Match the following NoSQL database features with their characteristics:
1. NoSQL: Data Model and Query Optimization; Different NoSQL Products, Querying and Managing NoSQL; Indexing and Ordering Data Sets; NoSQL in Cloud.
2. Web Programming: HTML, DHTML, XML, Scripting, Java, Servlets, Applets.
3. Programming in C++: Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event Handling; Streams and Files; Multifile Programs.
Choose the correct answer from the options given below:
(1) 1-D, 2-A, 3-C
(2) 1-C, 2-B, 3-D
(3) 1-B, 2-D, 3-A
(4) 1-A, 2-C, 3-B
Answer Key: 4
Solution:
? NoSQL databases often prioritize flexible data models such as document, key-value, or graph structures, facilitating indexing and querying across large datasets, especially in cloud environments.
? Web Programming encompasses markup languages like HTML, dynamic HTML (DHTML), markup languages like XML for data interchange, scripting languages for client-side logic, and server-side Java technologies including Servlets and Applets.
? C++ programming involves lexical components (tokens, identifiers), data types, control flow, functions with parameter passing, object-oriented features like classes, inheritance, virtual functions, and advanced features such as templates and exception handling, alongside stream management and multi-file compilation.
Hence, Option (4) is the right answer.

24.Consider a layered OSI model and a network employing TCP/IP stack. Which of the following are true regarding the functions performed at different layers?
I. The Data Link layer manages framing and error detection.
II. The Network layer handles routing and logical addressing.
III. The Transport layer ensures end-to-end flow and error control.
IV. The Application layer is responsible for data encryption.
Select all that apply:
(1) I, II, and III only
(2) I and IV only
(3) II and III only
(4) All of the above
Answer Key: 1
Solution:
Statement I (Correct): Data Link layer manages framing, MAC addressing, and error detection.
Statement II (Correct): Network layer handles routing, logical addressing (IP addresses), and packet forwarding.
Statement III (Correct): Transport layer ensures reliable data transfer with flow and error control, especially in TCP.
Statement IV (Incorrect): While encryption can be implemented at various layers, it is primarily an application or presentation layer function, not a core function of the Application layer in the OSI model.
Hence, the correct answer is Option (1).

Match the following topics with their advanced characteristics:
1. Isomorphism in Group Theory 2. Homomorphism in Algebra 3. Graph Coloring
A. Assigns colors to vertices such that no adjacent vertices share the same color
B. A structure-preserving map between two algebraic structures
C. Two groups are structurally identical if there exists a bijective homomorphism between them
D. Maps between algebraic structures that may not be bijective but preserve the operation

Choose the correct answer from the options given below:
(1) 1-C, 2-D, 3-A
(2) 1-D, 2-B, 3-C
(3) 1-C, 2-B, 3-A
(4) 1-B, 2-D, 3-C
Answer Key: 3
Solution:
? Isomorphism in Group Theory: It indicates a structural identity between two groups via a bijective homomorphism, aligning with option C.
? Homomorphism in Algebra: A map that preserves structure but may not be bijective, matching option D.
? Graph Coloring: Assigns colors to vertices to prevent adjacent vertices from sharing the same color, fitting option A.
Thus, the correct associations are given in option (3).
Hence, the correct answer is (3).

25. A software project has the following identified risks:
- Requirements ambiguity
- Technology unfamiliarity
- Tight deadlines
Which of the following are appropriate risk mitigation strategies?
I. Conduct thorough requirements analysis before development
II. Invest in training and prototyping for unfamiliar technologies
III. Prioritize features and adjust scope to meet deadlines
IV. Ignore risks and proceed with initial plans
Choose the correct options:
(1) I, II, and III only
(2) I and IV only
(3) II and III only
(4) All of the above
Answer Key: 1
Solution:
Statement I (Correct): Clarifying requirements reduces ambiguity, minimizing risk.
Statement II (Correct): Training and prototyping reduce technology risk.
Statement III (Correct): Prioritization and scope adjustment help in meeting deadlines.
Statement IV (Incorrect): Ignoring risks increases project failure likelihood.
Hence, the correct answer is Option (1).

