



Paper - II

COMPUTER SCIENCE

Booklet Code

A

Test Booklet No.

SUBJECT CODE : 1 0

Roll No. :

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(Figures as per admission card)

Roll No. (in words) :

OMR Sheet No. :

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Name and Signature of Invigilator/s

Signature : _____

Name : _____

Time : 2 Hours

Maximum Marks : 200

Number of Pages in this Booklet : 32

Number of Questions in this Booklet : 100

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of hundred (100) multiple-choice type of questions.
3. At the commencement of examination, the test booklet will be given to you. In the first 5 minutes, you are requested **To Open the Booklet and Compulsorily Examine it as Below:**
 - (i) To have access to the Test Booklet, tear off the paper seal on the edge of the cover page. Do not accept a booklet without sticker seal or open booklet.
 - (ii) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the Test Booklet will be replaced nor any extra time will be given.
 - (iii) After the verification is over, the Test Booklet Number should be entered in the OMR Sheet and the OMR Sheet Number should be entered on this Test Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
Example : Ⓐ Ⓑ ● Ⓓ
 where (C) is the correct response.
5. Your responses to the questions are to be indicated in the **OMR Sheet kept inside this Booklet**. If you mark at any place other than in the circles, the OMR Sheet will not be evaluated.
6. Read the instructions given in OMR Sheet carefully. Fill the Booklet Code of Paper-II in OMR Sheet **Compulsorily**.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the OMR Answer Sheet, except for the space provided for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the OMR answer Sheet to the invigilators at the end of the examination compulsorily and must NOT carry it with you outside the Examination Hall.
10. You can take away test booklet and carbon copy of OMR Answer Sheet after the examination.
11. **Use only Blue/Black Ball point pen.**
12. **Use of any calculator, electronic gadgets or log table, etc. is prohibited.**
13. **There is no negative mark for incorrect answer.**

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Total Number of Pages : 32

1. A virtual memory system with 32 bit virtual addresses uses 4KB page size and 128 MB byte-addressable main memory. What is the virtual page number size (in bit) for this memory system?
 - (A) 20
 - (B) 15
 - (C) 32
 - (D) 27
2. Which of the following pairs of equivalence of logic expressions is not true?
 - (A) $X(Y+Z) = (XY)+(XZ)$
 - (B) $(X+Y)' = X'Y'$
 - (C) $XY+YZ+XZ = XY+X'Z$
 - (D) $XY+YZ+ZX = (X+Y)(Y+Z)(Z+X)$
3. Which of the following is not the reason of cache coherence problem in shared memory MIMD Processors?
 - (A) Sharing of writable data
 - (B) Process migration
 - (C) I/O activity
 - (D) Multithreading
4. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
 Assertion (a) : In a pipelined processor, if there are k stages in the instruction pipeline, then the speedup factor of pipeline is approximately k.
 Reason (r) : Dependencies among instructions reduces the speedup factor of an instruction pipeline.
 - (A) Both (a) and (r) are true and (r) is correct explanation of (a)
 - (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
 - (C) (a) is true, but (r) is false
 - (D) (a) is false, but (r) is true
5. Given below are two statements :
 Statement I: Mutual exclusion and other synchronization problems in multiprocessors can be solved by high level synchronization constructs like semaphores, conditional critical reasons, monitors etc.
 Statement II: The use of spin-locks in cache based multiprocessors gives rise to a new problem called thrashing.
 In light of the above statements, choose the most appropriate answer from the codes given below:
 - (A) Both Statement I and Statement II are correct
 - (B) Both Statement I and Statement II are incorrect
 - (C) Statement I is correct and Statement II is incorrect
 - (D) Statement I is incorrect and Statement II is correct



6. Given below are two statements:
Statement I: In RISC based processors, generally microprogrammed control is used.

Statement II: In CISC based processors, instructions are of variable lengths.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect
(D) Statement I is incorrect and Statement II is correct

7. Given below are two statements:
Statement I: Access time of memory in memory hierarchy increases as you move away from the processor.

