

D

સમય : 120 મિનિટ
કુલ પ્રશ્નો : 200
કુલ ગુણ : 200

Time : 120 Minutes
Total Ques. : 200
Total Marks : 200

ઉમેદવારનો Roll
બેઠક નંબર No:

This Question Booklet
Contains 40 Printed Pages

BWL**ઉમેદવારોને સૂચના**

સૂચના ન મળે ત્યાં સુધી પ્રશ્નપુસ્તિકા ખોલવી નહીં

- (1) પ્રત્યેક પ્રશ્નનો ઉત્તર A, B, C અને D પૈકી કોઈ એક છે અને ઉમેદવાર જો જવાબ ન આપવા માંગતા હોય તો તેમના માટે વિકલ્પ E OMR ઉત્તરપત્રમાં આપેલ છે. તમારે બધાજ પ્રશ્નોના ઉત્તર આપવા ફરજિયાત છે. તમારે આ સાથે અલગ OMR ઉત્તરપત્રમાં જ ઉત્તર આપવાના છે.

ઉદાહરણ તરીકે:

ભારતના રાષ્ટ્રપિતા તરીકે કોણ ઓળખાય છે?

- (A) સરદાર પટેલ (B) સુભાષચંદ્ર બોઝ
(C) મહાત્મા ગાંધી (D) વિનોબા ભાવે

ઉત્તરપત્ર (OMR SHEET) માં

(A) (B) (C) (D) (E)

ઉપર્યુક્ત ઉદાહરણનો જવાબ "C" છે. આથી "C" નું વર્તુળ કાળું (encode) કરેલ છે. સાચી અને ખોટી પદ્ધતિથી વર્તુળ ઘાટું કરવા બાબતની સૂચના OMR ની પાછળ આપેલ છે જેની નોંધ લેવી

- (2) આ પાના ઉપર આપનો રોલ નંબર લખો.
- (3) બધા જ પ્રશ્નો પૂરેપૂરા છપાયેલા છે કે કેમ તેની પ્રથમ ખાતરી કરી લો. જો પ્રશ્નો પૂરા છપાયા ન હોય અથવા કોઈ પૃષ્ઠ ફાટેલું હોય કે કોઈ પૃષ્ઠ સામેલ ન હોય અથવા તો અન્ય કોઈ ક્ષતિ જણાય તો તરત જ પ્રશ્નપુસ્તિકા નિરીક્ષક પાસેથી અચૂક બદલાવી લેવી.
- ઉમેદવારને OMR ઉત્તરપત્ર મળ્યા બાદ જો તેઓ દ્વારા તેનો નાશ કરવામાં આવશે કે ગુમ કરવામાં આવશે તો તે ઉમેદવાર ગેરલાયક ઠેરાવવામાં આવશે તેમજ ભવિષ્યની પરીક્ષાઓમાં બેસવા માટે પ્રતિબંધ મુકવા ઉપરાંત ફોજદારી ગુનાને પણ પાત્ર બનશે.
- (4) પરીક્ષા શરૂ થયેથી પૂરી થાય તે દરમિયાન ઉમેદવાર પરીક્ષાર્થીએ પરીક્ષાખંડ છોડવાની મનાઈ છે.
- (5) ઉમેદવારે પોતાના બેઠક ક્રમાંકની પ્રશ્નપુસ્તિકા અને OMR ઉત્તરપત્ર મળેલ છે તેની ખાતરી કરી લેવી અન્યથા ખંડ નિરીક્ષકનું તરત જ ધ્યાન દોરવું. ઉમેદવારને OMR ઉત્તરપત્ર મળે કે તરત જ તેમાં નિયત કરેલ જગ્યાએ પોતાનો બેઠક નંબર સ્વચ્છ અક્ષરે લખવાનો રહેશે. તેમજ બેઠક ક્રમાંક નીચે આપેલ વર્તુળ પણ ઘાટું કરવાનું રહેશે. મળેલ પ્રશ્નપત્રની સીરીઝ નિયત જગ્યાએ લખીને તેની નીચે તે સીરીઝ સામે આપેલ વર્તુળ પણ ઘાટું કરવાનું રહેશે. લખેલી વિગતો અને ઘાટું કરેલ વર્તુળની વિગતો યોગ્ય રીતે ભરાયેલ છે તેની ખાતરી કરી લેવી.
- (6) પ્રત્યેક સાચા જવાબદીઠ 1 (એક) ગુણ મળવાપાત્ર થશે. આયોગ દ્વારા ગુણાંકન પદ્ધતિમાં માઈનસ પદ્ધતિ દાખલ કરવામાં આવી છે. જે મુજબ-

- (i) પ્રત્યેક ખોટા જવાબદીઠ, ખાલી છોડેલ જવાબદીઠ તથા છેકછાક, ખોટી પદ્ધતિથી એક કરતાં વધુ વિકલ્પ દર્શાવેલ જવાબદીઠ 0.3 ગુણ કાપવામાં આવશે. પરંતુ જો ઉમેદવાર

જવાબ આપવા માંગતા ન હોય અને વિકલ્પ (E) ઘાટું કરશે તો 0.3 ગુણ કાપવામાં આવશે નહીં.

- (ii) આન્સર કી ક્રાઈનલ કરતી વખતે જો આયોગ દ્વારા એક પ્રશ્નના એકથી વધુ વિકલ્પો સાચા છે તેમ જાહેર કરવામાં આવે ત્યારે સાચા વિકલ્પ પૈકી કોઈપણ જવાબ માટે એક (1) ગુણ મળવાપાત્ર થશે.

- (7) OMR ઉત્તરપત્રમાં નિશ્ચિત જગ્યા સિવાય ઉમેદવારે પોતાનો બેઠક ક્રમાંક લખવો નહીં તથા પોતાની ઓળખ છતી થાય તેવી નામ સહિતની અન્ય કોઈ પણ પ્રકારની નિશાની કરવાની સખત મનાઈ છે. તેમ છતાં પણ કોઈ પણ નિશાની કે ઓળખ માલુમ પડશે તો તેને સંપૂર્ણ ગેરશિસ્ત ગણવામાં આવશે અને પરીક્ષા માટે ગેરલાયક ગણવામાં આવશે.
- (8) OMR ઉત્તરપત્રના પ્રમાણપત્રમાં ઉમેદવાર તથા નિરીક્ષક બંનેની વાદળી / કાળી બોલપોઈન્ટ પેનથી સહી તથા ઉમેદવારના ડાબા હાથના અંગુઠાનું નિશાન કરજિયાત છે. ઉમેદવારની સહી તથા ડાબા હાથના અંગુઠાના નિશાન વિનાની OMR ઉત્તરપત્રવાળા ઉમેદવાર ગેરલાયક ઠરશે.
- (9) પરીક્ષા દરમિયાન ઉમેદવાર પાસેથી કોઈ પણ સાહિત્ય, ગાઈડ, માર્ગદર્શિકા, કાપડી, સ્લીપો, અન્ય હસ્તાલિખિત કે પ્રિન્ટેડ સાહિત્ય, મોબાઇલ ફોન, પેજર, કેલ્ક્યુલેટર કે અન્ય વીજાણુ ઉપકરણો હોવાનું જણાશે તો ઉમેદવારને ગેરલાયક ગણવામાં આવશે. તેમજ ભવિષ્યની પરીક્ષાઓમાં બેસવા માટે પ્રતિબંધ મુકવા પણ પગલાં લેવાશે.
- (10) ચાલુ પરીક્ષા દરમિયાન અંદરોઅંદર ગુસ્સપુસ કરવી, અવાજ કરવો કે નિરીક્ષકની સૂચનાઓનું ઉલ્લંઘન કરવું તે ગેરશિસ્ત ગણાશે. કોઈ પણ પ્રકારની ગેરશિસ્ત બદલ પગલા લેવાશે.
- (11) ઉમેદવારે વાદળી / કાળી બોલપોઈન્ટ પેનથી ઉત્તરો લખવાના છે. અન્ય શાહી કે પેન કે પેન્સિલ તથા સફેદ શાહીનો ઉપયોગ કરી શકશે નહીં તથા સફેદ શાહી (White Ink), બ્લેડ કે રબ્બરથી કે અન્ય કોઈ પણ રીતે કરેલા સુધારા માન્ય ગણાશે નહીં.
- (12) આ જવાબવહી કમ્પ્યુટર દ્વારા તપાસવાની હોવાથી તે વળે, ફાટે કે બગડે નહીં તેની ખાસ કાળજી રાખવી તથા જવાબ વહીની ધડી વાળવી નહીં.
- (13) પ્રશ્નપુસ્તિકામાં કોરી જગ્યામાં રફકામ કરવું, તે માટે અલગ કાગળ આપવામાં આવશે નહીં. જવાબવહી માં કઈ પણ રફકામ કરવું નહીં. પ્રશ્નપુસ્તિકામાં જવાબો લખવાની મનાઈ છે. પરીક્ષાખંડ છોડતા પૂર્વે જવાબવહી (OMR Answer Sheet) નિરીક્ષકને સોંપવી, જ્યારે પ્રશ્નપુસ્તિકા ઉમેદવારો લઈ જઈ શકશે.

પરીક્ષા પૂરી થયા બાદ OMR ઉત્તરપત્ર વર્ગ નિરીક્ષકને સોંપ્યા બાદ જ વર્ગખંડ છોડવાનો રહેશે. તેમ કરવામાં કસૂર થયેથી ઉમેદવારને ગેરલાયક ઠેરાવવામાં આવશે તે ભવિષ્યની પરીક્ષાઓમાં બેસવા માટે પ્રતિબંધ મુકવા તથા ફોજદારી પગલા લેવાને પણ પાત્ર થશે.

