

Andhra Pradesh State Council of Higher Education

Notations :

- 1.Options shown in green color and with ✓ icon are correct.
- 2.Options shown in red color and with ✗ icon are incorrect.

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Computer Science and Information Technology

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Computer Science and Information Technology

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Sub-Section Number :	1
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Question Number : 1 Question Id : 7520766601 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

How many different 5-character passwords can be formed using the digits 0-9 and lowercase letters a-z if the first character must be a letter and repetitions are allowed?

Options :

1. ✓ 26×36^4
2. ✗ 36^5
3. ✗ 26×35^4
4. ✗ $26 \times 10 \times 36^3$

Question Number : 2 Question Id : 7520766602 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The number of ways to distribute 10 identical apples among 4 children such that every child receives at least one apple is:

Options :

1. ✗ ${}^{13}C_3$
2. ✓ 9C_3
3. ✗

$${}^{10}C_4$$

4. ✘ ${}^{14}C_4$

Question Number : 3 Question Id : 7520766603 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

For a connected planar graph with 10 vertices and 15 edges, how many faces does the graph have?

Options :

1. ✘ 5

2. ✘ 6

3. ✔ 7

4. ✘ 8

Question Number : 4 Question Id : 7520766604 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Two graphs G_1 and G_2 are isomorphic if which of the following conditions is satisfied?

Options :

1. ✘ Both graphs have the same number of vertices only

2. ✘ Both graphs have the same number of edges only

3. ✔ There exists a one-to-one correspondence between their vertices that preserves adjacency

4. ✘ Both graphs have the same number of vertices but different edges

Question Number : 5 Question Id : 7520766605 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A graph is said to be Eulerian if it contains a closed trail that includes every:

Options :

1. ✘ Vertex exactly once.
2. ✔ Edge exactly once.
3. ✘ Vertex at least once.
4. ✘ Edge at most once.

Question Number : 6 Question Id : 7520766606 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If a graph G has 10 vertices and each vertex has degree 3, how many edges does G have?

Options :

1. ✘ 30
2. ✔ 15
3. ✘ 10
4. ✘ 20

Question Number : 7 Question Id : 7520766607 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a simple undirected graph, the sum of the degrees of all vertices is 20. How many edges are present in the graph?

Options :

1. ✘ 8
2. ✔ 10
3. ✘ 12
4. ✘ 20

Question Number : 8 Question Id : 7520766608 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following propositions is logically equivalent to $p \rightarrow q$?

Options :

1. ✘ $p \wedge q$
2. ✔ $\neg p \vee q$
3. ✘ $p \vee q$
4. ✘ $\neg q \rightarrow \neg p$

Question Number : 9 Question Id : 7520766609 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following circuits is a sequential circuit?

Options :

1. ✘ Multiplexer
2. ✘

Decoder

3. ✓ Flip-Flop

4. ✗ Adder

Question Number : 10 Question Id : 7520766610 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the 2's complement representation of the decimal number-5 in 8-bit binary?

Options :

1. ✗ 00000101

2. ✓ 11111011

3. ✗ 11111010

4. ✗ 00000110

Question Number : 11 Question Id : 7520766611 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In which addressing mode does the instruction contain the actual operand value itself rather than the address of operand?

Options :

1. ✗ Direct Addressing

2. ✗ Indirect Addressing

3. ✓ Immediate Addressing

4. ✘ Register Addressing

Question Number : 12 Question Id : 7520766612 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following statements about Arithmetic Logic Unit (ALU) is correct?

Options :

1. ✘ ALU stores instructions permanently.
2. ✔ ALU performs arithmetic and logical operations on data.
3. ✘ ALU controls the execution of programs.
4. ✘ ALU is responsible for input and output operations.

Question Number : 13 Question Id : 7520766613 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In CPU Control design, what is the primary difference between hardwired control and micro programmed control?

Options :

1. ✘ Hardwired control uses software programs, while micro programmed control used combinational circuits.
2. ✔ Hardwired control is faster but less flexible, while micro programmed control is slower but easier to modify.
3. ✘ Hardwired control cannot execute arithmetic operations, while micro programmed control can.
4. ✘

Hardwired control uses registers for control signals, while microprogrammed control does not.

Question Number : 14 Question Id : 7520766614 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following statements about linked lists is true?

Options :

1. ✘ Elements of a linked list are stored in contiguous memory locations.
2. ✘ Accessing the n^{th} element of a linked list takes $O(1)$ time.
3. ✔ In a singly linked list, each node contains a data part and a pointer to the next node.
4. ✘ A linked list cannot be dynamically resized.

Question Number : 15 Question Id : 7520766615 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A connected undirected graph has 8 vertices and 12 edges. How many edges will its spanning tree contain?

Options :

1. ✘ 6
2. ✔ 7
3. ✘ 8
4. ✘ 12

Question Number : 16 Question Id : 7520766616 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

An algorithm repeatedly divides a problem into smaller sub-problems, solves them independently, and combines the results to obtain the final solution. Determine the algorithm that follows this strategy.