Statement II: Cost per bit of memory in memory hierarchy decreases as you move away from the processor.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect
(D) Statement I is incorrect and Statement II is correct

8. Arrange the following operators used in Boolean expressions in the order of their precedence from highest to lowest :

- (i) OR
(ii) Parenthesis
(iii) NOT
(iv) AND

Choose the correct answer from options given below:

- (A) (iii), (iv), (i), (ii)
(B) (ii), (i), (iv), (iii)
(C) (ii), (iii), (iv), (i)
(D) (ii), (i), (iii), (iv)

9. Match List-I and List-II and select the correct answer from the codes given below:

List-I (Operation)	List-II (Register Used)
P. Instruction Fetch	1. AX
Q. ADD	2. ZF
R. POP	3. IP
S. JZ	4. SP

Codes:

	P	Q	R	S
(A)	3	1	4	2
(B)	3	4	1	2
(C)	2	3	4	1
(D)	4	1	2	3



10. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Perform the following micro operations on $R \leftarrow 11001$)

P. Register transfer micro operation

Q. Arithmetic micro operation

R. Logic micro operation

S. Shift micro operations

List-II

(Content of R after operation)

1. $R2 \leftarrow R1 \vee R3$

2. $R1 \leftarrow \text{ashl } R1$

3. P: $R2 \leftarrow R1$

4. $R2 \leftarrow R1 + R3$

Codes:

	P	Q	R	S
(A)	3	1	4	2
(B)	1	4	3	2
(C)	3	4	1	2
(D)	4	1	2	3

11. If a non-redundant constraint is removed from an LP problem, then :

- (A) feasible region will become larger
- (B) feasible region will become smaller
- (C) solution will become infeasible
- (D) feasible region will remain same

12. How any four digit different numbers greater than 5000 can be formed with the following digits - 0, 1, 2, 5, 9 if repetition is not allowed?

- (A) 128
- (B) 48
- (C) 24
- (D) 64



13. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): One disadvantage of using North-West Corner Rule to find initial solution to the transportation problem is that it does not take into account cost of transportation.

Reason (r) : The solution to a transportation problem with m-rows (supplies) and n-columns (destination) is feasible if number of positive allocations are $m + n - 1$.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true

14. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Rule of Reference in Logic)

- P. Modus Ponens
- Q. Modus Tollens
- R. Disjunctive Syllogism
- S. Hypothetical Syllogism

List-II

(Symbolic Representation)

1. $((p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r))$
2. $(\neg p \wedge (p \vee q) \rightarrow q)$
3. $(p \wedge (P \rightarrow q)) \rightarrow q$
4. $(\neg q \wedge (p \rightarrow q)) \rightarrow \neg p$

Codes:

	P	Q	R	S
(A)	1	2	3	4
(B)	2	4	1	3
(C)	4	2	1	3
(D)	3	4	2	1



15. Given below are two statements:
Statement I: A cyclic group is always an abelian group but every abelian group is not a cyclic group.
Statement II: An isomorphism can also be called automorphism if both domain and range are not equal.
In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

16. Given below are two statements:
Statement I: If a connected planar graph G has e edges and v vertices, then $3v - e \geq 6$.
Statement II: Any connected graph is called as a Euler Graph if and only if all its vertices are of even degree.
In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

17. Given below are two statements:
Statement I: The cardinality of a set with n elements is always n^2 .
Statement II: There are 2^n subsets of a set of n elements.
In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

18. Arrange the following steps involved in PERT/CPM in the order of first to last step:

- I. Computing critical path
- II. Developing relationship among activities
- III. Preparation of Work Breakdown Structure
- IV. Assigning time/cost estimate to activities
- V. Construction of Network diagram

- (A) III, II, V, IV, I
- (B) I, II, III, IV, V
- (C) V, IV, I, III, II
- (D) V, IV, III, II, I



19. Arrange the following in increasing order of their chromatic numbers:
- Bipartite graphs
 - Singleton graph
 - K_5 graph
 - 2-regular graph of 4 vertices
- III, II, I, IV
 - I, II, III, IV
 - II, I, IV, III
 - II, IV, I, III
20. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
- Assertion (a): A department contains 13 professors. Then two of the professors were born in the same month.
- Reason (r): The Pigeonhole Principle states that if there are more "pigeons" than "pigeonholes," there must be at least one pigeonhole with more than one pigeon.
- Both (a) and (r) are true and (r) is correct explanation of (a)
 - Both (a) and (r) are true and (r) is not correct explanation of (a)
 - (a) is true, but (r) is false
 - (a) is false, but (r) is true
21. Which of the following model is used by Linux directory structure?
- File Allocation Table (FAT)
 - Binary Tree Structure
 - Graph Structure
 - File System Hierarchy Standard
22. The concept of "thin clients" in network-based operating systems refers to:
- Lightweight laptops used for remote access to servers
 - Computers that rely heavily on local resources and minimal network communication
 - Systems that depend on a central server for processing and storage
 - Mobile devices with limited computing power
23. Consider a disk with 1000 cylinders numbered from 0 to 999. The disk arm is currently at cylinder 300 and moving towards cylinder 800. If there are pending requests at cylinders 350, 780, 200, 900, 600 and 480, which disk scheduling algorithm will result in the lowest variance of seek time?
- C-LOOK
 - SCAN
 - LOOK
 - C-SCAN



24. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): The priority-based approach for deadlock handling leads to starvation.