D

1. What happens in a B+ tree when a record is deleted and the node occupancy falls below the minimum threshold?
 - (A) The node is immediately deleted and keys are redistributed to the root.
 - (B) The tree is rebalanced by rotation only.
 - (C) The system attempts to borrow an entry from a sibling (redistribution) or merges the node with a sibling (coalescing).
 - (D) The node remains underfull until a rebuild is triggered.
2. Regarding Transaction States,
 - I. A transaction is in the *Active* state while it is executing.
 - II. A transaction enters the *Failed* state after the discovery that normal execution can no longer proceed.
 - III. A transaction is *Committed* immediately after the final statement has been executed, regardless of whether it stays in memory or disk.Which statements are CORRECT?
 - (A) I and II only
 - (B) I and III only
 - (C) II and III only
 - (D) I, II and III
3. Consider a schedule with "Blind Writes" (a write not preceded by a read). Which of the following is true?
 - (A) Blind writes are illegal in database transactions.
 - (B) Blind writes prevent a schedule from being conflict serializable.
 - (C) Blind writes appear in any view-serializable schedule that is not conflict serializable.
 - (D) Blind writes ensure the schedule is recoverable.
4. Which version of the Two-Phase Locking protocol requires that all locks be held until the transaction commits?
 - (A) Strict Two-Phase Locking
 - (B) Conservative Two-Phase Locking
 - (C) Rigorous Two-Phase Locking
 - (D) Basic Two-Phase Locking
5. For the Timestamp-Ordering Protocol:
 - I. $W\text{-timestamp}(Q)$ denotes the largest timestamp of any transaction that executed $\text{write}(Q)$ successfully.
 - II. If transaction T_i issues $\text{read}(Q)$ and $TS(T_i) < W\text{-timestamp}(Q)$, the read operation is rejected.
 - III. The protocol ensures freedom from deadlock.Which statements are CORRECT?
 - (A) I and II only
 - (B) II and III only
 - (C) I and III only
 - (D) I, II and III

6. In the wait-die deadlock prevention scheme
- (A) If an older transaction requests a resource held by a younger one, the older transaction waits.
 - (B) If an older transaction requests a resource held by a younger one, the younger transaction is rolled back.
 - (C) If a younger transaction requests a resource held by an older one, the younger transaction waits.
 - (D) If an older transaction requests a resource held by a younger one, the older transaction dies (rolls back).
7. Consider the below two statements:
- Statement-1: The application program is an initial program to run when a computer is powered - up or rebooted.
- Statement-2: The Kernel is a program that runs all time on the computer.
- Which of the following is true?
- (A) Statement-1 is correct but Statement-2 is not correct
 - (B) Statement-1 is not correct but Statement-2 is correct
 - (C) Both statements are correct
 - (D) None of the statements are correct
8. Where is bootstrap program stored?
- (A) RAM (B) ROM (C) HDD (D) CACHE
9. Consider the below two statements:
- Statement-1: In asymmetric multiprocessing system, each processor is assigned a specific task.
- Statement-2: A trap is a hardware-generated interrupt.
- (A) Statement-1 is correct but Statement-2 is not correct
 - (B) Statement-1 is not correct but Statement-2 is correct
 - (C) Both statements are correct
 - (D) None of the statements are correct
10. Which Scheduler controls the degree of multiprogramming?
- (A) Short-term scheduler (B) Medium-term scheduler
 - (C) Long-term scheduler (D) None of the above

11. Consider the following set of processes with CPU burst time (in ms):
P1(6), P2(8), P3(7), P4(3).
If the processes arrive in the order P1, P2, P3, P4 at time 0, what is the average waiting time using Non-Preemptive SJF?
(A) 4 ms (B) 5 ms (C) 6 ms (D) 7 ms
12. Which of the following statements is/are true?
I. Shortest remaining time first scheduling may cause starvation.
II. Round robin scheduling never suffers from starvation.
III. Round robin is better than FCFS in terms of response time.
IV. The convoy effect occurs in FCFS scheduling.
(A) I only (B) II and III only (C) I and III only (D) I, II, III and IV
13. A semaphore S is an integer variable that, apart from initialization, is accessed only through two standard atomic operations: wait() and signal().
The definition of wait() is as follows:
wait(S) {
 while (_____) ; // busy wait
 S -- ;
}
The definition of signal() is as follows:
signal(S) {
 S + + ;
}
Select the appropriate condition for while loop in wait(S) function.
(A) $S \leq 0$ (B) $S > 0$ (C) $S > 1$ (D) $S \geq 1$
14. A process executes the following code
for (i = 0; i <= 4; i++) fork();
The total number of child processes created is _____.
(A) 15 (B) 16 (C) 31 (D) 32
15. A system contains four programs and each requires three tape units for its operation. The minimum number of tape units which the system must have such that deadlocks never arise is _____.
(A) 8 (B) 9 (C) 11 (D) 12
16. Which one of the following is NOT TRUE?

- (A) Privileged instructions can be executed in kernel mode only
 - (B) The objective of CPU scheduling is to maximize CPU utilization
 - (C) Thrashing occurs when processes on system are in waiting state
 - (D) The "Swap Space" resides in high-speed disk
17. A critical section is a program segment,
- (A) which avoids deadlocks
 - (B) where semaphores are implemented
 - (C) which avoid starvation
 - (D) where shared resources are accessed
18. Which of the following page replacement algorithms suffers from Belady's anomaly?
- (A) LRU
 - (B) Optimal
 - (C) Both LRU and Optimal
 - (D) None of the above
19. If a Resource-Allocation Graph contains a cycle and all resource types have only one instance, which of the following statements is true?
- (A) Deadlock is neither necessary nor sufficient
 - (B) Deadlock is necessary but not sufficient
 - (C) Deadlock is sufficient but not necessary
 - (D) Deadlock is necessary and sufficient
20. When a process is in a "Blocked" state waiting for some I/O service. When the service is completed, it goes to the _____.
- (A) Terminated state
 - (B) Ready state
 - (C) Running state
 - (D) New state
21. The Banker's Algorithm prevents the system from entering a deadlocked state by ensuring that any resource request is granted only if, after allocation, there still exists at least one
- (A) Circular wait condition
 - (B) Need vector that is greater than the allocation matrix
 - (C) Safe sequence of processes
 - (D) Unsafe state
22. Which function of the Session Layer allows two processes to communicate in either half-duplex or full-duplex mode?
- (A) Error correction
 - (B) Dialog control
 - (C) Physical addressing
 - (D) Frame synchronization

D

23. Which statement best describes the operational sequence of a sender using the Stop-and-Wait Protocol?
- (A) The sender transmits all available frames and then waits for a single final report.
 - (B) The sender sends frames continuously until the receiver sends a "stop" signal.
 - (C) The sender sends one frame and must receive an ACK frame before sending the next one.
 - (D) The sender and receiver send data frames to each other at the same time.
24. In circuit switching, the reservation of resources such as channels, switch buffers and input/output ports occurs during the
- (A) Data transfer phase
 - (B) Teardown phase
 - (C) Error control phase
 - (D) Setup phase
25. Select the statement that accurately describes the treatment of packets within a datagram network:
- (A) Each packet is treated as an independent unit, regardless of whether it is part of a larger message.
 - (B) Packets are grouped together and must follow the same physical path to the destination.
 - (C) The network recognizes the relationship between packets and processes them in a specific sequence.
 - (D) Packets are stored at the first switch until all parts of the message arrive.
26. The generating function for the sequence 1, 1, 1, 1, ... is
- (A) $\ln(1-x)$
 - (B) e^x
 - (C) $1/(1-x)$
 - (D) $1/(1+x)$
27. Let p and q be two propositions. Consider the following two formulae in propositional logic.
- $S_1: (\neg p \wedge (p \vee q)) \rightarrow q$
- $S_2: q \rightarrow (\neg p \wedge (p \vee q))$
- Which one of the following choices is correct?
- (A) Both S_1 and S_2 are Tautologies
 - (B) S_1 is a Tautology but S_2 is not a Tautology
 - (C) S_1 is not a Tautology but S_2 is a Tautology
 - (D) Neither S_1 nor S_2 is a Tautology
28. Let G be a group of order 6 and H be a subgroup of G such that $1 < |H| < 6$. Which one of the following options is correct?
- (A) Both G and H are always cyclic.