Options :

1. ✘ Linear search
2. ✔ Binary search
3. ✘ Breadth First search
4. ✘ Bubble sort

Question Number : 17 Question Id : 7520766617 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Consider the linear search algorithm on an array of size ' n '. What is the worst-case time complexity of linear search?

Options :

1. ✘ $O(1)$
2. ✘ $O(\log n)$
3. ✔ $O(n)$
4. ✘ $O(n^2)$

Question Number : 18 Question Id : 7520766618 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A grammar is given:

$$E \rightarrow E + T \mid TT \rightarrow T * F \mid FF \rightarrow (E) \mid id$$

For the input: $id + id * id$, What is the correct interpretation?

Options :

1. ✘ $(id + id) * id$
2. ✔ $id + (id * id)$
3. ✘ $(id + id * id)$
4. ✘ Ambiguous expression

Question Number : 19 Question Id : 7520766619 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A program allocates memory dynamically using *malloc()* and does not free it.

After repeated execution, what is the most likely outcome?

Options :

1. ✘ Deadlock
2. ✔ Memory Leak
3. ✘ Thrashing
4. ✘ Starvation

Question Number : 20 Question Id : 7520766620 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following is TRUE about the Quick Sort algorithm?

Options :

1. ✘

It is a stable sorting algorithm.

2. ✘ Its worst-case complexity is $O(n \log n)$.
3. ✔ Its performance depends heavily on the choice of the pivot.
4. ✘ It requires $O(n)$ auxiliary space for merging.

Question Number : 21 Question Id : 7520766621 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The Huffman coding algorithm used for data compression is based on which algorithmic strategy?

Options :

1. ✘ Divide and Conquer
2. ✘ Dynamic Programming
3. ✘ Backtracking
4. ✔ Greedy Method

Question Number : 22 Question Id : 7520766622 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following parameter passing mechanisms allows a function to modify the actual variable in the calling function?

Options :

1. ✘ Pass by value
2. ✘ Pass by constant
3. ✔ Pass by reference

4. ✘ Pass by result

Question Number : 23 Question Id : 7520766623 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a circular queue implemented using an array of size MAX , if ' $front$ ' and ' $rear$ ' are the indices, the condition for the queue being full is:

Options :

1. ✔ $(rear + 1) \% MAX == front$
2. ✘ $rear == MAX - 1$
3. ✘ $front == (rear + 1)$
4. ✘ $front == 0 \ \&\& \ rear == MAX$

Question Number : 24 Question Id : 7520766624 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which data structure is used by the compiler to manage function calls and local variables (Activation Records)?

Options :

1. ✘ Queue
2. ✘ Linked List
3. ✔ Stack
4. ✘ Heap

Question Number : 25 Question Id : 7520766625 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Boolean algebra is mainly used in which area?

Options :

1. ✘ Database design
2. ✘ Sorting algorithms
3. ✔ Circuit design
4. ✘ Graph theory

Question Number : 26 Question Id : 7520766626 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which data structure allows insertion and deletion at both ends?

Options :

1. ✘ Stack
2. ✘ Queue
3. ✔ Deque
4. ✘ Array

Question Number : 27 Question Id : 7520766627 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which tree traversal visits left subtree, root, then right subtree?

Options :

1. ✘ Preorder
2. ✔ Inorder
3. ✘ Postorder

4. ✘ Level order

Question Number : 28 Question Id : 7520766628 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which data structure is used to implement priority scheduling?

Options :

1. ✘ Stack

2. ✘ Queue

3. ✔ Priority queue

4. ✘ Linked list

Question Number : 29 Question Id : 7520766629 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which data structure is used for level order traversal in trees?

Options :

1. ✘ Stack

2. ✔ Queue

3. ✘ Array

4. ✘ Tree

Question Number : 30 Question Id : 7520766630 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which sorting algorithm has the best-case time complexity of $O(n)$ when the input array is already sorted?

Options :

1. ✘ Merge Sort
2. ✘ Quick Sort
3. ✔ Insertion Sort
4. ✘ Heap Sort

Question Number : 31 Question Id : 7520766631 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The Bellman-Ford algorithm is preferred over Dijkstra's algorithm when the graph contains:

Options :

1. ✘ Positive weight cycles
2. ✘ Large number of nodes
3. ✔ Negative weight edges
4. ✘ Disconnected components

Question Number : 32 Question Id : 7520766632 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the time complexity of the optimal solution for the 0/1 Knapsack problem with n items and capacity W using Dynamic Programming?

Options :

1. ✘ $O(n + W)$
2. ✔

$O(nW)$

3. ✘ $O(2^n)$

4. ✘ $O(W^2)$

Question Number : 33 Question Id : 7520766633 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A statement that is always false regardless of truth values is called _____

Options :

1. ✔ Contradiction

2. ✘ Tautology

3. ✘ Condition

4. ✘ Implication

Question Number : 34 Question Id : 7520766634 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which circuit produces output only based on current inputs without memory?

