GATE CS Question paper with solution

Ques 1. What is the time complexity of binary search on a sorted array of size n?

Answer. O(logn)

Solution. Explanation: Binary search works by repeatedly dividing the search space in half. Initially, it compares the target element with the middle element of the array. Based on whether the target is larger or smaller, it eliminates half of the remaining elements from consideration

Ques 2. In a graph, if all nodes are reachable from any node, what property does this graph exhibit?

Answer. Strongly Connected

Solution. Explanation: A strongly connected graph is one where, for every pair of nodes u and v, there is a path from u to v and also a path from v to u. In other words, it is possible to travel between any two nodes in both directions.

Ques 3. Consider a function that takes a string as input and reverses it recursively. What is the time complexity of this function for an input string of length n?

Answer. O(n)

Solution. Explanation: Recursively reversing a string involves swapping the first and last characters, then recursively reversing the remaining substring (excluding the first and last characters).

Ques 4. What is dynamic programming, and how does it optimize the solution of problems?

Answer. Dynamic Programming (DP) is a technique used to solve complex problems by breaking them down into simpler subproblems, solving each subproblem once, and storing its result.

Solution: In dynamic programming, problems that exhibit the property of overlapping subproblems (i.e., subproblems that are solved multiple times) and optimal substructure (i.e., an optimal solution to a problem can be composed of optimal solutions to its

subproblems) can be efficiently solved by remembering the results of already-solved subproblems.

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Ques 6. Window dressing is a practice?

Answer. To manipulate accounts to show a better picture of the financial position than the actual one.

Solution.Explanation: Window Dressing refers to manipulation of accounts for presenting the financial statements in a way to show a better position than the actual.

Ques 7.In a directed graph, what does it mean for the graph to be strongly connected?

Answer.Every vertex is reachable from every other vertex.

Solution.Explanation A directed graph is considered strongly connected if, for every pair of vertices u and v, there exists a directed path from u to v and a path from v to u. This property ensures that you can traverse the graph in both directions between any two vertices.

Ques 8. What is the difference between a process and a thread?

Answer. A process is an independent program in execution, while a thread is a smaller unit of a process that can run concurrently.

Solution. Explanation: Processes are separate entities with their own memory space and system resources. They communicate via inter-process communication (IPC) mechanisms. Threads, on the other hand, share the same memory space within a process and are more lightweight, allowing for easier and faster context switching.

Ques 9. What is a deadlock in operating systems?

Answer. A situation where two or more processes are unable to proceed because each is waiting for the other to release a resource.

Solution.Explanation: Deadlocks can be prevented or avoided using strategies like resource allocation graphs or timeout mechanisms.

Ques 10. Explain the concept of cache memory.

Answer. A small-sized type of volatile computer memory that provides high-speed data access to the CPU

Solution. Explanation: Cache stores frequently accessed data and instructions, improving overall system performance by reducing access time.

Ques 11. What is a database transaction?

Answer. A sequence of operations performed as a single logical unit of work.

Solution. Explanation: Transactions must be atomic, consistent, isolated, and durable (ACID properties).

Ques 12. What is a stack?

Answer. A data structure that follows the Last In First Out (LIFO) principle.

Solution. Explanation: Operations like push (adding an item) and pop (removing the top item) are performed at one end of the stack

Ques 13. Explain the difference between TCP and UDP.

Answer. TCP is a connection-oriented protocol, while UDP is connectionless.

Solution.Explanation: TCP ensures reliable transmission with error-checking, while UDP provides faster but less reliable communication.

Ques 14. What is the function of an operating system's kernel?

Answer. To manage system resources and allow software to communicate with hardware.

Solution. Explanation: The kernel is the core component of an OS, handling memory management, process scheduling, and hardware interaction.

Ques 15. Explain the term "asymptotic analysis.

Answer. A method of describing the behavior of a function as its argument approaches a limit, often infinity.

Solution. Explanation: Asymptotic analysis helps in comparing the efficiency of algorithms.

Ques 16. Explain the difference between supervised and unsupervised learning.

Answer. Supervised learning uses labeled data to train models, while unsupervised learning works with unlabeled data.

Solution. Explanation: Supervised learning aims to predict outcomes, while unsupervised learning identifies patterns or groupings within the data.

Ques 17. What is a software development life cycle (SDLC)?

Answer. A process for planning, creating, testing, and deploying software.

Solution.Explanation: The SDLC consists of several phases, including requirements analysis, design, implementation, testing, and maintenance.

Ques 18. What is an operating system's scheduler?

Answer. A component that manages the execution of processes.

Solution. Explanation: The scheduler allocates CPU time to various processes and ensures fair resource distribution

Ques 19. What is the difference between symmetric and asymmetric encryption?

Answer. Symmetric encryption uses the same key for encryption and decryption, while asymmetric encryption uses a pair of keys.

Solution. Symmetric encryption is faster and suitable for large data volumes, while asymmetric encryption is more secure for key exchange.

Ques 20. What is cloud computing?

Answer. The delivery of computing services over the internet.

Solution. Cloud computing enables on-demand access to shared resources, including servers, storage, and applications.