- (B) G may not be cyclic, but H is always cyclic.
 (C) G is always cyclic, but H may not be cyclic.
 (D) Both G and H may not be cyclic.
29. A simple graph with 'n' vertices can have at most how many edges?
 (A) $n(n-1)/2$ (B) n^2 (C) n (D) $n-1$
30. If A and B are finite sets with $|A|=10$, $|B|=8$ and $|A \cap B|=3$, then $|A \cup B| =$
 (A) 21 (B) 15 (C) 5 (D) 18
31. Which of the following problem cannot be efficiently solved using the divide-and-conquer?
 (A) Closest pair of points (B) Matrix multiplication
 (C) Longest common subsequence (D) Maximum subarray
32. What is the minimum number of comparisons required in the worst case to sort 'n' distinct elements?
 (A) $n \log n$ (B) $\log_2 n!$ (C) n^2 (D) $\log n$
33. In Depth First Search of a directed graph, which edge type cannot exist?
 (A) Tree edge (B) Back edge (C) Forward edge (D) None of the above
34. A directed graph has a topological ordering if
 (A) Graph is strongly connected (B) Graph is connected
 (C) Graph has no cycles (D) All vertices have equal indegree
35. What is time complexity of fun()?
 def fun(n):
 count = 0
 i = n
 while i > 0:
 for j in range(i):
 count += 1
 i //= 2
 return count
 (A) $O(n^2)$ (B) $O(n^2 \log(n))$
 (C) $O(n)$ (D) $O(n \log(n \log(n)))$

D

36. Dijkstra fails if graph has
(A) Zero-weight edges (B) More than one edge with same weights
(C) Negative-weight cycles (D) Parallel edges
37. In Dynamic Programming: Longest Common Subsequence (LCS), what is the length of the LCS of "ABCBDAB" and "BDCABA"?
(A) 3 (B) 4 (C) 5 (D) 6
38. Consider the recurrence relation $a_1 = 8$, $a_n = 6n^2 + 2n + a_{n-1}$. Let $a_{99} = k \times 10^4$. The value of K is ____
(A) 190 (B) 296 (C) 198 (D) 200
39. Worst-case complexity of Quick Sort occurs when
(A) Pivot is median
(B) Input is random
(C) Input is already sorted and pivot is the first element
(D) Input has duplicates
40. Consider the following four decision problems:
1. 3-SAT: Given a Boolean formula in 3-CNF, is it satisfiable?
2. Graph Isomorphism: Given two undirected graphs G_1 and G_2 , are they isomorphic?
3. 2-SAT: Given a Boolean formula in 2-CNF, is it satisfiable?
4. Subset Sum: Given a set of integers and a target sum S, is there a subset that sums exactly to S?
Which of the following identifies the set of problems that are NP-complete?
(A) 1 and 4 only (B) 1, 2 and 4 only (C) 1, 3 and 4 only (D) All of the above
41. A binary search tree T contains 'n' distinct elements. What is the time complexity of picking an element in T that is larger than the minimum element in T?
(A) $\Theta(n \log n)$ (B) $\Theta(n)$ (C) $\Theta(\log n)$ (D) $\Theta(1)$
42. The array $arr = [10, 80, 30, 90, 40, 50, 70]$ is sorted using quick sort whereby the last element is considered as the pivot. What will be the minimum number of swaps required to get the array sorted?
(A) 7 (B) 12 (C) 4 (D) 16
43. Which of the following approach will give some solution to Real Knapsack Problem?
(i) Dynamic Programming
(ii) Greedy Algorithm
(iii) Branch and Bound

(A) (i) only (B) (i) and (ii) only (C) (i) and (iii) only (D) (i), (ii) and (iii)

44. In the context of the Activity Selection Problem, which choice does the greedy strategy make at each step to find the maximum number of non-overlapping activities?
- (A) Select the activity with the maximum profit.
 (B) Select the activity with the longest duration.
 (C) Select the activity with the earliest finish time.
 (D) Select the activity with the earliest start time.
45. If an algorithm's running time is described by $f(n) = O(g(n))$, which of the following statements about the asymptotic growth of $f(n)$ is true?
- (A) $f(n)$ grows strictly faster than $g(n)$.
 (B) $f(n)$ grows at most as fast as $g(n)$ (upper bound).
 (C) $f(n)$ grows at least as fast as $g(n)$ (lower bound).
 (D) $f(n)$ grows at the same rate as $g(n)$ only.
46. Which of the following is NOT a required property of a PRIMARY KEY constraint in SQL?
- (A) The values of the primary key attributes must be unique.
 (B) No tuple can have a null value for a primary key attribute.
 (C) The primary key must consist of a single attribute.
 (D) No two tuples in the relation can be equal on all primary key attributes.
47. Consider a relation schema R and a set of functional dependencies F . R is in Boyce-Codd Normal Form (BCNF). If for all functional dependencies in F^+ of the form $\alpha \rightarrow \beta$ (where $\alpha \subseteq R$ and $\beta \subseteq R$), at least one of the following holds
- (A) $\alpha \rightarrow \beta$ is trivial or β is a superkey for R .
 (B) $\alpha \twoheadrightarrow \beta$ is trivial or α is a superkey for R .
 (C) $\beta \subseteq \alpha$ or β is a candidate key for R .
 (D) α is a superkey for R or β is part of a candidate key.
48. In the context of integrity constraints, what is the specific purpose of an assertion in SQL?
- (A) To enforce referential integrity between two specific tables.
 (B) To express a condition that the database must always satisfy, potentially involving multiple relations.
 (C) To define a default value for a specific column during insertion.
 (D) To create a temporary constraint that is valid only for the duration of a transaction.

D

49. Which of the following best describes the difference between a dense index and a sparse index?
- (A) A dense index has an index entry for every search-key value, while a sparse index has entries for only some search-key values.
 - (B) A dense index is always a secondary index, while a sparse index is always a primary index.
 - (C) A sparse index requires the file to be unordered, while a dense index requires the file to be ordered.
 - (D) A dense index points to the data block, while a sparse index points to the specific record.
50. In a hash file organization, what typically happens when a bucket becomes full (Bucket Overflow)?
- (A) The entire file is reorganized immediately.
 - (B) The record is discarded.
 - (C) An overflow bucket is provided and linked to the original bucket.
 - (D) The hash function is automatically recomputed to generate a new address.
51. Which of the following is not an advantage of a linked list over an array?
- (A) Dynamic memory allocation
 - (B) Ease of insertion/deletion
 - (C) Random access to elements
 - (D) Efficient memory utilization
52. A series of operations are performed on an empty queue:
Enqueue(10), Enqueue(20), Dequeue(), Enqueue(30), Dequeue(), Dequeue(), Enqueue(40), Enqueue(50), Dequeue().
- This queue is implemented using 2 Stacks, where Enqueue internally calls PUSH in stack S_1 and Dequeue internally calls POP from S_2 and function SWITCH is called while performing Dequeue if S_2 is empty. For the given sequence of Enqueue-Dequeue, how many times SWITCH will be called?
- (A) 2
 - (B) 3
 - (C) 1
 - (D) Insufficient data
53. Given a Binary Search Tree where preorder traversal is sorted in increasing order, which statement must be TRUE?
- (A) Tree is balanced
 - (B) Tree is skewed to the right
 - (C) Tree is skewed to the left
 - (D) Tree is heaped
54. Which statement about a binary heap is TRUE?

- (A) Searching arbitrary key is $O(\log n)$ (B) Heap sort is stable
 (C) Inorder traversal gives sorted order (D) Height of heap is $\Theta(\log n)$
55. Which of the following sorting algorithms modifies elements within the same memory space but does not maintain relative order of equal keys?
 (A) Merge Sort (B) Insertion Sort (C) Quick Sort (D) Bubble Sort
56. If binary search takes 5 comparisons to find an element, the maximum number of elements in the list can be
 (A) 16 (B) 31 (C) 32 (D) 63
57. Which of the following sorting algorithms does not have time complexity $O(n \log n)$ in any of its best, average or worst cases?
 (A) Merge Sort (B) Quick Sort (C) Selection Sort (D) Heap Sort
58. For a Simple Queue with size N , while inserting an element in it, it shows "Overflow error". From the following, which could be possible condition met?
 (i) $REAR \geq N - 1$ (ii) $REAR - FRONT \geq N$
 (iii) $REAR - FRONT \leq N - 1$ (iv) $REAR - FRONT - 1 = N$
 (A) (i) only (B) (i) and (iv) (C) (i), (ii) and (iii) (D) (ii) and (iv)
59. Which of the following is not the application of stack?
 (A) A parenthesis balancing program
 (B) Tracking of local variables at run time
 (C) Compiler syntax analyzer
 (D) Data transfer between two asynchronous processes
60. Which of the following is NOT a stable sorting algorithm?
 (A) Insertion Sort (B) Bubble Sort (C) Merge Sort (D) Quick Sort
61. Evaluate the postfix expression $10\ 5\ 2\ 3\ ^\wedge\ * + 12\ 3\ / 2\ * - 4 +$
 (A) 38 (B) 42 (C) 46 (D) 54
62. A disconnected planar graph has ^{5×5} 25 vertices, ^{6×8} 48 edges and ^{$8 \times 5 \times 2$} 30 regions. How many disconnected components are there in the graph?
 (A) 5 (B) 6 (C) 7 (D) Insufficient Data

D

63. Which of the following function call will give output as 11010 for the function pqr defined as below:
- ```
void pqr(int n) {
 if (n == 0) {
 printf("1");
 return;
 }
 pqr(n / 2);
 printf("%d", n % 2);
}
```
- (A) pqr(10)                      (B) pqr(26)                      (C) pqr(16)                      (D) pqr(20)
64. Consider a circular doubly linked list with 'n' nodes. A sub-list containing more than one node is to be deleted such that the remaining nodes form a valid circular doubly linked list and the deleted sub-list is completely detached. What is the minimum number of pointer changes required to achieve this?
- (A) 4                              (B) 2                              (C) 3                              (D) 1
65. Suppose the values 10, 4, 15, 29, 18, 5, 50, 16 are inserted in that order into an initially empty binary search tree. Let T be the resulting binary search tree. The number of edges in the path from the node containing 16 to the root node of T is \_\_\_\_\_.
- (A) 2                              (B) 7                              (C) 4                              (D) 5
66. Let p and q be propositions. Which of the following is a tautology?
- (A)  $p \leftrightarrow (p \vee q)$                               (B)  $(p \wedge (p \rightarrow q)) \rightarrow q$   
(C)  $(p \vee q) \rightarrow (p \wedge q)$                               (D)  $(p \rightarrow q) \wedge (q \rightarrow p)$
67. The negation of  $\forall x \exists y (P(x, y) \wedge Q(y))$  is
- (A)  $\exists x \forall y (\neg P(x, y) \vee \neg Q(y))$                               (B)  $\exists x \exists y (\neg P(x, y) \wedge \neg Q(y))$   
(C)  $\exists x \forall y (\neg P(x, y) \wedge \neg Q(y))$                               (D)  $\forall x \exists y (\neg P(x, y) \vee \neg Q(y))$
68. Let  $A = \{1, 2, 3, 4\}$ . How many relations on A are reflexive and symmetric?
- (A)  $2^6$                               (B)  $2^{\{10\}}$                               (C)  $2^{\{4\}}$                               (D)  $2^{\{12\}}$
69. Which condition is necessary and sufficient for a relation to be a partial order?
- (A) Reflexive, symmetric, transitive                              (B) Irreflexive, transitive  
(C) Reflexive, antisymmetric, transitive                              (D) Symmetric, transitive
70. Which of the following groups is not cyclic?
- (A)  $\mathbb{Z}_{12}$                               (B)  $\mathbb{Z}_2 \times \mathbb{Z}_6$                               (C)  $\mathbb{Z}_{15}$                               (D)  $\mathbb{Z}_4 \times \mathbb{Z}_3$