Options :

1. ✘ Sequential circuit

2. ✔ Combinational circuit

3. ✘ Register circuit

4. ✘ Flip-flop circuit

Question Number : 35 Question Id : 7520766635 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a singly linked list, what is the time complexity to delete a node given a pointer to that specific node?

Options :

1. ✘ $O(1)$

2. ✔ $O(n)$

3. ✘ $O(\log n)$

4. ✘ $O(n^2)$

Question Number : 36 Question Id : 7520766636 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The problem solving technique which divides a problem into smaller sub problems and then combines their results _____

Options :

1. ✘ Greedy

2. ✘ Backtracking

3. ✔ Divide and conquer

4. ✘ Brute force

Question Number : 37 Question Id : 7520766637 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which algorithm is commonly used to find a minimum spanning tree?

Options :

1. ✓ Prim's
2. ✗ Dijkstra
3. ✗ Binary search
4. ✗ DFS

Question Number : 38 Question Id : 7520766638 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Name the notation that represents the average-case complexity of an algorithm.

Options :

1. ✗ Big O
2. ✗ Little o
3. ✗ Big Omega
4. ✓ Big Theta

Question Number : 39 Question Id : 7520766639 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which time complexity grows the slowest as input size increases?

Options :

1. ✗ $O(n)$
2. ✓ $O(\log n)$

3. ✘ $O(n^2)$

4. ✘ $O(2^n)$

**Question Number : 40 Question Id : 7520766640 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0**

Which of the following is true about a good hash function?

Options :

1. ✘ It always produces the same hash value for different keys.

2. ✔ It distributes keys uniformly across the hash table.

3. ✘ It always results in hash collisions.

4. ✘ It requires storing all keys in contiguous memory locations.

**Question Number : 41 Question Id : 7520766641 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0**

What type of automaton is mainly used for simple pattern matching?

Options :

1. ✔ DFA

2. ✘ PDA

3. ✘ Turing machine

4. ✘ Grammar

Question Number : 42 Question Id : 7520766642 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which type of grammar is mainly used in programming languages?

Options :

1. ✘ Regular
2. ✔ Context free
3. ✘ Unrestricted
4. ✘ Linear

Question Number : 43 Question Id : 7520766643 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Name the computational model that can simulate both PDA and DFA?

Options :

1. ✘ PDA
2. ✘ DFA
3. ✘ Compiler
4. ✔ Turing machine

Question Number : 44 Question Id : 7520766644 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a deterministic finite automaton, the behaviour of transitions is strictly defined for every input symbol at each state. Identify the statement that correctly describes this property.

Options :

1. ✘ DFA can have ϵ (epsilon) transitions.

2. ✘ DFA can recognize all context -free languages.
3. ✔ DFA has exactly one transition for each symbol from every state.
4. ✘ DFA can have multiple start states.

Question Number : 45 Question Id : 7520766645 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Consider the language $L = \{a^n b^n \mid n \geq 0\}$

Choose the computational model that can recognize this language.

Options :

1. ✘ Finite Automata
2. ✔ Pushdown Automata
3. ✘ Turing Machine with no Stack
4. ✘ Linear Search Algorithm

Question Number : 46 Question Id : 7520766646 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A pushdown automaton differs from a finite automaton due to the presence of a _____ that helps in handling nested structures.

Options :

1. ✘ Queue
2. ✔ Stack
3. ✘ Heap
4. ✘

Register

Question Number : 47 Question Id : 7520766647 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

If a language L and its complement L' are both Recursively Enumerable (RE), then L is:

Options :

1. ✘ Context-sensitive
2. ✔ Recursive
3. ✘ Not accepted by any Turing Machine
4. ✘ Universal

Question Number : 48 Question Id : 7520766648 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

According to the Rice's Theorem, any non-trivial property of the language recognized by a Turing Machine is:

Options :

1. ✘ Decidable.
2. ✔ Undecidable.
3. ✘ Context-free
4. ✘ Recursive

Question Number : 49 Question Id : 7520766649 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which class of problem solving is considered the easiest one?

Options :

1. ✘ NP
2. ✘ NP-hard
3. ✔ P
4. ✘ Complex

Question Number : 50 Question Id : 7520766650 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A lexical analyser processes the input string

`int x = a + 10;` How many tokens are generated?

Options :

1. ✘ 5
2. ✘ 6
3. ✔ 7
4. ✘ 8

Question Number : 51 Question Id : 7520766651 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A program requires more memory than the available physical memory. The system allows execution by loading only required parts of the program into memory while keeping the rest on disk. This mechanism is known as?

Options :

1. ✘

Paging

2. ✓ Virtual Memory
3. ✗ Deadlock
4. ✗ Multiprocessing

Question Number : 52 Question Id : 7520766652 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which type of graph does not contain any cycles?

Options :

1. ✗ Complete graph
2. ✗ Directed graph
3. ✓ Tree
4. ✗ Weighted graph

Question Number : 53 Question Id : 7520766653 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Consider the code

$$X = a * 2$$

$$Y = a * 2$$

After optimization, what is the most efficient transformation?