Reason (r): The priority-based approach always terminates the process with the lowest priority to resolve the deadlocks.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true

25. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): Fast User Switching is a feature available on all major operating systems, including Windows, macOS and Linux.

Reason (r): Fast User Switching allows users to switch between multiple user accounts without requiring administrative privileges.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true

26. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Attack)

- P. Phishing
- Q. Denial of Service (DoS)
- R. Man-in-the-Middle
- S. SQL Injection

List-II

(Descriptions)

- 1. An attack where an attacker intercepts and alters communication between two parties without their knowledge.
- 2. An attack that floods a network or server with excessive traffic, making it unavailable to legitimate users.
- 3. A technique used to trick users into revealing sensitive information by posing as a trustworthy entity.
- 4. An attack that exploits vulnerabilities in a web application's database query system to access unauthorized data.

Codes:

	P	Q	R	S
(A)	3	1	2	4
(B)	3	2	1	4
(C)	4	3	2	1
(D)	2	3	4	1



27. Match List-I and List-II and select the correct answer from the codes given below:

List-I (Components)

- P. Hypervisor (Type 2)
- Q. Full Virtualization
- R. Paravirtualization
- S. Containerization

List-II (Descriptions)

1. A virtualization technique where the guest operating system is modified to work with a virtual machine monitor, improving performance by allowing direct communication between the guest and the hypervisor.
2. A virtualization technique where multiple instances of an operating system share the same OS kernel but are isolated from each other using namespaces and control groups.
3. A virtualization technique that emulates the complete hardware environment, allowing unmodified guest operating systems to run on the virtual machine.
4. A virtualization technique that runs on top of a host operating system and requires a host OS to manage the virtual machines.

Codes:

	P	Q	R	S
(A)	1	2	4	3
(B)	4	3	1	2
(C)	4	1	3	2
(D)	4	2	1	3

28. Given below are two statements:
Statement I: Using semaphores for process synchronisation is more CPU intensive than a busy-wait method.
Statement II: All operations on semaphores should be atomic or indivisible.
In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

29. Given below are two statements:
Statement I: Multithreading is beneficial in applications that conduct a number of fundamentally separate activities that are not serialised.
Statement II: A database server that listens for and processes many client requests is an example of multithreading.

- In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
 - (B) Both Statement I and Statement II are incorrect
 - (C) Statement I is correct and Statement II is incorrect
 - (D) Statement I is incorrect and Statement II is correct



30. Arrange the following sequence types in ascending order of reliability (from least to most reliable) in a robust distributed system:
- P. At-most-once delivery
Q. At-least-once delivery
R. Exactly-once delivery
S. Best-effort delivery
- (A) S-Q-P-R
(B) P-R-Q-S
(C) S-P-Q-R
(D) S-R-Q-P
31. Which software process model is suitable for projects with changing requirements and involves frequent communication with stakeholders?
- (A) Waterfall Model
(B) Spiral Model
(C) V-Model
(D) Incremental Model
32. Which requirement elicitation technique involves observing users in their work environment to understand their tasks and interactions with the current system?
- (A) Brainstorming
(B) Interviews
(C) Ethnographic Studies
(D) Prototyping
33. Choose invalid statement in context of software testing:
- (A) System testing is usually done by the development team
(B) Release testing is performed after acceptance testing
(C) Release testing is usually a blackbox testing
(D) Alpha testing is a type of user testing
34. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
- Assertion (a): McCall's Quality Model considers 11 quality factors that are essential for software quality evaluation.
Reason (r): These quality factors cover all aspects of software, including reliability, maintainability and portability.
- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
(B) Both (a) and (r) are true and (r) is not correct explanation of (a)
(C) (a) is true, but (r) is false
(D) (a) is false, but (r) is true



35. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): Software estimation models provide precise and accurate estimates for all types of software projects.