3. Match the following data management features with their related concepts:
1. NOSQL: NOSQL and Query Optimization; Different NOSQL Products, Querying and Managing NOSQL; Indexing and Ordering Data Sets; NOSQL in Cloud.
2. Web Programming: HTML, DHTML, XML, Scripting, Java, Servlets, Applets.
3. Programming in C++: Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event Handling; Streams and Files; Multifile Programs.
Choose the correct answer from the options given below:
(1) 1-C, 2-D, 3-B
(2) 1-A, 2-C, 3-D
(3) 1-D, 2-B, 3-A
(4) 1-B, 2-A, 3-C
Answer Key: 4
Solution:
? NoSQL data management features include flexible data models suited for cloud environments, with

indexing and ordering capabilities to optimize query performance.
? Web programming involves markup and scripting languages, with Java-based server technologies like Servlets and Applets facilitating dynamic content.
? C++ features such as token processing, variable declaration, control flow, class design, constructors/destructors, overloading, inheritance, templates, exception handling, and stream management constitute core language concepts.
Hence, Option (4) is the right answer.

3. Match the following graph algorithms with their core characteristics:
1. Breadth-First Search (BFS) A. Finds shortest path in unweighted graphs
2. Depth-First Search (DFS) B. Explores as far as possible along each branch before backtracking
3. Shortest Path Algorithm (Dijkstra's Algorithm) C. Uses a priority queue to efficiently find minimal distances
4. Maximum Flow Algorithm (Ford-Fulkerson) D. Computes the maximum feasible flow in a network
Choose the correct answer from the options given below:
(1) 1-A, 2-B, 3-C, 4-D
(2) 1-B, 2-A, 3-D, 4-C
(3) 1-A, 2-B, 3-D, 4-C
(4) 1-B, 2-A, 3-C, 4-D
Answer Key: 1
Solution:
? BFS (1): It systematically explores neighboring nodes level by level, finding shortest paths in unweighted graphs, linking to A.
? DFS (2): It explores along one path to its end before backtracking, characteristic B.
? Dijkstra's Algorithm (3): It uses a min-priority queue to select the next node with the smallest tentative distance, matching C.
? Max Flow (4): Implements augmenting path algorithms to compute maximum flow from source to sink, corresponding to D.
Hence, Option (1) is the right answer.

Match the following Linux kernel components with their primary functions:
1. Kernel Modules A. Provides an abstraction layer for hardware devices
2. Process Scheduler B. Manages the execution order and time slicing of processes
3. Memory Management Unit C. Handles virtual memory, paging, and segmentation
4. File System Interface D. Supports dynamic loading and unloading of kernel functionalities
Choose the correct answer from the options given below:
(1) 1-D, 2-B, 3-C, 4-A
(2) 1-A, 2-C, 3-D, 4-B
(3) 1-D, 2-B, 3-D, 4-A
(4) 1-B, 2-D, 3-C, 4-A
Answer Key: 2
Solution:
? Kernel Modules (1): They are loadable components that extend kernel functionalities without rebooting, hence support dynamic loading/unloading, linking to D.
? Process Scheduler (2): Its primary role is to determine which process runs at what time, managing process execution, linking to B.
? Memory Management Unit (3): Handles virtual memory, including paging and segmentation, hence C.
? File System Interface (4): Provides an abstraction for file operations and hardware interaction, matching A.
Hence, Option (2) is the right answer.

26. In the context of software quality factors, which of the following are considered primary McCall?s quality factors?
I. Correctness
II. Flexibility

III. Maintainability
IV. Usability
Choose the correct options:
(1) I, II, and III only
(2) I, III, and IV only
(3) II and IV only
(4) All of the above
Answer Key: 2
Solution:
Statement I (Correct): Correctness ensures the software meets specifications.
Statement II (Incorrect): Flexibility is a desirable attribute but not explicitly listed as a primary McCall?s factor.
Statement III (Correct): Maintainability is a core McCall?s factor, focusing on ease of modification.
Statement IV (Correct): Usability is also a key factor in software quality, emphasizing user satisfaction.
Hence, the correct answer is Option (2).