Options :

1. ✗ Keep both statements unchanged
2. ✗

Replace multiplication with addition

3. ✓ Compute once and reuse result
4. ✗ Remove both statements

Question Number : 54 Question Id : 7520766654 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a compiler, which phase is responsible for identifying the token types from the source program's stream of characters?

Options :

1. ✗ Syntax Analysis
2. ✗ Semantic Analysis
3. ✓ Lexical Analysis
4. ✗ Intermediate Code Generation

Question Number : 55 Question Id : 7520766655 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following statements is TRUE regarding LL(1) grammars?

Options :

1. ✗ A grammar with left recursion can be LL(1).
2. ✓ Every LL(1) grammar is also LR(1).
3. ✗ LL(1) parsers are bottom-up parsers.
4. ✗ Ambiguous grammars can be LL(1).

Question Number : 56 Question Id : 7520766656 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In Syntax Directed Translation (SDT), an attribute is called "inherited" if its value at a node in the parse tree is defined in terms of attributes at:

Options :

1. ✘ Its children only.
2. ✔ Its parent and/or its siblings.
3. ✘ Its left child only.
4. ✘ Its descendants only.

Question Number : 57 Question Id : 7520766657 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following intermediate code representations is typically used to represent expressions where each instruction has at most three operands?

Options :

1. ✘ Postfix Notation
2. ✘ Syntax Trees
3. ✔ Three Address Code
4. ✘ Directed Acyclic Graph

Question Number : 58 Question Id : 7520766658 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In the context of code optimization, "*Loop Invariant Code Motion*" refers to:

Options :

1. ✘

Removing loops that never execute.

2. ✓ Moving computations that yield the same result regardless of the loop iteration outside the loop.
3. ✗ Replacing expensive operations with cheaper ones inside a loop.
4. ✗ Combining two loops into a single loop.

Question Number : 59 Question Id : 7520766659 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A handle in a bottom-up parser is a substring that matches the right-hand side of a production and whose reduction represents:

Options :

1. ✗ The next step in a derivation.
2. ✓ One step in the reverse of a rightmost derivation.
3. ✗ The leftmost leaf of the parse tree.
4. ✗ A terminal symbol to be shifted.

Question Number : 60 Question Id : 7520766660 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which phase of a compiler checks variable declaration?

Options :

1. ✗ Lexical
2. ✗ Syntax
3. ✓ Semantic

4. ✘ Code generation

Question Number : 61 Question Id : 7520766661 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A system has 4 redundant units of a resource. There are 3 processes, each requiring 2 units of the resource. Which of the following is TRUE?

Options :

1. ✘ Deadlock is certain to occur.
2. ✔ Deadlock can never occur.
3. ✘ Deadlock occurs only if all processes request resources at the same time.
4. ✘ The system is in an unsafe state.

Question Number : 62 Question Id : 7520766662 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

"*Belady's Anomaly*" refers to the phenomenon where the page fault rate increases as the number of allocated page frames increases. This is observed in which page replacement algorithm?

Options :

1. ✘ Optimal (OPT)
2. ✘ Least Recently Used (LRU)
3. ✔ First-In-First-Out (FIFO)
4. ✘ Stack-based algorithms

Question Number : 63 Question Id : 7520766663 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In an I/O system, "Direct Memory Access (DMA)" is used to:

Options :

1. ✘ Allow the CPU to execute I/O instructions faster.
2. ✔ Transfer data between I/O devices and memory without continuous CPU intervention.
3. ✘ Synchronize the speeds of the CPU and the disk.
4. ✘ Prevent deadlocks in peripheral devices.

Question Number : 64 Question Id : 7520766664 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Consider the following C function:

```
int fun(int n){  
    if (n == 0)  
        return 0;  
    else  
        return n + fun (n -1);  
}
```

What does the function *fun* (4) return?

Options :

1. ✘ 4
2. ✔ 10
3. ✘ 24

4. ✘ 16

Question Number : 65 Question Id : 7520766665 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Three processes arrive at time 0 with burst times 5, 3, and 1 unit respectively. The scheduler always selects the process with the smallest burst time next. The order of execution will be?

Options :

1. ✘ 5 → 3 → 1

2. ✔ 1 → 3 → 5

3. ✘ 3 → 1 → 5

4. ✘ 1 → 5 → 3

Question Number : 66 Question Id : 7520766666 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which memory technique creates the illusion of larger memory?

Options :

1. ✔ Virtual memory

2. ✘ Cache

3. ✘ Register

4. ✘ Buffer

Question Number : 67 Question Id : 7520766667 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the "Thrashing" phenomenon in virtual memory systems?

Options :

1. ✘ High CPU utilization due to heavy process loads.
Excessive paging activity where the system spends more time swapping than
2. ✔ executing.
3. ✘ Frequent disk crashes due to high read/write speeds.
4. ✘ Corruption of the page table by a malicious process.

Question Number : 68 Question Id : 7520766668 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the main purpose of a Translation Lookaside Buffer (TLB)?