Reason (r): The accuracy of estimation models may vary depending on the project's size, complexity and available historical data.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
(B) Both (a) and (r) are true and (r) is not correct explanation of (a)
(C) (a) is true, but (r) is false
(D) (a) is false, but (r) is true

36. Match List-I and List-II and select the correct answer from the codes given below:

List-I

List-II

- P. Integration Testing
Q. Unit Testing
R. Acceptance Testing
S. System Testing
1. Alpha Testing
2. Usability Testing
3. Data Flow Testing
4. Black Box Testing

Codes:

	P	Q	R	S
(A)	2	4	1	3
(B)	4	3	2	1
(C)	3	4	1	2
(D)	1	2	4	3

37. Match List-I and List-II and select the correct answer from the codes given below:

List-I

- P. Version Control System
Q. Baseline
R. Change Control
S. Configuration Item

List-II

1. A specific version of a software system that has been formally reviewed and approved, serving as a reference point for future changes.
2. A process that manages and records changes to configuration items, ensuring proper authorization documentation and traceability.
3. A tool or system used to track and manage different versions of software source code and other project artifacts.
4. A distinct and identifiable piece of software or documentation that is under configuration management control.

Codes:

	P	Q	R	S
(A)	3	1	2	4
(B)	3	2	1	4
(C)	3	1	4	2
(D)	2	3	1	4



38. Given below are two statements:
Statement I : Web engineering includes front-end and back-end development.
Statement II : Front-end development focuses on server-side programming and database management.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect
(D) Statement I is incorrect and Statement II is correct
39. Given below are two statements:
Statement-I: Timeline charts can be used to track the progress of a project and identify potential delays.
Statement-II: Timeline charts are static representations and cannot be updated to reflect real-time changes in the project schedule.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect.
(D) Statement I is incorrect and Statement II is correct.
40. Arrange the following activities to form a general software engineering process model:
I. Modelling
II. Planning
III. Deployment
IV. Construction
V. Communication
(A) I, II, III, IV, V
(B) II, III, V, I, IV
(C) V, II, I, IV, III
(D) I, V, IV, II, III
41. With respect to the channel access methods in broadcast network, which of the following statements is incorrect?
(A) CSMA/CD is a more fair method than Token Passing.
(B) Token Passing is a more fair method than CSMA/CD.
(C) Token Passing is more stable in heavy traffic conditions.
(D) Adding and removing nodes to CSMA/CD LAN is easier than to Token Passing LAN.
42. Datagram networks are also referred as networks.
(A) Connection oriented
(B) Bluetooth
(C) Wi-Fi
(D) Connectionless
43. Socket address is :
(A) IPv4 address translated to IPv6 address
(B) Combination of IP address and port address
(C) Combination of MAC address and domain address
(D) Application layer address



44. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): DNS operates on port 53 for both UDP and TCP communication.

Reason (r): DNS queries are always transmitted over TCP for reliability and error correction.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
(B) Both (a) and (r) are true and (r) is not correct explanation of (a)
(C) (a) is true, but (r) is false
(D) (a) is false, but (r) is true

45. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): AODV (Ad hoc On-Demand Distance Vector) is a proactive routing protocol used in MANETs.

Reason (r): AODV establishes and maintains routes between nodes in the network before data transmission.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
(B) Both (a) and (r) are true and (r) is not correct explanation of (a)
(C) (a) is true, but (r) is false
(D) (a) is false, but (r) is true

46. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Algorithms)

- P. Rivest-Shamir-Adleman
Q. Diffie-Hellman
R. Elliptic Curve Cryptography
S. Digital Signature Algorithm

List-II

(Characteristics)

1. Based on the difficulty of factoring large composite numbers into primes.
2. Used for secure key exchange between two parties.
3. Uses cryptography technologies
4. Enables secure encryption and decryption using public and private keys.

Codes:

	P	Q	R	S
(A)	1	2	3	4
(B)	4	2	1	3
(C)	1	4	2	3
(D)	3	1	4	2



47. Match List-I and List-II and select the correct answer from the codes given below:

List-I (Layer)

P Physical layer

Q Data link layer

R Session layer

S Presentation layer

List-II (Feature)

1. Dialog control and synchronization

2. Synchronization of bits

3. Translation and compression

4. Error control and framing

Codes:

	P	Q	R	S
(A)	2	4	1	3
(B)	4	3	2	1
(C)	2	4	1	3
(D)	1	2	3	4

48. Given below are two statements:

Statement I : UDP stands for User Datagram Protocol.

Statement II : UDP is a connection-oriented protocol that guarantees reliable data delivery.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

49. Given below are two statements :

Statement I : In packet switching, packets from the same message can take different paths to reach the destination.