71. A connected graph with 'n' vertices and  $n-1$  edges is always?  
 (A) Cyclic (B) Tree (C) Eulerian (D) Complete
72. The difference between the chromatic numbers of the cycle graphs  $C_m$  and  $C_n$ , where  $m$  is odd and  $n$  is even, is  
 (A) 0 (B) 1  
 (C) Odd number (D) Insufficient data, can't be determined
73. Solve the following:  
 $a_n = 3a_{n-1} - 2a_{n-2}$   
 where  $a_0 = 1, a_1 = 2$   
 (A)  $a_n = 1$  (B)  $a_n = 2^n$  (C)  $a_n = 1 + 2^n$  (D)  $a_n = n2^n$
74. Number of ways to choose 4 objects from 10 distinct objects arranged in a line such that no two chosen objects are adjacent is  
 (A)  ${}^7C_4$  (B)  ${}^6C_4$  (C)  ${}^{10}C_4$  (D)  ${}^5C_4$
75. The recurrence relation for the Fibonacci sequence is  
 (A)  $F_n = F_{n-1} - F_{n-2}$  (B)  $F_n = 2F_{n-1}$   
 (C)  $F_n = n * F_{n-1}$  (D)  $F_n = F_{n-1} + F_{n-2}$
76. If a router has three separate connections to the Internet, how many IPv4 addresses does it require to function at the network layer?  
 (A) One single address for the entire device.  
 (B) Two addresses — one for input and one for output.  
 (C) Three addresses — one for each connection.  
 (D) Zero addresses, as routers only use physical MAC addresses.
77. Based on the distance vector routing principle, which specific nodes are responsible for sharing routing information with each other?  
 (A) Only the source and the final destination nodes.  
 (B) Every node shares its information with all other nodes in the entire network.  
 (C) Information is only shared between the central switch and the end systems.  
 (D) Each node shares its routing table only with its immediate neighbours.

**D**

78. Which of the following components is included in a Link State Packet (LSP) specifically to help routers distinguish between new information and outdated data during the flooding process?
- (A) The node's physical MAC address      (B) A sequence number  
(C) The routing table's third column      (D) A list of all end-user IP addresses
79. At which point in the communication process are open-loop congestion control policies applied to the network?
- (A) Only after the network has already crashed.  
(B) When the receiver sends a specific "congestion encountered" signal.  
(C) During the teardown phase of a circuit-switched connection.  
(D) To prevent congestion from occurring before it happens.
80. Identify the specific component included during the creation of a Message Authentication Code (MAC) to provide proof of the sender's identity
- (A) A symmetric key shared between the sender and the receiver.  
(B) The physical address of the network interface card.  
(C) A sequence number used for frame synchronization.  
(D) The time-to-live (TTL) value of the IP datagram.
81. Identify the primary distinction regarding whose keys are involved in a digital signature process versus a confidentiality process
- (A) Confidentiality uses the sender's keys; digital signature uses the receiver's keys.  
(B) Both processes rely exclusively on the sender's public and private keys.  
(C) Confidentiality uses the receiver's keys; digital signature uses the sender's keys.  
(D) Both processes rely exclusively on the receiver's public and private keys.
82. Consider the following statements regarding Security Attacks:
1. Passive attacks are difficult to detect because they do not involve any alteration of the data.
  2. Active attacks involve some modification of the data stream or the creation of a false stream.
  3. The emphasis in dealing with active attacks is on prevention rather than detection.
  4. Traffic analysis is a form of active attack. ✓
- Which of the above statements are CORRECT?
- (A) 1 and 2 only      ✓ (B) 2 and 3 only      (C) 1, 2 and 4 ✗      ✗ (D) 1, 3 and 4
83. What is the specific purpose of the "Nonce" in authentication protocols?
- (A) To encrypt the user's password.

- (B) To provide a permanent identifier for the user.  
(C) To protect against replay attacks by verifying freshness.  
(D) To compress the message data.
84. Specify the standard location for the installation of a firewall within an organization's network infrastructure:  
(A) Between the host computer and its local peripheral devices.  
(B) Only within the central processing unit of a web server.  
(C) Exclusively inside the transport layer header of a TCP packet.  
(D) Between the internal network of an organization and the rest of the Internet.
85. Which of the following tools is primarily used for network intrusion detection?  
(A) Wireshark                      (B) Snort                      (C) Nessus                      (D) Nikto
86. Which HTTP method, if left enabled and improperly secured on a web server, allows an attacker to directly upload arbitrary files (such as a web shell) to the server and is therefore recommended by OWASP to be disabled if not required?  
(A) POST                      (B) PUT                      (C) PATCH                      (D) CONNECT
87. In a Star Schema, the dimension tables are generally \_\_\_\_\_ and the fact table is \_\_\_\_\_  
(A) Normalized, Denormalized  
(B) Denormalized, Normalized  
(C) Small and Normalized, Large and Denormalized  
(D) Highly redundant, Non-redundant
88. In a multidimensional data model, what is the cuboid that holds the lowest level of summarization called?  
(A) Apex cuboid                      (B) Lattice cuboid                      (C) Base cuboid                      (D) 0-D cuboid
89. A regional manager for a retail chain is currently viewing the total "Electronics" sales for the year 2025 across all of India. He decides to see the sales broken down by individual states (e.g., Gujarat, Maharashtra, Karnataka). Which OLAP operation is being performed?  
(A) Roll-up                      (B) Drill-down                      (C) Slice                      (D) Pivot
90. A system is processing millions of small "Point of Sale" (POS) transactions per hour, focusing on immediate data consistency and individual row updates. This system is classified as  
(A) OLAP                      (B) Data Mining Engine  
(C) OLTP                      (D) Distributed Warehouse

**D**

91. When comparing ROLAP (Relational OLAP) and MOLAP (Multidimensional OLAP), which statement is TRUE?
- (A) ROLAP stores data in optimized multidimensional arrays for faster access.
  - (B) MOLAP uses relational databases to store and manage warehouse data.
  - (C) ROLAP is generally more scalable for very large data volumes than MOLAP.
  - (D) MOLAP does not support the slice and dice operations.
92. In the context of OLAP and data cube design, what is meant by the "curse of dimensionality"?
- (A) The fact that data mining results are often biased.
  - (B) The exponential growth in the number of possible cuboids as the number of dimensions in a data cube increases.
  - (C) The difficulty of cleaning noisy data in high-dimensional space.
  - (D) The lack of storage space for base cuboids.
93. Which schema model is characterized by normalized dimension tables to reduce redundancy?
- (A) Star schema
  - (B) Snowflake schema
  - (C) Fact constellation schema
  - (D) Galaxy schema
94. In the knowledge discovery process, which step involves removing noise and inconsistent data?
- (A) Data integration
  - (B) Data selection
  - (C) Data cleaning
  - (D) Data transformation
95. Which data mining functionality is used to find models that describe and distinguish data classes for the purpose of predicting unknown labels?
- (A) Cluster analysis
  - (B) Association analysis
  - (C) Outlier analysis
  - (D) Classification
96. Which type of attribute is qualitative and has an inherent order, but the magnitude between values is unknown?
- (A) Nominal
  - (B) Binary
  - (C) Ordinal
  - (D) Ratio-scaled
97. Which statistical measure is most sensitive to outliers?
- (A) Mean
  - (B) Median
  - (C) Mode
  - (D) Interquartile range
98. A data mining task that identifies a set of software products that are frequently purchased together in a "bundle" is classified as which type of analytics?

- (A) Predictive Analytics                      (B) Descriptive Analytics  
(C) Prescriptive Analytics                  (D) Regression Analysis

99. Relational databases separate the logical organization of data from physical storage. However, they faced significant challenges with the advent of Web applications. Which of the following was the primary driver for the emergence of NoSQL databases?
- (A) The inability of SQL to handle complex queries involving joins.  
(B) The need to support ACID transactions for financial data.  
(C) The requirement to support high availability, scalability and flexibility for massive user bases.  
(D) The high cost of storage devices required for normalized data.
100. Regarding the cost and licensing models of databases, which of the following statements is TRUE regarding the typical deployment of NoSQL systems?
- (A) NoSQL databases are always proprietary and charge per CPU core.  
(B) NoSQL databases employ named-user licensing similar to Oracle or SQL Server.  
(C) NoSQL databases generally utilize open-source models, allowing usage on extensive clusters without per-server licensing fees.  
(D) NoSQL databases are cheaper because they do not support commercial support services.
101. The National Cyber Security Policy 2013 (NCSP-2013) was unveiled by the Government of India to build a secure and resilient cyberspace. Which of the following is an explicit target or objective highlighted in this policy document?
- (A) Establishing a separate internet infrastructure for India that is completely disconnected from the global web.  
(B) Developing a workforce of 5,000,000 (50 lakh) certified cybersecurity professionals within 10 years.  
(C) Building a secure cyber ecosystem and training 500,000 (5 lakh) cybersecurity professionals in the country.  
(D) Mandating that all Indian citizens must register their private symmetric keys with local police stations.