Match the following algebraic structures with their defining properties:
1. Groups 2. Rings 3. Fields
A. Every non-zero element has a multiplicative inverse
B. Closure, associativity, identity, and inverses under a single operation
C. Addition and multiplication are both commutative
D. Closure, associativity, distributivity over addition, with additive identity and additive inverses
Choose the correct answer from the options given below:
(1) 1-B, 2-D, 3-A
(2) 1-B, 2-D, 3-C
(3) 1-A, 2-D, 3-C
(4) 1-B, 2-C, 3-A
Answer Key: 3
Solution:
? Groups: An algebraic structure with a single operation, where closure, associativity, identity, and inverses exist. The key property is every element having an inverse, aligning with option B.
? Rings: Consist of two operations (addition and multiplication) with closure, associativity, distributivity, and additive identity/inverses, matching option D.
? Fields: Are rings with multiplicative inverses for all non-zero elements and commutative multiplication, satisfying properties of addition and multiplication being commutative, aligning with option C.
Hence, Option (3) is the right answer.

Match the following graph theoretical concepts with their properties:
1. Eulerian Path 2. Hamiltonian Path 3. Spanning Tree
A. Visits every vertex exactly once
B. Visits every edge exactly once, possibly starting and ending at different vertices
C. Connects all vertices with the minimum number of edges
D. Includes all vertices and some subset of edges forming a tree
Choose the correct answer from the options given below:
(1) 1-B, 2-A, 3-D
(2) 1-A, 2-B, 3-C
(3) 1-B, 2-C, 3-D
(4) 1-A, 2-C, 3-D
Answer Key: 2
Solution:
? Eulerian Path: Traverses every edge exactly once, which is characteristic of option B.
? Hamiltonian Path: Visits each vertex exactly once, matching option A.
? Spanning Tree: Connects all vertices with the minimum number of edges without forming cycles, which is captured by option C and D; typically, the spanning tree is a subset of edges forming a tree covering all

vertices, hence option D.
Given the options, the matching with the properties indicates Option (2).
Hence, the correct answer is (2).

2. Match the following query types with their optimization techniques:
1. NOSQL: NOSQL and Query Optimization; Different NOSQL Products, Querying and Managing NOSQL; Indexing and Ordering Data Sets; NOSQL in Cloud.
2. Web Programming: HTML, DHTML, XML, Scripting, Java, Servlets, Applets.
3. Programming in C++: Tokens, Identifiers, Variables and Constants; Data types, Operators, Control statements, Functions Parameter Passing, Virtual Functions, Class and Objects; Constructors and Destructors; Overloading, Inheritance, Templates, Exception and Event Handling; Streams and Files; Multifile Programs.
Choose the correct answer from the options given below:
(1) 1-B, 2-C, 3-D
(2) 1-A, 2-B, 3-C
(3) 1-C, 2-D, 3-A
(4) 1-D, 2-A, 3-B
Answer Key: 1
Solution:
? Query Optimization in NoSQL involves indexing strategies like secondary indexes, ordering data sets based on access patterns, and leveraging cloud scalability features to improve performance.
? Web programming optimizations include minimizing HTML and XML size, efficient scripting, and server-side caching via Java Servlets and Applets.
? C++ optimization techniques include token management, efficient control structures, usage of constructors/destructors for resource management, and leveraging overloading, inheritance, and templates for code reuse and efficiency, along with efficient stream and file handling.
Hence, Option (1) is the right answer.

Match the following computer architecture concepts with their descriptions:
1. Stored Program Organization A. Uses memory to hold instructions and data simultaneously
2. Instruction Cycle B. The process of fetching, decoding, and executing instructions
3. Computer Registers C. Small, fast storage locations inside the CPU
4. Memory-Reference Instructions D. Instructions that directly specify memory addresses
Choose the correct answer from the options given below:
(1) 1-A, 2-B, 3-C, 4-D
(2) 1-B, 2-A, 3-D, 4-C
(3) 1-A, 2-C, 3-B, 4-D
(4) 1-D, 2-B, 3-A, 4-C
Answer Key: 1
Solution:
? Stored Program Organization (1): It indicates that instructions and data are stored in memory, enabling program execution, linking to A.
? Instruction Cycle (2): The sequence of fetch, decode, and execute steps for processing instructions, matching B.
? Computer Registers (3): Small, fast storage units within CPU, essential for quick data access, linked to C.
? Memory-Reference Instructions (4): These instructions include addresses in memory explicitly, linking to D.
Hence, Option (1) is the right answer.