Statement II : Packet switching provides efficient and robust data transmission.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

50. Which of the following indicates the increasing order of accuracy in error detection?

- (A) CRC, Single Parity, Block Sum Check
- (B) Block Sum Check, CRC, Single Parity
- (C) Single Parity, CRC, Block Sum Check
- (D) Single Parity, Block Sum Check, CRC



51. Which of the following is the correct representation in predicate logic for the sentence "All students who are doing sports are smart"?
- (A) $(\exists x) (\text{student}(x) \wedge \text{doing_sports}(x)) \Rightarrow \text{smart}(x)$
- (B) $(\forall x) (\text{student}(x) \wedge \text{doing_sports}(x)) \Rightarrow \text{smart}(x)$
- (C) $(\exists x) (\text{student}(x) \wedge (\forall x) \text{doing_sports}(x)) \Rightarrow \text{smart}(x)$
- (D) $\forall x (\text{student}(x) \wedge \exists x \text{doing_sports}(x)) \Rightarrow \text{smart}(x)$
52. Which of the following is not the correct statement?
- (A) The min-max search procedure is a depth first, depth limited search procedure.
- (B) In game playing programs the development of good static evaluation function is time consuming.
- (C) A heuristic function is a function that maps from problem state descriptions to measure desirability, usually represented as numbers.
- (D) In game playing problem, search is the only available technique.
53. Given below are two statements:
Statement I: Conceptual dependency provides a structure but not a specific set of primitives.
Statement II: Conceptual dependency does not require all knowledge to be decomposed into fairly low level primitives.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct
54. Given below are two statements:
Statement I: Most planning systems work primarily in a goal directed mode in which they search backward from goal to initial state.
Statement II: Detecting Dead Ends is not a task in a planning system.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct



55. Given below are two statements:

Statement I: The most common way to represent grammars is a set of production rules.

Statement II: In pragmatic processing, when necessary, the knowledge based representation is translated into a command to be executed by the system.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

56. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a) : A property of perceptron learning is : whatever a perceptron can compute, it can learn to compute.

Reason (r) : A perceptron computes a binary function of its input.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true

57. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a) : The most common methods of defuzzification are Centre of Gravity method and the Composite Maxima method.

Reason (r) : These two methods work best for the control applications.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true



58. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Planning Techniques)

- P. Linear Planning
- Q. Non-Linear Planning
- R. Goal Stack Planning
- S. Hierarchical Planning

List-II

(Property)

1. The problem solver makes use of a single stack that contains both goals and operators that have been proposed to satisfy those goals.
2. Developed by ABSTRIPS system, in which preconditions at a lower level of abstraction were ignored.
3. A problem that is composed of a sequence of complete sub-plans.
4. A problem in which multiple sub-problems are worked on simultaneously.

Codes:

	P	Q	R	S
(A)	3	2	4	1
(B)	3	4	2	1
(C)	2	1	4	3
(D)	3	4	1	2

59. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Knowledge Representation)

- P. Semantic Networks
- Q. Frames
- R. Production Rules
- S. Ontologies

List-II

(Property)

1. Represents knowledge as a collection of attributes and values.
2. Represents knowledge in the form of interconnected nodes and links.
3. Represents knowledge as a structured framework with slots and fillers.
4. Represents knowledge as a set of rules and conditions.

Codes:

	P	Q	R	S
(A)	2	1	4	3
(B)	4	2	1	3
(C)	2	4	1	3
(D)	4	1	3	2



60. Arrange the following operators applied to an iteration of Genetic Algorithm :

1. Selection
2. Initialization
3. Reproduction
4. Replacement

Choose the correct sequence of their applicability from the below options only:

- (A) 2, 1, 3, 4
- (B) 3, 1, 2, 4
- (C) 2, 1, 4, 3
- (D) 1, 2, 4, 3

61. Which of the following is not the peephole optimization technique?

- (A) Eliminating redundant load and stores
- (B) Eliminating unreachable code
- (C) Use of machine idioms
- (D) Loop Unrolling

62. Which of the following is the correct statement?

- (A) A DFA has always same number of states as compared to an equivalent NFA.
- (B) A DFA has less number of states as compared to an equivalent NFA.
- (C) A DFA has same or more number of states as compared to an equivalent NFA.
- (D) A DFA has more expressive power as compared to NFA.

63. Given below are two statements:

Statement I: Every Context free grammar can be converted into an equivalent Greibach Normal Form.

Statement II: Every Regular and context Free grammar is always accepted by PDA.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

64. Given below are two statements:

Statement I: Halting problem is unsolvable.

Statement II: Post Correspondence problem is decidable.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct



65. Given below are two statements:

Statement I: Left factoring is a grammar that is useful for producing grammar suitable for Bottom up parsing.

Statement II: Top down parsing methods cannot handle left recursive grammars.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

66. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a): NPDA and DPDA are not equivalent.

Reason (r): NPDA is more powerful than DPDA and accepts more languages than DPDA.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true

67. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a) : Three-address code is a type of intermediate code representation.