**D**

102. Under the Information Technology Act, 2000, Section 66F specifically addresses 'Cyber Terrorism'. What is the maximum punishment prescribed under Section 66F for committing cyber terrorism in India?
- (A) Imprisonment which may extend to life imprisonment
  - (B) Imprisonment up to 3 years or a fine up to Rs. 5 lakh, or both
  - (C) A civil penalty of Rs. 1 crore payable to the state treasury
  - (D) Death penalty by hanging
103. Which sections of the Information Technology Act, 2000 empower the Central Government to issue directions for the decryption of information and the blocking of public access to information, respectively?
- (A) Section 43 for both decryption and blocking
  - (B) Section 69 for decryption of information and Section 69A for blocking public access to information
  - (C) Section 66C for decryption of information and Section 66D for blocking public access
  - (D) Section 79 for both decryption and blocking
104. In the context of e-Governance under Digital India, the exchange of data and services between two or more government departments or agencies (e.g., inter-departmental data sharing over a State Wide Area Network) is classified under which model?
- (A) G2C (Government to Citizen)
  - (B) G2G (Government to Government)
  - (C) G2B (Government to Business)
  - (D) G2E (Government to Employee)
105. An online classifieds marketplace (such as OLX or Quikr), where one private individual sells a used item directly to another private individual, is an example of which e-commerce model?
- (A) B2C (Business to Consumer)
  - (B) C2B (Consumer to Business)
  - (C) C2C (Consumer to Consumer)
  - (D) B2B (Business to Business)
106. A freelance bidding platform where individual consumers offer their skills or products and a business selects and purchases from among the offers made (e.g., a freelancer setting a price for a company to accept) exemplifies which e-commerce model?
- (A) B2C (Business to Consumer)
  - (B) C2B (Consumer to Business)
  - (C) C2C (Consumer to Consumer)
  - (D) G2B (Government to Business)
107. Electronic Data Interchange (EDI) is best defined as
- (A) The computer-to-computer exchange of structured business documents (such as purchase orders or invoices) in a standardized electronic format, without human intervention

- (B) A cloud-based file storage service for sharing scanned business documents by email
  - (C) A social media protocol for businesses to advertise products to consumers
  - (D) A biometric authentication standard for verifying business identities
108. The primary purpose of an Enterprise Resource Planning (ERP) system within an organization is to
- (A) Provide antivirus protection for all networked computers in the organization
  - (B) Manage only the organization's external social media presence
  - (C) Integrate core business processes — such as finance, HR, manufacturing, procurement and supply chain — into a single unified information system
  - (D) Replace the need for any human resource department
109. In the context of e-Governance, Citizen Relationship Management (CzRM) primarily refers to
- (A) A legal framework that grants citizens ownership rights over government land records
  - (B) A systematic approach, analogous to business CRM, by which government agencies manage citizen interactions, service requests and grievances to improve service delivery
  - (C) A private-sector loyalty programme offered by e-commerce companies to citizens
  - (D) A biometric database used exclusively for law enforcement purposes
110. How many core principles does the COBIT 5 framework, developed by ISACA for the governance and management of enterprise IT, comprise?
- (A) 3                                      (B) 4                                      (C) 5                                      (D) 7
111. Which COBIT 5 principle holds that governance and management are distinct types of activities, requiring different organizational structures and serving different purposes?
- (A) Meeting Stakeholder Needs
  - (B) Applying a Single Integrated Framework
  - (C) Separating Governance From Management
  - (D) Enabling a Holistic Approach
112. In collaborative digital platform and application development, a 'Partner' or 'Collaborative' API is one that is
- (A) Open to the general public with no restrictions
  - (B) Accessible only within a single organization's internal systems
  - (C) Used exclusively for testing purposes before public release
  - (D) Shared with select business partners under a formal agreement to jointly build integrated applications and services

**D**

113. Under India's Smart Cities Mission, the deployment of a single smart solution (such as an Intelligent Traffic Management System) across an entire existing city — rather than confined to one specific redeveloped area — is termed
- (A) Retrofitting (B) Redevelopment  
(C) Greenfield Development (D) Pan-city Development
114. The 'e-Gram Vishwagram' project, which computerized and connected Gram Panchayats across Gujarat via broadband to deliver e-services in rural areas, is implemented under which department?
- (A) Ministry of Panchayati Raj, Government of India  
(B) Department of Panchayat, Government of Gujarat  
(C) Department of Rural Development, Government of India  
(D) Gujarat Informatics Limited (GIL) independently
115. The Gujarat State Wide Area Network (GSWAN) — a dedicated end-to-end IP-based network connecting the State Secretariat, District and Taluka level government offices for voice, video and data — became operational in which year?
- (A) 2010–11 (B) 2005–06 (C) 2001–02 (D) 1998–99
116. The 'Digital Gujarat Portal' functions as a Common Services Portal (CSP) whose vision is to provide?
- (A) B2B services exclusively for IT companies registered in Gujarat  
(B) A one-stop G2C solution for all citizen services of the Government of Gujarat  
(C) G2G data exchange between Gujarat and other Indian states only  
(D) Online grievance redressal restricted to Gujarat government employees
117. DigiLocker, a flagship initiative of the Ministry of Electronics & IT (MeitY) under Digital India that provides citizens a secure cloud-based digital document wallet, is explicitly aimed at furthering which Digital India objective?
- (A) e-Employment (B) e-Learning  
(C) Digital Empowerment of the citizen (D) Public Safety
118. The National Career Service (NCS) portal, which connects job seekers with employers and was designed to progressively replace the traditional Employment Exchange system, is operated under which Ministry of the Government of India?
- (A) Ministry of Skill Development and Entrepreneurship  
(B) Ministry of Electronics and Information Technology  
(C) Ministry of Labour and Employment  
(D) Ministry of Corporate Affairs

119. The Aadhaar Enabled Payment System (AePS), a bank-led digital payment mode developed by NPCI, allows a customer to perform basic banking transactions (cash withdrawal, deposit, balance enquiry) at a Micro ATM using which primary means of authentication?
- (A) Debit card and PIN
  - (B) One-Time Password (OTP) sent to a registered mobile number
  - (C) Aadhaar number combined with biometric (fingerprint) authentication
  - (D) UPI PIN entered on a smartphone
120. The National Digital Library of India (NDLI), a virtual repository of learning resources sponsored under the Ministry of Education's National Mission on Education through ICT, is hosted and coordinated by which institution?
- (A) Indian Institute of Technology, Delhi
  - (B) Indian Institute of Technology, Kharagpur
  - (C) Indian Institute of Science, Bangalore
  - (D) University Grants Commission
121. The Emergency Response Support System (ERSS), which integrates emergency numbers such as Police (100) and Fire (101) into a single Pan-India emergency number '112', was launched as the vision of which Ministry?
- (A) Ministry of Home Affairs
  - (B) Ministry of Electronics and Information Technology
  - (C) Ministry of Health and Family Welfare
  - (D) Ministry of Road Transport and Highways
122. Under India's Digital Personal Data Protection (DPDP) Act, 2023, an entity that, alone or jointly with others, determines the purpose and means of processing an individual's personal data is termed a
- (A) Data Principal
  - (B) Data Processor
  - (C) Data Fiduciary
  - (D) Consent Manager
123. The Government of Gujarat's Data Centre Policy, unveiled on 9 July 2026 to position the state as India's leading hyperscale AI data centre hub, targets an investment of approximately how much and what data centre capacity?
- (A) ₹1 lakh crore investment; 1 GW capacity
  - (B) ₹6 lakh crore investment; 7.5 GW capacity
  - (C) ₹10,000 crore investment; 500 MW capacity
  - (D) ₹25,000 crore investment; 250 MW capacity

**D**

124. Under the National e-Governance Plan (NeGP), Mission Mode Projects (MMPs) are divided into Central, State and Integrated categories. Which of the following is an "Integrated" MMP?
- (A) Land Records (NLRMP) (B) Commercial Taxes  
(C) India Post 2012 (D) Common Service Centers (CSC)
125. Besides standard CAPEX/OPEX support, which of the following is a distinctive additional fiscal incentive offered under the Gujarat IT/ITeS Policy 2022-27?
- (A) 100% Income Tax exemption for 10 years  
(B) Reimbursement of the employer's contribution to EPF ("Atmanirbhar Gujarat Rojgar Sahay")  
(C) Free electricity for 20 years  
(D) Full reimbursement of international travel costs
126. A software project manager has estimated that a software system of size 50 KLOC will require 100 person-months of nominal effort over an optimal development schedule of 12 months using the COCOMO model. The client insists on accelerating the delivery and compressing the schedule by 20% (i.e., new duration is 9.6 months). According to Putnam's Resource Allocation Model, what will be the new estimated effort required to complete the project?
- (A) 244.14 person-months (B) 156.25 person-months  
(C) 120 person-months (D) 195.31 person-months
127. A cloud service provider offers a web-based automated billing service (SaaS) and signs a Service Level Agreement (SLA) guaranteeing 99.9% availability (three nines) 24/7 over a non-leap year (365 days). Over the year, the system undergoes maintenance and experienced recovery events due to minor database crash incidents. If the Mean Time To Repair (MTTR) is recorded as 2 hours per incident, what is the maximum number of failure recovery incidents the system can experience before the vendor violates the SLA?
- (A) 8 incidents (B) 4 incidents (C) 5 incidents (D) 12 incidents
128. When modeling the software architecture for an industrial SCADA (Supervisory Control and Data Acquisition) system using real-time structural analysis extensions, a designer must explicitly capture rapid asynchronous event signals (such as a boiler temperature crossing a critical safety threshold). Under the Hatley and Pirbhai real-time extension model, how are control processing and data processing aspects structurally separated and integrated in the analysis model?
- (A) Control processing is modeled on a separate Control Flow Diagram (CFD) and is linked to the Data Flow Diagram (DFD) using a notational reference (solid bar) to a Control Specification (CSPEC), which contains State Transition Diagrams (STDs)