Options :

1. ✘ To increase the size of physical memory.
To reduce the effective memory access time for virtual-to-physical address
2. ✔ translation.
3. ✘ To store frequently used files for faster I/O.
4. ✘ To manage the CPU registers during a context switch.

Question Number : 69 Question Id : 7520766669 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following is a solution to the "*Critical Section Problem*" that satisfies mutual exclusion, progress, and bounded waiting?

Options :

1. ✓ Peterson's Solution
2. ✗ Test-and-Set Lock (hardware-only)
3. ✗ Busy Waiting
4. ✗ Shared Memory without synchronization

Question Number : 70 Question Id : 7520766670 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which of the following transitions is NOT possible in a standard process state transition diagram?

Options :

1. ✗ Running → Ready
2. ✗ Ready → Running
3. ✓ Blocked → Running
4. ✗ Running → Blocked

Question Number : 71 Question Id : 7520766671 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

An ER model contains:

- Student with attributes: StudentID, Name, Age
- Course with attributes: CourseID, Title
- A many-to-many relationship Enrols between Student and Course, with attribute Grade

In the relational design, a separate table is needed to capture the relationship and its attribute. The correct schema design is?

Options :

The Enrols relationship can be represented as a table with columns: StudentID,

1. ✘ CourseID, Grade only, with no foreign keys

The relational schema will have three tables: Student, Course, Enrols, where Enrols includes StudentID and CourseID as foreign keys referencing Student and

2. ✔ Course

The relational schema can merge Enrols into Student table without violating normalization

3. ✘

The relational schema will have two tables only: Student and Course, since Enrols

4. ✘ is many-to-many and does not require a separate table

Question Number : 72 Question Id : 7520766672 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following relational algebra operations is equivalent to a Cartesian product followed by a selection (σ)?

Options :

1. ✘ Natural Join

2. ✔ Theta Join

3. ✘ Outer Join

4. ✘ Intersection

Question Number : 73 Question Id : 7520766673 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A relation R is in 3NF if every non-prime attribute of R is:

Options :

1. ✘ Partially dependent on the primary key.
2. ✔ Non-transitively dependent on every candidate key.
3. ✘ Functionally dependent on a non-key attribute.
4. ✘ Multi-valued.

Question Number : 74 Question Id : 7520766674 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A database designer is refining a relation that has a composite primary key. Some non-key attributes depend only on part of this key, leading to redundancy. Removing such dependencies ensures the relation satisfies a higher normal form. The correct statement describing this transformation is _____.

Options :

1. ✘ First Normal Form (1NF) allows repeating groups and multi-valued attributes
2. ✔ Second Normal Form (2NF) eliminates partial dependencies on a composite key
3. ✘ Third Normal Form (3NF) allows transitive dependencies
4. ✘ Boyce-Codd Normal Form (BCNF) is weaker than 3NF

Question Number : 75 Question Id : 7520766675 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A relation $R(A, B, C)$ has the following functional dependencies:

$$A \rightarrow B, B \rightarrow C$$

If attribute A is known, the value of C can be determined due to?

Options :

1. ✘ Partial dependency
2. ✔ Transitive dependency
3. ✘ Multivalued dependency
4. ✘ Trivial dependency

Question Number : 76 Question Id : 7520766676 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Two transactions operate on the same data item:

- T_1 : Read(X), Write(X)
- T_2 : Read(X), Write(X)

If both execute without proper control, the system may face?

Options :

1. ✘ Deadlock
2. ✔ Lost update problem
3. ✘ Starvation
4. ✘ Thrashing

Question Number : 77 Question Id : 7520766677 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

What is the primary difference between a B-tree and a B+ tree?

Options :

1. ✘ B-trees have a higher fill factor.
2. ✔ B+ trees store data pointers only in the leaf nodes.

3. ✘ B-trees do not allow duplicate keys.

4. ✘ B+ trees cannot be used for primary indexing.

Question Number : 78 Question Id : 7520766678 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following is a conflict-serializable schedule?

Options :

1. ✔ One that is equivalent to some serial schedule.

2. ✘ One that uses only shared locks.

3. ✘ One that results in a deadlock.

4. ✘ One where all write operations occur at the end.

Question Number : 79 Question Id : 7520766679 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Two transactions execute concurrently, but their results are the same as if they were executed one after another. This property is called?

Options :

1. ✘ Atomicity

2. ✘ Durability

3. ✘ Consistency

4. ✔ Serializability

Question Number : 80 Question Id : 7520766680 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A file is stored such that records are placed in no particular order, and searching requires scanning the entire file. This organization is known as

Options :

1. ✘ Sequential file organization
2. ✘ Indexed file organization
3. ✔ Heap file organization
4. ✘ Clustered file organization

Question Number : 81 Question Id : 7520766681 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A development team conducts interviews, observations, and questionnaires before starting system design. The goal is to understand user expectations, constraints, and workflows. This activity primarily supports?

Options :

1. ✔ Requirement elicitation
2. ✘ Coding phase
3. ✘ Testing phase
4. ✘ Deployment

Question Number : 82 Question Id : 7520766682 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Software project management involves multiple activities carried out throughout the project lifecycle, including planning, execution, and post-delivery support. Select the statement that correctly reflects this concept?