Reason (r) : Three-address code allows at most three operands in a single instruction.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true



68. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Attributes)

- P. Synthesized attributes
Q. Inherited attributes
R. S-attributed definition
S. L-attributed definition

List-II

(Description)

1. An SDT uses only synthesized attributes
2. An SDT uses both synthesized attributes and inherited attributes with a restriction that inherited attribute can inherit values from left siblings only
3. An attribute of the nonterminal on the left-hand side of a production.
4. An attribute of a nonterminal on the right-hand side of a production.

Codes:

	P	Q	R	S
(A)	4	3	2	1
(B)	3	4	1	2
(C)	3	1	4	2
(D)	1	3	4	2

69. Match List-I and List-II and select the correct answer from the codes given below:

List-I

List-II

(Regular Expressions) (Regular Sets)

- | | |
|-----------------|--------------------------------------|
| P. a^* | 1. $\{aa, ab, ba, bb\}$ |
| Q. $(a+b)$ | 2. $\{\epsilon, a, aa, aaa, \dots\}$ |
| R. a^+ | 3. $\{a, b\}$ |
| S. $(a b)(a b)$ | 4. $\{a, aa, aaa, \dots\}$ |

Codes:

	P	Q	R	S
(A)	4	1	2	3
(B)	4	3	2	1
(C)	2	3	4	1
(D)	3	4	2	1

70. Given below are two statements:

Statement I: Constant Folding is a machine independent code optimization techniques.

Statement II: Loop jamming is a machine independent code optimization techniques.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect
(D) Statement I is incorrect and Statement II is correct



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71. Pick the incorrect statement about inline functions in C++ :
- (A) Saves overhead of a return, call from a function.
 - (B) A function defined inside the body of a class is inline by default.
 - (C) These functions are inserted/substituted at the point of call.
 - (D) A recursive function can also be made inline by using the keyword inline.
72. Identify the correct statements with regard to Bezier curves from the following list :
- (A) A Bezier curve passes through all control points.
 - (B) A Bezier curve passes only through the starting and ending control points.
 - (C) A Bezier curve always is a collection of cubic polynomials.
 - (D) As the number of control points increases, the accuracy of the Bezier curve increases.
73. The Flood Fill algorithm :
- (A) May use 4-connected or 8-connected approach
 - (B) Must use 8-connected approach
 - (C) Must use 4-connected approach
 - (D) Must not use recursive approach
74. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
- Assertion (a): XML Schema defines the structure and data types for elements in an XML document.
- Reason (r): XML Schema is used for styling and presentation of XML documents.
- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
 - (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
 - (C) (a) is true, but (r) is false
 - (D) (a) is false, but (r) is true
75. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
- Assertion (a): Java applets are small applications that can be embedded on any web page.
- Reason (r): Applets are written in Java programming language and can run on any platform.
- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
 - (B) Both (a) and (r) are true and (r) is not correct explanation of (a)
 - (C) (a) is true, but (r) is false
 - (D) (a) is false, but (r) is true



76. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(File pointers handling functions in C++)

- P. tellp ()
- Q. tellg ()
- R. seekp ()
- S. seekg ()

List-II

(Description)

1. provides the current position of the input pointer.
2. moves input pointer to a specified location.
3. provides the current position of the output pointer.
4. moves the output pointer to a given location.

Codes:

	P	Q	R	S
(A)	3	1	4	2
(B)	1	3	2	4
(C)	3	4	1	2
(D)	4	3	2	1

77. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Keywords in C)

- P. auto
- Q. extern
- R. static
- S. register

List-II

(Description)

1. It is a local variable which is capable of returning a value even when control is transferred to the function call.
2. It is a variable which is stored inside a Register.
3. It is a default storage class.
4. It is a global variable.

Codes:

	P	Q	R	S
(A)	3	1	4	2
(B)	1	2	3	4
(C)	3	4	1	2
(D)	4	3	2	1



78. Given below are two statements:
Statement I: In two-dimensions, a rotation can be achieved by a combination of shear transformations.
Statement II: In three-dimensions, a rotation about an arbitrary axis can be achieved by three transformations around the X, Y and Z axes.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect
(D) Statement I is incorrect and Statement II is correct
79. Given below are two statements:
Statement I: The Phong specular reflection model is not a physical simulation of the behaviour of real-world light.
Statement II: Gouraud shading, linearly interpolates the normal vectors at the polygon vertices.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
(B) Both Statement I and Statement II are incorrect
(C) Statement I is correct and Statement II is incorrect
(D) Statement I is incorrect and Statement II is correct
80. Arrange the following data types of Java in descending order of their size:
- I. double
II. float
III. short
IV. Boolean
- (A) I-II-III-IV
(B) II-III-IV-I
(C) II-IV-I-III
(D) II-I-IV-III
81. Which of the following is not a characteristic of the Divide and Conquer algorithm?
- (A) Breaking a problem into smaller subproblems
(B) Solving subproblems independently
(C) Combining the solutions of subproblems to solve the original problem
(D) Using a sequential approach to solve the problem