- (B) Data processing and control processing are represented on the same diagram using dashed bubbles for control processes and solid bubbles for data processes.
  - (C) Control processing is modeled using state machines embedded directly within the data stores of the DFD model.
  - (D) Control aspects are modeled purely as auxiliary mathematical functions within a global data dictionary.
129. The hierarchical McCall Quality Model organizes software quality attributes into three distinct high-level parameters reflecting different perspectives of product usage. If a software development team is tasked with assessing "Product Revision" (how easy it is to modify or debug), which of the following sets of quality factors must they evaluate?
- (A) Correctness, Reliability, Usability, Integrity, Efficiency
  - (B) Maintainability, Flexibility, Testability
  - (C) Portability, Reusability, Interoperability
  - (D) Usability, Maintainability, Portability
130. Which of the following KPAs is introduced at SEI CMM Level 3 (Defined), but was not a Level 2 KPA?
- (A) Quantitative Process Management, Software Quality Management.
  - (B) Defect Prevention, Technology Change Management, Process Change Management.
  - (C) Organization Process Definition, Training Program, Peer Reviews.
  - (D) Software Configuration Management, Software Project Planning, Requirements Management.
131. A software project is classified as an "organic" mode project under the Basic COCOMO model, with an estimated size of 32 KLOC. Using the Basic COCOMO effort equation  $E = a \times (\text{KLOC})^b$ , with organic-mode constants  $a = 2.4$  and  $b = 1.05$ , what is the estimated nominal effort (rounded to one decimal place)?
- (A) 91.3 person-months
  - (B) 76.8 person-months
  - (C) 110.4 person-months
  - (D) 128.0 person-months
132. In the Function Point (FP) metric, which of the following is NOT one of the five information domain characteristics counted to compute the Unadjusted Function Points (UFP)?
- (A) Number of external inputs
  - (B) Number of external outputs
  - (C) Number of external inquiries
  - (D) Number of lines of code

**D**

133. According to Halstead's Software Science, the Program Volume (V) of a program is computed using which of the following formulas, where N denotes the program length and n denotes the program vocabulary?
- (A)  $V = N \times \log_2(n)$  (B)  $V = n \times \log_2(N)$   
(C)  $V = N \div \log_2(n)$  (D)  $V = n \wedge N$
134. Which of the following is NOT listed as a desirable characteristic of a good Software Requirements Specification (SRS) document?
- (A) Consistent (B) Verifiable (C) Ambiguous (D) Traceable
135. In the Model-View-Controller (MVC) design pattern, which component is responsible for maintaining the application's core data and business logic, independent of any specific user-interface representation?
- (A) View (B) Controller (C) Model (D) Observer
136. According to McCabe's Cyclomatic Complexity metric, for a program's Control Flow Graph (CFG) having E edges and N nodes, the cyclomatic complexity V(G) is computed as:
- (A)  $V(G) = E - N + 2$  (B)  $V(G) = N - E + 2$   
(C)  $V(G) = E + N - 2$  (D)  $V(G) = E - N - 2$
137. Which of the following correctly expresses the relationship between Mean Time Between Failures (MTBF), Mean Time To Failure (MTTF) and Mean Time To Repair (MTTR)?
- (A)  $MTBF = MTTF + MTTR$  (B)  $MTBF = MTTF - MTTR$   
(C)  $MTBF = MTTF \times MTTR$  (D)  $MTBF = MTTF \div MTTR$
138. Which category of software maintenance is performed specifically to correct defects that were not discovered during the testing phase of the software development life cycle?
- (A) Adaptive maintenance (B) Perfective maintenance  
(C) Corrective maintenance (D) Preventive maintenance
139. Under the X.800 Security Architecture, security attacks are classified as either passive or active. Which of the following statements is/are CORRECT regarding these attacks?
- ✓ I. Passive attacks are highly difficult to detect because they do not involve any data alteration, meaning the transmission appears normal to both parties.
- II. Active attacks present the opposite characteristics: they are easy to prevent absolutely, but highly difficult to detect.
- III. Traffic analysis is a passive attack that relies on masking message contents via encryption and then observing message frequency, source/destination and lengths to guess communication patterns.

IV. Denial of Service (DoS) is an active attack that prevents or inhibits the normal use or management of communications facilities.

- (A) I and IV only ✗ (B) I, III and IV only  
(C) II and III only ✗ (D) I, II and IV only ✗

140. According to ITU-T Recommendation X.800, which of the following security mechanisms is correctly mapped to its category and the security service it provides?

- (A) Security Audit Trail is a Specific Security Mechanism used to provide Peer Entity Authentication.  
(B) Encipherment is a Specific Security Mechanism used to provide Data Confidentiality.  
(C) Routing Control is a Pervasive Security Mechanism used to provide Nonrepudiation.  
(D) Notarization is a Pervasive Security Mechanism used to provide Availability.

141. While 'Data Confidentiality' and 'Privacy' are often used interchangeably, RFC 4949 and NIST SP 800-12 draw a clear distinction between them. Which of the following statements correctly represents this distinction?

- (A) Confidentiality ensures that personal data is processed using asymmetric cryptography, while privacy ensures that symmetric keys are used to hide database schemas.  
(B) Confidentiality is the protection of data from unauthorized disclosure, whereas privacy is the assurance that individuals control or influence what information related to them may be collected, stored and to whom it may be disclosed.  
(C) Privacy is a technical protocol mechanism implemented at the link layer, whereas confidentiality is a legal right granted under international maritime law.  
(D) Confidentiality is the right of an organization to intercept employee communications, while privacy is the requirement to obtain a warrant before accessing databases.

142. In multiple encryption schemes, such as Double DES (using two keys  $K_1$  and  $K_2$ ), a major security bottleneck is the Meet-in-the-Middle attack. If the block cipher has a key size of  $k$  bits, what is the effective cryptographic strength (in terms of time complexity) and memory requirement of Double DES under this attack?

- (A) Time complexity:  $O(2^{2k})$ , Space complexity:  $O(1)$   
(B) Time complexity:  $O(2^{k+1})$ , Space complexity:  $O(2^k)$   
(C) Time complexity:  $O(2^k)$ , Space complexity:  $O(2^k)$   
(D) Time complexity:  $O(2^k)$ , Space complexity:  $O(1)$

**D**

143. Consider the feedback characteristics and error propagation of block cipher modes of operation: Cipher Block Chaining (CBC), Cipher Feedback (CFB), Output Feedback (OFB) and Counter (CTR) mode. Which of the following statements is **INCORRECT**?
- (A) In CBC mode, a 1-bit error in a ciphertext block  $C_i$  affects the decryption of the corresponding plaintext block  $P_i$  and the subsequent plaintext block  $P_{i+1}$ .
  - (B) In CFB mode, the input to the encryption algorithm is the preceding ciphertext block, making it a stream-oriented mode where errors in ciphertext propagate to subsequent blocks.
  - (C) In OFB mode, the input to the encryption algorithm is the preceding encryption output, which means controlled changes to the ciphertext result in predictable changes to the recovered plaintext, making it highly vulnerable to message stream modification.
  - (D) In CTR mode, because there is no chaining, decryption can be performed in parallel, but any error in a single ciphertext block  $C_i$  propagates and corrupts all subsequent plaintext blocks.
144. In the taxonomy of malicious software, a botnet represents a network of compromised computers (zombies) controlled by a botmaster. Which of the following statements correctly distinguishes between botnet propagation mechanisms and payloads?
- (A) Propagation involves vulnerability exploits (worms) or social engineering (Trojans) to infect new hosts, while the payload turns the infected host into an active attack agent (zombie) for actions like DDoS or spam.
  - (B) Propagation involves the use of backdoors to maintain stealth on a target machine, while payloads are limited strictly to brute-forcing the administrator password.
  - (C) Propagation is handled entirely by the Boot sector of the host's hard drive, while payloads are sent only through physical USB drives.
  - (D) Propagation is a reactive service that repairs security vulnerabilities, while the payload is a proactive service that registers domain names with CERT-In.
145. During a Transmission Control Protocol (TCP) SYN flooding attack, the attacker floods the victim with SYN packets to exhaust its connection queue. To counter this without allocating state memory for half-open connections, what cryptographic mechanism can the defender employ?
- (A) AES-GCM: It encrypts the entire TCP handshake sequence and verifies it via a MAC.
  - (B) Diffie-Hellman Key Exchange: It forces the attacker to compute a shared secret key before sending the SYN packet.

