--Question Starting--
Match the following concepts related to Context Free Languages with their descriptions:
1. Context Free Language Description
I. Pushdown Automaton A. Formal grammatical method to generate all strings in a language
II. Chomsky Normal Form B. Automaton that uses a stack to manage state transitions
III. Ambiguity C. Situation where a string can be derived in more than one way
IV. Parse Tree Representation D. Represents the structure of strings derived from a grammar
Choose the correct answer from the options given below:
(1) I-B, II-A, III-C, IV-D
(2) I-C, II-D, III-A, IV-B
(3) I-A, II-C, III-B, IV-D
(4) I-D, II-C, III-A, IV-B
Answer Key: 1
Solution:
? Pushdown Automaton: Utilizes a stack to help process its input and determine reachability within the language, crucial for managing context-free languages.
? Chomsky Normal Form: A simplified grammar that can generate any context-free language, essential for theoretical computer science and parsing algorithms.
? Ambiguity: Occurs when a grammar allows for more than one parse tree for a single string, impacting the clarity and determinism of the language parsing.
? Parse Tree Representation: Visual depiction of the derivation of a string in a grammar, showing how the string is derived from the start symbol.
Hence, Option (1) is the right answer.

--Question Starting--
Match the following aspects of Intermediate Code Generation with their corresponding functionalities:
1. Intermediate Code Generation Functionality
I. Translation of Declarations A. Handles if-else, loops, and other control structures
II. Boolean Expressions B. Translates variable and function declarations to intermediate representations
III. Control Flow C. Evaluates and optimizes logical conditions and decisions
IV. Assignments D. Converts high-level language assignments into machine-independent code
Choose the correct answer from the options given below:
(1) I-B, II-C, III-A, IV-D
(2) I-D, II-A, III-C, IV-B
(3) I-C, II-B, III-D, IV-A
(4) I-A, II-B, III-D, IV-C
Answer Key: 1
Solution:
? Translation of Declarations: Maps high-level language declarations into a form that can be easily manipulated in intermediate stages.
? Boolean Expressions: Transformed to optimize and simplify logical operations, critical for efficient runtime decision-making.
? Control Flow: Intermediate code for control structures like loops and conditionals ensures the logical flow of the program.
? Assignments: Turn into a series of operations that respect the semantics of the original high-level code while being platform-independent.
Hence, Option (1) is the right answer.

--Question Starting--
Match the following concepts in Sets and Relations with their correct descriptions:
1. Sets and Relations Description
I. Equivalence Relations A. Involves the intersection, union, and difference operations
II. Set Operations B. Defines a partial ordering among elements

III. Partially Ordering C. Relation that is reflexive, symmetric, and transitive
IV. Representation and Properties D. Mathematical depiction and characteristics of relations
Choose the correct answer from the options given below:
(1) I-C, II-A, III-B, IV-D
(2) I-D, II-B, III-A, IV-C
(3) I-A, II-C, III-D, IV-B
(4) I-B, II-D, III-A, IV-C
Answer Key: 1
Solution:
? Equivalence Relations: Characterized by reflexivity, symmetry, and transitivity, which structure the elements into equivalence classes.
? Set Operations: Fundamental operations that define the structure and interaction of sets in mathematics and logic.
? Partially Ordering: A type of relation where some, but not necessarily all, elements are comparable.
? Representation and Properties: Explains how relations are depicted and their inherent properties, crucial for understanding their behavior in various contexts.
Hence, Option (1) is the right answer.

--Question Starting--
Match the following components of NOSQL systems with their functionalities:
1. NOSQL Components Functionality
I. Query Optimization A. Enhances data retrieval and management efficiency
II. Indexing and Ordering B. Improves the performance of data queries by structuring data access
III. Different NOSQL Products C. Offers varied solutions tailored to specific needs like document storage, key-value stores, etc.
IV. Querying and Managing D. Involves interacting with and manipulating data within the system
Choose the correct answer from the options given below:
(1) I-A, II-B, III-C, IV-D
(2) I-C, II-D, III-A, IV-B
(3) I-B, II-A, III-D, IV-C
(4) I-D, II-C, III-B, IV-A
Answer Key: 1
Solution:
? Query Optimization: Critical for enhancing the efficiency of queries in NOSQL databases, which often handle large, unstructured data sets.
? Indexing and Ordering: Essential for fast data retrieval, affecting how data is accessed and used in real-time applications.
? Different NOSQL Products: Provide a range of database models that cater to specific application needs and data handling requirements.
? Querying and Managing: The processes involved in manipulating and retrieving data, fundamental for database interaction.
Hence, Option (1) is the right answer.

--Question Starting--
Match the following elements of Network Security with their corresponding functionalities:
1. Network Security Functionality
I. Cryptography A. Protects data transmitted across a network
II. Digital Signature B. Ensures the authenticity and integrity of a message
III. Firewalls C. Blocks unauthorized access while permitting outward communication
IV. Malwares D. Programs designed to harm or exploit operating systems
Choose the correct answer from the options given below:
(1) I-A, II-B, III-C, IV-D
(2) I-D, II-A, III-B, IV-C

(3) I-B, II-C, III-D, IV-A
(4) I-C, II-D, III-A, IV-B
Answer Key: 1
Solution:
? Cryptography: Secures information by transforming it into an unreadable format, crucial for data secrecy and security.
? Digital Signature: Provides a means to verify the authenticity of digital messages or documents, preventing tampering and impersonation.
? Firewalls: Serve as a barrier between a trusted and an untrusted network, filtering incoming and outgoing traffic based on security rules.
? Malwares: Malicious software designed to infiltrate or damage a computer system without the user's informed consent.
Hence, Option (1) is the right answer.