82. Identify the "queue full" condition in case of double ended queue :
- If (front=0 && rear=max -1)
 - If (front= -1 && rear = -1)
 - if (rear= max-1)
 - If ((front=0 && rear=max -1) || (front = rear+1))
83. Select from among the following a limitation which exist in Tree Data structures which cannot be seen in graphs :
- Tree data structures can only represent relations of hierarchical type, such as relation between a parent and a child whereas, in Graphs, one can represent relations of any kind.
 - In Tree data structures, one can see nodes and connection in between them but in Graphs, one cannot see nodes or connections in between them.
 - In Tree data structures, one can store only numbers as opposed to Graphs where any type of data is possible for storage.
 - In Tree data structures, one cannot search for a value but in Graphs, searching for a value is possible.
84. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
Assertion(a): Both Kruskal's algorithm and Prim's algorithms can always produce the minimum spanning tree.
Reason(r): The minimum spanning tree of a graph produced by Kruskal's algorithm and Prim's algorithm is always unique.
- Both (a) and (r) are true and (r) is correct explanation of (a)
 - Both (a) and (r) are true and (r) is not correct explanation of (a)
 - (a) is true, but (r) is false
 - (a) is false, but (r) is true
85. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:
Assertion (a): In Dynamic Programming, memoization is used to store the solutions of subproblems to avoid redundant computations.
Reason (r): Memoization is the process of breaking a problem into smaller subproblems and solving them independently.
- Both (a) and (r) are true and (r) is correct explanation of (a)
 - Both (a) and (r) are true and (r) is not correct explanation of (a)
 - (a) is true, but (r) is false
 - (a) is false, but (r) is true



86. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Concepts/Problems)

- P. Bellman-Ford Algorithm
- Q. Prim's Algorithm
- R. Topological Sorting
- S. Floyd-Warshall Algorithm

List-II

(Definitions/Properties)

1. A single-source shortest path algorithm that handles negative edge weights and detects negative cycles.
2. A graph traversal algorithm that orders the vertices of a directed acyclic graph (DAG) in a linear order based on their dependencies.
3. A minimum spanning tree algorithm that starts with an arbitrary vertex and repeatedly adds the minimum-weight edge connected to the tree.
4. An all-pairs shortest path algorithm that finds the shortest path between all pairs of vertices in a weighted graph, even with negative edge weights.

Codes:

	P	Q	R	S
(A)	1	3	4	2
(B)	1	3	2	4
(C)	4	3	1	2
(D)	3	1	4	2

87. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Concepts/Problems)

- P. Parallel Breadth-First Search (BFS)
- Q. Parallel Depth-First Search (DFS)
- R. Parallel Merge Sort
- S. Randomized Parallel Algorithms

List-II

(Definitions/Properties)

1. Algorithms that use randomness to parallelize certain computations and reduce the dependency on communication.
2. A parallel sorting algorithm that divides the input into smaller chunks, sorts them independently and then merges the results.
3. A parallel version of the graph traversal algorithm that explores as far as possible along each branch before backtracking.
4. A parallel version of the popular graph traversal algorithm that explores all the vertices at the current level before moving to the next level.

Codes:

	P	Q	R	S
(A)	4	3	1	2
(B)	4	2	3	1
(C)	4	3	2	1
(D)	3	1	2	4



88. Given below are two statements:

Statement I: The Fast Fourier Transform (FFT) is an algorithm used to compute the discrete Fourier transform of a sequence of N complex numbers in $O(N \log N)$ time.

Statement II: The FFT algorithm is based on the divide-and-conquer approach, which recursively breaks down the DFT into smaller subproblems.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

89. Given below are two statements:

Statement I: Dijkstra's algorithm can find the shortest path in a weighted graph with negative edge weights.

Statement II: Bellman-Ford algorithm can find the shortest path in a graph with negative edge weights.