- (C) **SYN Cookies:** The responder sends a cryptographically generated sequence number (cookie) in the SYN-ACK packet that encodes connection parameters, requiring the client to echo it in the ACK packet to authenticate the connection before state is allocated.
- (D) **Traffic Padding:** It inserts dummy bits into the TCP segment header to confuse the attacker's parsing engine.
146. The original Wired Equivalent Privacy (WEP) protocol of the IEEE 802.11 standard contains severe cryptographic vulnerabilities. Which of the following is the primary reason why WEP is insecure against key-recovery attacks?
- (A) WEP uses AES in CBC mode, which is vulnerable to padding oracle attacks.
- (B) WEP uses a short 24-bit Initialization Vector (IV) concatenated with a static pre-shared key as seed to the RC4 stream cipher, leading to rapid IV reuse and weaknesses in the RC4 key scheduling algorithm.
- (C) WEP does not employ any checksum or error-detecting code, allowing attackers to modify messages without detection.
- (D) WEP requires the use of public-key certificates for every wireless client, which overloads the wireless access point.
147. In IT security risk management, which of the following represents the correct relationship among Asset, Threat, Vulnerability and Risk?
- (A) Risk is the product of Asset Value and Threat frequency, while Vulnerability is a countermeasure that automatically eliminates Threat.
- (B) Asset is a software program that generates Threats, while Risk is a passive security service.
- (C) Vulnerability is the legal liability of an organization, while Threat is a specific hardware component.
- (D) A Threat is a potential for violation of security, which exploits a Vulnerability to cause harm to an Asset, resulting in a Risk.

**D**

148. Ethical hacking requires clear boundaries to distinguish it from malicious intrusion. Which of the following is a primary characteristic that distinguishes an ethical hacking engagement (penetration testing) from cybercrime?
- (A) Ethical hackers use advanced zero-day exploits that are legally patented by the government, while malicious hackers only use public scripts.
  - (B) Ethical hackers operate under written, explicit authorization from the asset owner, maintain confidentiality of the findings and report discovered vulnerabilities for remediation.
  - (C) Ethical hackers are permitted to destroy production databases and alter financial records as long as they provide a verbal summary to the IT head.
  - (D) Ethical hackers only perform automated vulnerability scans and are strictly prohibited from writing code or using the command-line interface.
149. In cloud security data protection, which of the following correctly describes the security trade-off between multi-instance and multi-tenant database models?
- (A) Multi-instance models run a unique DBMS instance per subscriber, offering complete subscriber control over authorization and high isolation, but at a higher resource cost; multi-tenant models share a single DBMS instance where data is tagged, relying heavily on the cloud provider's logical isolation.
  - (B) Multi-tenant models encrypt data using symmetric keys, while multi-instance models are prohibited from using any form of cryptography.
  - (C) Multi-instance models share a single database table among all subscribers without any tagging, while multi-tenant models isolate users at the hardware level using physical fiber-optic switches.
  - (D) There is no security difference; both models are physically hosted on the client's on-premise mainframe.
150. The Indian Computer Emergency Response Team (CERT-In) is designated as the national nodal agency for cybersecurity incident response. Under which Section and of which Act does CERT-In derive its statutory powers and functions?
- (A) Section 43 of the Indian Penal Code, 1860
  - (B) Section 79 of the Companies Act, 2013
  - (C) Section 66A of the Indian Evidence Act, 1872
  - (D) Section 70B of the Information Technology Act, 2000
151. Consider a Key-Value store using the key naming convention  
EntityName : Identifier : Attribute.
- If we store a customer's email as Cust : 101 : Email, which of the following represents a significant limitation of this model compared to a Relational Database?

- (A) It is impossible to update the value once written.
  - (B) The database cannot enforce data type validation on the value (e.g., ensuring the value is a valid string).
  - (C) The keys are not unique within the namespace.
  - (D) It requires a join operation to retrieve the value.
152. Document databases often use JSON or XML. Which of the following is a structural advantage of a Document store over a Key-Value store?
- (A) Documents allow querying and filtering based on internal attributes (fields), whereas Key-Value stores typically only allow lookups by key.
  - (B) Documents force all records to have the exact same size.
  - (C) Document stores do not use keys or identifiers to retrieve records.
  - (D) Documents prevent the use of arrays or nested structures
153. In a Column Family database like Google Bigtable or Cassandra, a specific data value is indexed by a tuple of three elements. What are they?
- (A) (Table Name, Column ID, Data Type)
  - (B) (Row Key, Column Name, Time Stamp)
  - (C) (Partition Key, Shard ID, Sequence Number)
  - (D) (Node ID, Disk Sector, Checksum)
154. Which data structure is primarily used to implement Column Family databases?
- (A) A dense matrix of fixed-width columns.
  - (B) A sparse, multidimensional distributed map.
  - (C) A balanced B-Tree for all columns.
  - (D) A linked list of JSON documents.
155. According to the CAP theorem (Brewer's theorem), a distributed system can simultaneously guarantee only two of which three properties?
- (A) Consistency, Authentication, Performance
  - (B) Consistency, Availability, Partition Tolerance
  - (C) Concurrency, Atomicity, Persistence
  - (D) Cluster, Availability, Performance

**D**

156. In the context of the CAP theorem, what does "Partition Tolerance" specifically refer to?
- (A) The ability of the database to shard data across hard drives.
  - (B) The ability of the system to continue operating despite a network failure that prevents communication between servers.
  - (C) The ability to partition a table into smaller vertical segments.
  - (D) The ability to allow multiple users to write to the same record simultaneously.
157. In a distributed system subject to CAP, if a network partition occurs, the system designer must choose between
- (A) Scalability and Latency
  - (B) Consistency and Availability
  - (C) Atomicity and Durability
  - (D) Encryption and Compression
158. NoSQL databases typically follow the BASE model. What does the acronym BASE stand for?
- (A) Basic Availability, Soft state, Eventual consistency
  - (B) Big Availability, Stable state, Enforced consistency
  - (C) Binary Atomic, Structured storage, Efficient consistency
  - (D) Basic Atomicity, Scalable storage, Eventual consistency
159. Consider the following statements regarding Denormalization in NoSQL:
- I. It minimizes the need for Join operations.
  - II. It increases the complexity of reading data.
  - III. It results in redundant data storage.
  - IV. It is primarily used to improve Write performance at the cost of Read performance.
- Which of the above statements are CORRECT?
- (A) I and III only
  - (B) II and IV only
  - (C) I, III and IV
  - (D) I and II only
160. What is the defining characteristic of a hybrid cloud?
- (A) It is owned by an organization that sells cloud services to the public.
  - (B) It serves a common function for a single organization.
  - (C) It is managed by a third party off-premises.
  - (D) It combines multiple clouds (such as private and public) which remain unique but are bound together.
161. Which cloud characteristic is defined by a pay-as-you-go model that matches resources to ongoing needs, thereby eliminating waste?
- (A) Scalability
  - (B) Utility
  - (C) Low barrier to entry
  - (D) Elasticity

162. What is a key benefit of the SaaS model regarding software versions?
- (A) Each user can choose which version of the software they want to run.
  - (B) Users are responsible for performing their own automated upgrades and updates.
  - (C) It supports multiple users, but each may be running a different, incompatible version.
  - (D) All users have the same version of the software, ensuring compatibility among them.
163. What is the fundamental role of a hypervisor (or Virtual Machine Monitor)?
- (A) To provide virtual machines with access to the physical system's resources.
  - (B) To clone and replicate machine instances for failover.
  - (C) To virtualize systems by mapping a logical address to a physical address.
  - (D) To run only a single application or process inside a sandbox.
164. For which type of application would a "High Memory Instance" be the most appropriate choice?
- (A) Standard server applications.
  - (B) Applications that require high data throughput, such as large databases or data caching.
  - (C) Compute-intensive tasks like data analysis.
  - (D) Small applications that run in short periodic bursts.
165. Which of the following is an example of a structural hazard in pipelining?
- (A) Two instructions needing the same memory port simultaneously
  - (B) Branch instruction altering program counter
  - (C) Data dependency between consecutive instructions
  - (D) Cache coherence delay
166. A company keeps sensitive databases on-premise but uses AWS for high-traffic web services. This is an example of
- (A) Public cloud
  - (B) Private cloud
  - (C) Community cloud
  - (D) Hybrid cloud
167. Which statement is TRUE about private cloud?
- (A) It is always hosted on-premise
  - (B) It cannot be managed by a third party
  - (C) It is dedicated to a single organization
  - (D) It automatically scales like public cloud

**D**

168. Which technology introduced packet-oriented data transfer to the GSM network, often referred to as 2.5G?
- (A) HSCSD (High Speed Circuit Switched Data)
  - (B) GPRS (General Packet Radio Service)
  - (C) EDGE (Enhanced Data rates for GSM Evolution)
  - (D) UMTS (Universal Mobile Telecommunications System)
169. A "Soft Handover" is a characteristic feature of which multiple access technology?
- (A) CDMA
  - (B) TDMA
  - (C) FDMA
  - (D) SDMA
170. Which of the following logical channels in GSM is responsible for carrying the dialled digits and short messages (SMS)?
- (A) Stand-alone Dedicated Control Channel (SDCCH)
  - (B) Slow Associated Control Channel (SACCH)
  - (C) Fast Associated Control Channel (FACCH)
  - (D) Traffic Channel (TCH)
171. Which technology in WAP 2.0 allows the use of standard Internet protocols like TCP/IP and HTTP?
- (A) Wireless Session Protocol
  - (B) Wireless Transaction Protocol
  - (C) Wireless Profiled TCP and HTTP
  - (D) UDP only
172. The concept of 'Mobile First' design suggests that developers should
- (A) Charge users for the mobile app before allowing them to use the web version.
  - (B) Start by designing for the smallest screen and then scale up for larger devices.
  - (C) Only develop apps for mobile phones and ignore tablets and desktops.
  - (D) Design the desktop version first and then shrink it for mobile devices.
173. Which navigation pattern is characterized by a hidden menu that slides in from the side of the screen?
- (A) Tab bar
  - (B) Infinite scroll
  - (C) Navigation drawer
  - (D) Breadcrumbs
174. During a software design audit, an architect finds that modules M1 and M2 are stamp-coupled: M1 defines a local array of records and M2's functions receive this array as a parameter to perform several unrelated operations on it (one function validates entries, another sorts them, another generates a report) — with no required order between these operations. The architect merges M1 and M2 into a single module, Mnew, eliminating the parameter-passing interface between them. What is the resulting cohesion type of Mnew?