Options :

1. ✘ Project planning is only concerned with coding and testing schedules.
Effective project management includes estimating resources, scheduling tasks, and monitoring progress.
2. ✘
3. ✘ Risk management is not part of project management.
Project management continues through maintenance and support, even after software delivery.
4. ✔

Question Number : 83 Question Id : 7520766683 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

During software development, the implementation phase focuses on transforming system design into an executable system. Select the activity that belongs to this phase?

Options :

1. ✔ Coding modules, integration them, and testing the system.
2. ✘ Gathering requirements from users and analysing them.
3. ✘ Writing marketing materials for the software product.
4. ✘ Conducting post-deployment user training only.

Question Number : 84 Question Id : 7520766684 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which of the following statement about a Data Flow Diagram (DFD) is true?

Options :

1. ✘ A DFD represents the physical implementation of a system.

- A DFD shows how data moves through a system, including processes, data stores, and external entities.
2. ✓ stores, and external entities.
 3. ✘ A DFD is used to write sources code directly.
 4. ✘ A DFD ignores the flow of data and focuses only on user interface design.

Question Number : 85 Question Id : 7520766685 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

A software application has been in use for two years. Users report that some features are not working as expected, and there are minor bugs that need fixing. The development team also wants to add a new reporting feature based on recent user requests. Which type(s) of software maintenance does this scenario involve?

Options :

1. ✘ Corrective maintenance only.
2. ✘ Adaptive maintenance only.
3. ✓ Both corrective and perfective maintenance.
4. ✘ Preventive maintenance only.

Question Number : 86 Question Id : 7520766686 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

The "*Cyclomatic Complexity*" of a software module is primarily used to estimate:

Options :

1. ✘ The number of lines of code (LOC).
2. ✓ The number of linearly independent paths through the source code.

3. ✘ The total memory consumption of the module.

4. ✘ The time required for integration testing.

Question Number : 87 Question Id : 7520766687 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A software project follows a spiral model for development. Which of the following statements is true about the spiral model compared to the traditional waterfall model?

Options :

1. ✘ The spiral model eliminates the need for risk analysis because all requirements are known upfront.

2. ✔ The spiral model allows iterative refinement of the system through multiple loops, incorporating risk assessment at each iteration.

3. ✘ In the spiral model, testing is performed only at the end, similar to the waterfall model.

4. ✘ The spiral model is suitable only for small projects with well- understood requirement.

Question Number : 88 Question Id : 7520766688 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Software testing plays a crucial role in ensuring reliability and correctness at different stages of development. Select the statement that correctly represents this role?

Options :

1. ✘ Software testing is only done after the software is fully implemented.

2. ✘ Unit testing verifies individual modules or components for correctness.
 3. ✘ System testing tests only the hardware components of the system.
- Testing is essential to identify defects and ensure software quality, even if the software is well – designed.
4. ✔

Question Number : 89 Question Id : 7520766689 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Cohesion is a measure of how strongly related the functions within a single module are. Which level of cohesion is considered the most desirable?

Options :

1. ✘ Coincidental cohesion
2. ✘ Logical cohesion
3. ✔ Functional cohesion
4. ✘ Procedural cohesion

Question Number : 90 Question Id : 7520766690 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0

Which testing technique focuses on exercising the internal logic, control flow, and data structures of a software module?

Options :

1. ✘ Black Box Testing
2. ✔ White Box Testing

3. ✘ Regression Testing

4. ✘ Beta Testing

Question Number : 91 Question Id : 7520766691 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Software coupling is a measure of the degree of interdependence between modules.

Which of the following is the most desirable (best) type of coupling?

Options :

1. ✘ Content coupling

2. ✘ Control coupling

3. ✔ Data coupling

4. ✘ External coupling

Question Number : 92 Question Id : 7520766692 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which software process model is most appropriate for projects with poorly defined requirements that are expected to evolve significantly over time?

Options :

1. ✘ Waterfall Model

2. ✔ Iterative Prototyping

3. ✘ V-Model

4. ✘ Incremental Model

Question Number : 93 Question Id : 7520766693 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In project management, the "*Critical Path*" in a PERT/CPM chart represents:

Options :

1. ✘ The shortest sequence of tasks in the project.
2. ✘ The path with the maximum slack/float.
3. ✔ The longest path of planned activities to the end of the project.
4. ✘ The path containing only non-essential tasks.

Question Number : 94 Question Id : 7520766694 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a relational schema, a "*Foreign Key*" is used to enforce

Options :

1. ✘ Entity Integrity
2. ✔ Referential Integrity
3. ✘ Domain Integrity
4. ✘ Check Constraints

Question Number : 95 Question Id : 7520766695 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A developer is designing a network application. She needs reliable delivery of messages with error checking, sequencing, and acknowledgment, but another part of her application needs fast transmission of data without delay, and occasional data loss is acceptable.

Identify the protocols should she use for the above two cases?

