

Explanation: The Media Access Control (MAC) address is a hardware address that uniquely identifies each node on a local network. It operates at the Data Link Layer.

44. In C++, which operator is used for dynamic memory allocation?

- A) `alloc`
- B) `new`
- C) `malloc`

D) `create`

Answer: B) `new`

Explanation: The `new` operator allocates memory from the heap for an object or an array of objects and returns a pointer to that memory.

45. The `ls -a` command in Unix/Linux will:

- A) List files in long format.
- B) List all files, including hidden files.
- C) List files sorted by access time.
- D) List directories only.

Answer: B) List all files, including hidden files.

Explanation: Hidden files in Unix-like systems have names that begin with a dot (`.`), and the `-a` flag tells `ls` to include them in the listing.

46. An SQL `JOIN` clause is used to:

- A) Add new rows to a table.
- B) Combine rows from two or more tables based on a related column.
- C) Filter records based on a condition.
- D) Sort the result set.

Answer: B) Combine rows from two or more tables based on a related column.

Explanation: Joins are a fundamental part of relational databases, allowing for the retrieval of data that spans multiple tables.

47. A function in C++ that is declared within a class with the `friend` keyword:

- A) Is a member of the class.
- B) Can access the private and protected members of the class.
- C) Cannot be called from outside the class.
- D) Must be defined within the class.

Answer: B) Can access the private and protected members of the class.

Explanation: A friend function is a non-member function that is granted special access to the private and protected members of a class.

48. A firewall is a network security device that:

- A) Encrypts network traffic.
- B) Monitors and filters incoming and outgoing network traffic.
- C) Detects viruses and malware.
- D) Assigns IP addresses.

Answer: B) Monitors and filters incoming and outgoing network traffic.

Explanation: A firewall acts as a barrier between a trusted internal network and an untrusted external network, enforcing a set of security rules.

49. An operating system's ability to run more than one task at a time is called:

- A) Multitasking
- B) Multithreading
- C) Multiprocessing
- D) Multiprogramming

Answer: A) Multitasking

Explanation: Multitasking allows a user to perform more than one computer task concurrently by sharing common processing resources, such as a CPU.

50. What does IDE stand for in the context of computer hardware?

- A) Integrated Drive Electronics
- B) Intelligent Device Equipment
- C) Internal Digital Engine
- D) Integrated Development Environment

Answer: A) Integrated Drive Electronics

Explanation: IDE (later standardized as ATA) was a common interface standard used to connect storage devices like hard drives and CD-ROM drives to the motherboard.

51. A Feasibility Study in system analysis is conducted to determine if a proposed system is:

- A) Technically, economically, and operationally viable.
- B) Well-designed and user-friendly.
- C) Fully tested and bug-free.
- D) Compliant with all legal standards.

Answer: A) Technically, economically, and operationally viable.

Explanation: This study is a critical part of the initial planning phase to assess the practicality and justification for a new project before committing significant resources.

52. In digital electronics, a circuit that can store a single bit of data is a:

- A) Multiplexer
- B) Decoder
- C) Flip-Flop
- D) Logic Gate

Answer: C) Flip-Flop

Explanation: A flip-flop is the basic storage element in sequential logic, holding a state of either 0 or 1.

53. Which of the following is a key feature of the Unix/Linux operating system design?

- A) A monolithic graphical user interface.
- B) Treating everything as a file.
- C) A mandatory registry for configuration.
- D) A single-user, single-tasking environment.

Answer: B) Treating everything as a file.

Explanation: A core philosophy of Unix is that devices, services, and system resources can be accessed through the file system, providing a unified interface.

54. The process of loading the operating system into memory when a computer is turned on is known as:

- A) Compiling
- B) Linking
- C) Booting
- D) Paging

Answer: C) Booting

Explanation: The boot process involves firmware (like BIOS or UEFI) initializing hardware and then loading the OS kernel from a storage device into RAM.

55. In Windows 2000, what is the purpose of the Registry?

- A) To store user documents.
- B) A hierarchical database for storing low-level settings for the OS and applications.
- C) To log system events and errors.
- D) To manage network connections.

Answer: B) A hierarchical database for storing low-level settings for the OS and applications.

Explanation: The Registry is a central repository for configuration data, hardware information, and user preferences.

56. An object that is thrown in response to an exceptional circumstance in a program is a(n):

- A) Error
- B) Signal
- C) Exception
- D) Alert

Answer: C) Exception

Explanation: Exception handling is a mechanism in languages like C++ to manage runtime errors in a structured way, by throwing an exception at the point of the error and catching it elsewhere.

57. A pointer in C++ that is pointing to a memory location that is no longer valid is called a:

- A) Null Pointer
- B) Void Pointer
- C) Wild Pointer
- D) Dangling Pointer

Answer: D) Dangling Pointer

Explanation: A dangling pointer arises when an object is deleted or de-allocated, without modifying the value of the pointer, so that the pointer still points to the memory location of the de-allocated memory.

58. What is the decimal value of the binary number 1101?

- A) 11
- B) 12
- C) 13
- D) 14

Answer: C) 13

Explanation: The value is calculated as  $(1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) = 8 + 4 + 0 + 1 = 13$ .

59. An Application Programming Interface (API) is:

- A) A complete software application.
- B) A hardware interface for connecting peripherals.
- C) A set of rules and tools for building software applications.
- D) A user interface for an operating system.

Answer: C) A set of rules and tools for building software applications.

Explanation: An API defines how software components should interact, allowing developers to use pre-built functionality without needing to know the implementation details.

60. The process of translating a high-level language into a lower-level language, but not necessarily machine code, is done by a:

- A) Compiler
- B) Transpiler
- C) Interpreter
- D) Linker

Answer: B) Transpiler

Explanation: A transpiler, or source-to-source compiler, translates source code from one high-level language (e.g., TypeScript) to another (e.g., JavaScript).