- (A) Functional Cohesion
- (C) Procedural Cohesion

- (B) Communicational Cohesion
- (D) Sequential Cohesion

175. In the Extreme Programming (XP) agile methodology, several traditional software development best practices are carried out to extreme levels. Which of the following options correctly maps a traditional software engineering practice to its corresponding XP practice when pushed to the limit?
- (A) Traditional Code Review → Test-Driven Development (TDD)
  - (B) Traditional Code Review → Pair Programming
  - (C) Traditional Testing → Continuous Refactoring
  - (D) Traditional Designing → Continuous Integration
176. The Science, Technology and Innovation (STI) Policy of Gujarat (2026–31), unveiled at the Gujarat SemiConnect Conference 2026, established a dedicated ₹1,000 crore fund to accelerate indigenous research in strategic and frontier sectors. What is this fund called?
- (A) Aatmanirbhar Bharat Fund
  - (B) Swadeshi Anusandhan Fund
  - (C) Startup Gujarat Fund
  - (D) Digital Gujarat Innovation Fund
177. Which organization is the implementing agency for the "National Supercomputing Mission" (NSM), jointly with the Indian Institute of Science (IISc), Bengaluru?
- (A) NIC
  - (B) C-DAC
  - (C) DRDO
  - (D) ISRO
178. "GIFT City" (Gujarat International Finance Tec-City), which includes a dedicated area for IT/ITeS services, is developed across which types of zones?
- (A) Free Trade Warehousing Zone (FTWZ) only
  - (B) Special Economic Zone (SEZ) only
  - (C) Domestic Tariff Area (DTA) only
  - (D) Both SEZ and DTA
179. Which authority is appointed under the IT Act, 2000 to license and regulate the working of "Certifying Authorities" (CAs) who issue Digital Signature Certificates?
- (A) The Controller of Certifying Authorities (CCA)
  - (B) The Nodal Officer of CERT-In
  - (C) The Cyber Appellate Tribunal
  - (D) The Director General of NIC

**D**

180. The "CCTNS" project is a Mission Mode Project under the Ministry of Home Affairs. What does CCTNS stand for?
- (A) Central Command for Traffic and Network Security
  - (B) Crime and Criminal Tracking Network and Systems
  - (C) Cyber Crime and Terror Network Surveillance
  - (D) Citizen Centric Technology and Network Services
181. Consider the following about "e-Office":
- Statement I: It is a Mission Mode Project. ✓
- Statement II: It aims to usher in a "Paperless Office" in government departments.
- Statement III: It is developed by C-DAC. ✓
- Which is correct?
- (A) I and II only      (B) II and III only      (C) I and III only      (D) All of the above
182. In the context of "DigiLocker" architecture, which entity is responsible for pushing the Uniform Resource Indicator (URI) of e-documents to the DigiLocker system?
- (A) The Resident (User)
  - (B) The Requestor
  - (C) The Issuer
  - (D) The Repository Service Provider
183. The "Digitize India Platform" (DIP), an initiative under Digital India to convert scanned document images into usable digital data, uses which distinctive combination of methods?
- (A) Only manual data entry by government employees
  - (B) Optical Character Recognition (OCR) exclusively, with no human involvement
  - (C) A combination of machine intelligence and a cost-effective crowd-sourcing model involving citizen "Digital Contributors"
  - (D) Outsourcing exclusively to a single private IT vendor under contract
184. The "GI Cloud" initiative, popularly known as "Meghraj," was launched by the Government of India in 2014 and is implemented by which organization?
- (A) C-DAC
  - (B) National Informatics Centre (NIC)
  - (C) STQC Directorate
  - (D) Controller of Certifying Authorities
185. "e-Kranti," approved as "National e-Governance Plan (NeGP) 2.0" and a key pillar of Digital India, expanded the number of Mission Mode Projects (MMPs) from 31 to how many, under the vision "Transforming e-Governance for Transforming Governance"?
- (A) 27      (B) 35      (C) 44      (D) 50
186. Among the eleven key principles of e-Kranti (NeGP 2.0), which principle is listed FIRST, requiring that every project proposal involve a substantial change in the

quality, quantity and manner of service delivery rather than a mere digital copy of the existing process?

- (A) Transformation and not Translation      (B) Cloud by Default  
(C) Mobile First      (D) Language Localization

187. Section 43A, inserted into the Information Technology Act, 2000 by the IT (Amendment) Act, 2008, primarily deals with

- (A) Punishment for cyber terrorism  
(B) Compensation payable by a body corporate for its failure to protect sensitive personal data or information  
(C) Licensing of Certifying Authorities  
(D) Blocking of public access to information

188. The Standardization Testing and Quality Certification (STQC) Directorate, which provides quality assurance, testing and certification services in Electronics and IT (including for many e-Governance projects), functions as an attached office of which Ministry?

- (A) Ministry of Home Affairs  
(B) Ministry of Commerce and Industry  
(C) Ministry of Electronics and Information Technology (MeitY)  
(D) Ministry of Science and Technology

189. The National e-Governance Division (NeGD), established in 2009 as an independent business division under the Digital India Corporation, primarily supports MeitY by

- (A) Manufacturing electronic hardware for government offices  
(B) Programme management, technical and advisory support for the implementation of e-Governance projects (e.g., DigiLocker, UMANG) across Central and State levels  
(C) Issuing Digital Signature Certificates to citizens  
(D) Conducting cyber-crime investigations

190. The Gujarat IT/ITeS Policy 2022-27 set a target to increase the state's annual IT/ITeS exports from approximately ₹3,000 crore to what target figure?

- (A) ₹10,000 crore      (B) ₹15,000 crore      (C) ₹25,000 crore      (D) ₹50,000 crore

**D**

191. Section 4 of the Information Technology Act, 2000 is significant because it
- (A) Grants legal recognition to electronic records, treating them as equivalent to paper-based documents
  - (B) Establishes the Cyber Appellate Tribunal
  - (C) Defines the offence of identity theft
  - (D) Sets out the composition of the Controller of Certifying Authorities' office
192. The National Informatics Centre (NIC), which provides IT infrastructure, e-Governance application development and network support (including GI Cloud/Meghraj) to Central and State Governments, was established in which year and functions under which Ministry?
- (A) 1986; Ministry of Home Affairs
  - (B) 1976; Ministry of Electronics and Information Technology (MeitY)
  - (C) 2006; Ministry of Science and Technology
  - (D) 1998; Ministry of Communications
193. As originally enacted, the Information Technology Act, 2000 included consequential amendments to three other Indian laws to align them with electronic records and digital signatures. Which of the following was NOT one of the laws amended by the IT Act, 2000?
- (A) The Indian Penal Code, 1860
  - (B) The Indian Evidence Act, 1872
  - (C) The Reserve Bank of India Act, 1934
  - (D) The Indian Contract Act, 1872
194. "MinHash" is a technique used in large-scale applications (like Google Search or document deduplication) to efficiently compare sets. The probability that the MinHash values of two sets are the same is equal to their
- (A) Jaccard Similarity Coefficient
  - (B) Hamming Distance
  - (C) Euclidean Distance
  - (D) Cosine Similarity
195. The "Raft" algorithm has largely replaced Paxos in modern distributed systems (like Etcd, Consul) because
- (A) Raft provides stronger consistency than Paxos.
  - (B) Raft is computationally faster.
  - (C) Raft is designed for understandability, decomposing consensus into leader election, log replication and safety.
  - (D) Paxos cannot handle network partitions.
196. "RISC-V" is a major trend in computer architecture. What distinguishes it from x86 and ARM?
- (A) It is an open-source Instruction Set Architecture (ISA)

[Contd.]

- (B) It uses Complex Instruction Set Computing (CISC).  
(C) It is owned exclusively by Intel.  
(D) It cannot run Linux.
197. HTTP/3 is the newest version of the Hypertext Transfer Protocol. It is based on which underlying transport protocol?  
(A) TCP (B) QUIC (C) SCTP (D) ICMP
198. Google Play now requires "Android App Bundles" (.aab) instead of APKs for new apps. The primary benefit is  
(A) Dynamic Delivery according to device configuration.  
(B) It includes the source code for users to read.  
(C) It allows the app to run on iOS.  
(D) It bypasses security checks.
199. The "IndiaAI Mission," approved by the Union Cabinet in March 2024 with an outlay of approximately ₹10,372 crore, tackles India's shortage of AI computing power mainly through its "Compute" pillar. This pillar provides GPU access to startups, researchers and academia at  
(A) Full international market rates, with no government support.  
(B) A government-subsidized rate (around ~₹65 per hour) through the IndiaAI Compute Portal.  
(C) No cost whatsoever, funded entirely by private donations.  
(D) Access restricted only to central government departments.
200. "Retrieval-Augmented Generation (RAG)" is a widely adopted technique used to reduce hallucinations and improve factual accuracy in Large Language Models (LLMs). RAG works by  
(A) Retraining the entire LLM from scratch for every user query.  
(B) Permanently deleting the LLM's parametric (trained) memory.  
(C) Compressing the LLM's parameters to reduce model file size.  
(D) Retrieving relevant information from an external knowledge source and supplying it to the LLM as context before it generates a response.
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