In light of the above statements, choose the most appropriate answer from the codes given below:

- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct

90. Arrange the following algorithms based on their worst-case time complexity (from the fastest to the slowest growing): Merge Sort, Bubble Sort, Binary Search, Linear Search

- (A) Merge Sort $\rightarrow$ Bubble Sort $\rightarrow$ Binary Search $\rightarrow$ Linear Search
- (B) Bubble Sort $\rightarrow$ Binary Search $\rightarrow$ Linear Search $\rightarrow$ Merge Sort
- (C) Binary Search $\rightarrow$ Merge Sort $\rightarrow$ Linear Search $\rightarrow$ Bubble Sort
- (D) Linear Search $\rightarrow$ Bubble Sort $\rightarrow$ Binary Search $\rightarrow$ Merge Sort



91. What is the primary benefit of using NOSQL databases over traditional relational databases?
- (A) ACID Transactions
- (B) Data Schema Flexibility
- (C) Mature Ecosystem
- (D) Standard SQL Query Language
92. What is the default block size in HDFS?
- (A) 64 KB
- (B) 128 MB
- (C) 256 MB
- (D) 512 MB
93. In a Hidden Markov Model, what are the "hidden" states?
- (A) The states that are not directly observed
- (B) The states with the highest probabilities
- (C) The states with the lowest probabilities
- (D) The initial states of the model
94. Given below are two statements:
Statement I: Fact tables in data warehousing contain transactional data.
Statement II: Dimension tables in data warehousing store descriptive attributes.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct
95. Given below are two statements:
Statement I: Genome data management involves the storage and organization of genetic information.
Statement II: Genome data is typically structured and follows a tabular database model.
In light of the above statements, choose the most appropriate answer from the codes given below:
- (A) Both Statement I and Statement II are correct
- (B) Both Statement I and Statement II are incorrect
- (C) Statement I is correct and Statement II is incorrect
- (D) Statement I is incorrect and Statement II is correct



96. Consider the following Lecturer relation with the given attributes and data types. Salary and Income are monthly income for a lecturer :

Lecturer(EmpNo CHAR(03),
Name VARCHAR(50), Salary
REAL, Allowance REAL,
Research_SupNo CHAR(03),
Category VARCHAR(25),
DateJoined DATE, DNo
CHAR(02))

Which of the following SQL statements will increase the Salary by Rs: 3000/= for Lecturers who are categorised as Senior Lecturers?

- (A) UPDATE Lecturer SET Salary = Salary + 3000 WHERE Category = 'Senior Lecturer';
- (B) UPDATE Salary SET Salary = Salary + 3000 FROM Lecturer WHERE Category = 'Senior Lecturer';
- (C) UPDATE SET Salary + 3000 FROM Lecturer WHERE Category = 'Senior lecturer';
- (D) UPDATE SET Salary = Salary + 3000 FROM Lecturer WHERE Category = 'Senior lecturer';

97. Given below are two statements, one labelled as Assertion (a) and the other labelled as Reason (r). Read the statements and choose the correct answer from the code given below:

Assertion (a) : Database security is essential to prevent unauthorized access to sensitive data.

Reason (r) : Database security ensures the confidentiality, integrity, and availability of data.

- (A) Both (a) and (r) are true and (r) is correct explanation of (a)
- (B) Both (a) and (r) are true and (r) is not correct explanation of (a)

- (C) (a) is true, but (r) is false
- (D) (a) is false, but (r) is true

98. Choose the correct sequence of steps to perform a basic SQL query:

- (A) FROM, SELECT, WHERE, ORDER BY
- (B) SELECT, FROM, ORDER BY, WHERE
- (C) SELECT, WHERE, FROM, ORDER BY
- (D) FROM, WHERE, SELECT, ORDER BY



99. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(Type of Joins)

- P. INNER JOIN
Q. LEFT JOIN
R. RIGHT JOIN
S. FULL JOIN

List-II

(Descriptions)

- Returns all rows from both tables, including unmatched rows as NULL values.
- Returns only the rows with matching values in both tables.
- Returns all rows from the left table and the matching rows from the right table.
- Returns all rows from the right table and the matching rows from the left table.

Codes:

	P	Q	R	S
(A)	2	4	1	3
(B)	2	1	4	3
(C)	2	3	4	1
(D)	3	2	1	4

100. Match List-I and List-II and select the correct answer from the codes given below:

List-I

(SQL)

- P. Data Manipulation Language (DML)
Q. Data Definition Language (DDL)
R. Data Control Language (DCL)
S. Data Query Language (DQL)

List-II

(Description)

- Represents the logical structure of the database using entities and relationships.
- Used to interact with the data stored in the database.
- Used to define the database schema and create or modify database objects.
- Specifies the authorized access and permissions to the database.

Codes:

	P	Q	R	S
(A)	2	3	4	1
(B)	1	2	3	4
(C)	3	4	1	2
(D)	1	4	2	3

**ROUGH WORK**

**ROUGH WORK**