Options :

1. ✓ Use TCP for reliable delivery, and UDP for fast, unreliable transmission.
2. ✗ Use UDP for reliable delivery, and TCP for fast, unreliable transmission.
3. ✗ Use TCP for both reliable and fast transmission.
4. ✗ Use UDP for both cases because it's faster than TCP.

Question Number : 96 Question Id : 7520766696 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A network uses a routing protocol where each router periodically shares its entire routing table with its immediate neighbours. Over time, the network experiences issues like slow convergence and routing loops (count-to-infinity problem). Determine the routing algorithm, which is most likely being used in this network.

Options :

1. ✗ Link State Routing
2. ✓ Distance Vector Routing
3. ✗ Flooding Algorithm
4. ✗ Hierarchical Routing

Question Number : 97 Question Id : 7520766697 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A user is using an encryption system where a pair of keys is generated. One key is shared publicly, while the other key is kept secret by the owner and is used to decrypt messages or create digital signatures. Which key is being described?

Options :

1. ✘ Public Key
2. ✘ Session key
3. ✔ Private key
4. ✘ Shared key

Question Number : 98 Question Id : 7520766698 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which application layer protocol is used to retrieve emails from a remote server to a local client?

Options :

1. ✘ SMTP
2. ✔ POP3
3. ✘ SNMP
4. ✘ FTP

Question Number : 99 Question Id : 7520766699 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A "Digital Signature" provides which of the following security services?

Options :

1. ✘ Confidentiality and Privacy
2. ✔ Authentication and Non-repudiation
3. ✘ Availability and Auditing
4. ✘ Encryption and Compression

Question Number : 100 Question Id : 7520766700 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In Public Key Cryptography (RSA), if 'A' wants to send a confidential message to 'B', 'A' should encrypt the message using:

Options :

1. ✘ A's Private Key
2. ✘ A's Public Key
3. ✔ B's Public Key
4. ✘ B's Private Key

Question Number : 101 Question Id : 7520766701 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the size of the total address space in IPv4?

Options :

1. ✘ 2^{128}
2. ✔ 2^{32}

3. ✘ 2^{64}

4. ✘ 2^{48}

Question Number : 102 Question Id : 7520766702 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Which routing algorithm requires each router to inform all other routers in the network about its entire set of links and their current costs?

Options :

1. ✘ Distance Vector Routing

2. ✔ Link State Routing

3. ✘ Path Vector Routing

4. ✘ Flooding

Question Number : 103 Question Id : 7520766703 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In the ISO/OSI reference model, which layer is responsible for dialog control, token management, and synchronization?

Options :

1. ✘ Presentation Layer

2. ✔ Session Layer

3. ✘ Transport Layer

4. ✘ Data Link Layer

Question Number : 104 Question Id : 7520766704 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A web developer is creating a webpage where:

- A heading is displayed at the top
- A paragraph of text follows
- A link is provided to navigate to another webpage

Which of the following HTML code snippets correctly represents this structure?

Options :

1. ✘ `< head > < h1> Title </h1> </head> <body> <p> Text </p> Link </body>`
2. ✘ `<html> <h1> Title </h1> <p> Text </p> <a> Link </html>`
3. ✔ `<html> <body> <h1> Title </h1> <p> Text</p> Link </body> </html>`
4. ✘ `<html> <title> Title </title> <p> Text </p> <link> page.html </link> </html>`

Question Number : 105 Question Id : 7520766705 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

A developer is creating a data file to store structured information about books. The file must be self- descriptive, allow custom tags, and ensure that all tags are properly nested and closed. Which of the following XML snippets is well formed?

Options :

1. ✘ `<book><title>XML Guide<title><author>John</author></book>`
2. ✔ `<book><title>XML Guide</title><author>John</author></book>`
3. ✘

<book><title>XML Guide</author><author>John</title></book>

4. ✘ <book><title>XML Guide</title><author>John</book>

**Question Number : 106 Question Id : 7520766706 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0**

A user opens a web browser and requests a webpage. The request is sent to remote a machine, which processes the request and sends back the webpage content. In this scenario, which of the following correctly identifies the client and server roles?

Options :

1. ✘ The web browser is the server, and the remote machine is the client.
2. ✘ Both the web browser and remote machine act as servers.
3. ✔ The web browser is the client, and the remote machines is the server.
4. ✘ Both the web browser and remote machine act as clients.

**Question Number : 107 Question Id : 7520766707 Question Type : MCQ
Correct Marks : 1 Wrong Marks : 0**

In a client-server system, a company deploys a database application where multiple users and requests to access and update data stored in a centralized system. The system ensures that all users get consistent and updated information. Which of the following best describes the advantages of this client- server architecture?

Options :

1. ✘ Clients performs all processing without relying on the server.
2. ✘ No network is required for communication between clients and server.

3. ✓ Centralized control of data ensures consistency and easier management.
4. ✘ Data is stored separately on each client, improving redundancy.

Question Number : 108 Question Id : 7520766708 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In the context of the Client-Server model, which HTTP response status code indicates that the requested resource was not found on the server?

Options :

1. ✘ 200
2. ✘ 302
3. ✓ 404
4. ✘ 500

Question Number : 109 Question Id : 7520766709 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

What is the primary purpose of the XML Document Type Definition (DTD)?

Options :

1. ✘ To style the XML document for browser display.
2. ✓ To define the legal building blocks and structure of an XML document.
3. ✘ To compress the XML data for faster transmission.
4. ✘ To convert XML data into a relational database format.

Question Number : 110 Question Id : 7520766710 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a Client-Server computing model, "*Stateful*" servers are characterized by:

Options :

1. ✓ Keeping track of the status of client interactions across multiple requests.
2. ✗ Treating each request as an independent transaction with no context.
3. ✗ Storing all client data only on the client-side machine.
4. ✗ Using only UDP for communication to increase speed.

Question Number : 111 Question Id : 7520766711 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Let A, B be two events of a sample space such that $P(A) = \frac{1}{4}, P(A|B) = \frac{1}{4}$,

$P(B|A) = \frac{1}{2}$. Then, $P(\bar{A}|B) = \underline{\hspace{2cm}}$, where \bar{A} is the complement of A .

Options :

1. ✗ $\frac{2}{3}$
2. ✗ $\frac{1}{3}$
3. ✓ $\frac{3}{4}$
4. ✗ $\frac{1}{4}$

Question Number : 112 Question Id : 7520766712 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Let $1 < a < 7$ and $b > 7$. If both mean and median of the data set $\{1, 7, -7, a, b\}$ are equal to 4, then the value of b is _____

Options :

1. ✘ 20

2. ✔ 15

3. ✘ -1

4. ✘ 5

Question Number : 113 Question Id : 7520766713 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Let $G = \mathbb{R}^* \times \mathbb{R}$, where \mathbb{R} is the set of all real numbers and $\mathbb{R}^* = \mathbb{R} - \{0\}$. Define an operation o on G as $(a, b)o(c, d) = (ac, bc + d)$. Then, the identity element of the group (G, o) is _____

Options :

1. ✘ (0,0)

2. ✘ (0,1)

3. ✔ (1,0)

4. ✘ (1,1)

Question Number : 114 Question Id : 7520766714 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

In a Boolean algebra theorem which of the following is TRUE?

Options :

1. ✘ $x + (x, y) = y$
2. ✘ $x \cdot (x + y) = y$
3. ✔ $(x \wedge y) \vee x^1 \vee y^1 = 1$
4. ✘ $(x \vee y) \wedge ((x \wedge y^1) \vee y)^1 = 0$

Question Number : 115 Question Id : 7520766715 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Define two relations σ_1 and σ_2 on the set of all real numbers \mathbb{R} as follows:

$a \sigma_1 b \Leftrightarrow a - b$ is a rational number

$a \sigma_2 b \Leftrightarrow a - b$ is an integer

Which one of the following is correct?

Options :

1. ✔ Both σ_1 and σ_2 are equivalence relations
2. ✘ Neither σ_1 nor σ_2 is an equivalence relation
3. ✘ σ_1 is an equivalence relation, but σ_2 is not an equivalence relation
4. ✘ σ_1 is not an equivalence relation, but σ_2 is an equivalence relation

Question Number : 116 Question Id : 7520766716 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Consider the following system of equations

$$\begin{pmatrix} 1 & 3 & 2 \\ 2 & 2 & -3 \\ 4 & 4 & -6 \\ 2 & 5 & 2 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 1 \\ 2 \\ 1 \end{pmatrix}$$

The value of $y^2 + z^2$ is _____

Options :

1. ✓ 34

2. ✗ 41

3. ✗ 25

4. ✗ 18

Question Number : 117 Question Id : 7520766717 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

With the initial guess of $x_0 = 1$, $x_1 = 2$, the first iteration value using secant method for $f(x) = x^2 + 5x + 4$ will be _____

Options :

1. ✗ 0.5

2. ✓ -0.25

3. ✗ -0.75

4. ✗ -0.5

Question Number : 118 Question Id : 7520766718 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Let $f(x) = x^3 - x - 2$. Using the bisection method on the interval $[1, 2]$. How many iterations are required to approximate a root correct to two decimal places?

Options :

1. ✘ 5

2. ✘ 6

3. ✘ 7

4. ✔ 8

Question Number : 119 Question Id : 7520766719 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

Consider the function $f(x, y) = (x - 2)^2(y + 3)$. Then

Options :

1. ✘ $(2, -3)$ is not a stationary point of f .

2. ✘ f has a local minimum at $(2, -3)$

3. ✘ f has a local maximum at $(2, -3)$

4. ✔ f has neither a local maximum nor a local minimum at $(2, -3)$

Question Number : 120 Question Id : 7520766720 Question Type : MCQ

Correct Marks : 1 Wrong Marks : 0

The value of the improper integral $\int_0^1 \frac{1}{4\sqrt{1-x}} dx$ is equal to _____

Options :

1. ✘

4

2. ✘ $\frac{1}{4}$

3. ✔ $\frac{1}{2}$

4. ✘ ∞