

Match the following programming concepts with their primary domain of application:

1. Programming Concepts Domain of Application

I. Servlets A. Manipulating document structure and styles

II. Applets B. Web client-side scripting

III. HTML C. Web server-side programming

IV. Scripting D. Defines structure of web pages

Choose the correct answer from the options given below:

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

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

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

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

Answer Key: 1

Solution:

? Servlets are used in server-side programming to extend the capabilities of servers and respond to requests.

? Applets are small applications that run on the client-side within a web browser.

? HTML is the markup language used to construct web pages and define their structure.

? Scripting, particularly JavaScript, is used for client-side scripting to enhance user interaction by manipulating HTML and CSS.

Hence, Option (1) is the right answer.

Match the following architectural elements with their respective computing models:

1. Architectural Elements Computing Model

I. General Register Organization A. CISC Computer

II. RISC Computer B. Stack Organization

III. Instruction Formats C. General Register Organization

IV. Addressing Modes D. RISC Computer

Choose the correct answer from the options given below:

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

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

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

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

Answer Key: 4

Solution:

? General Register Organization is a feature typically found in RISC computers where the use of many registers aims to enhance performance.

? RISC Computer architectures simplify the instruction set, which allows for faster processing speeds.

? Instruction Formats in CISC computers are varied and complex, accommodating a larger set of instructions.

? Addressing Modes are a critical part of instruction design in both RISC and CISC but are more prominently flexible and complex in CISC computers.

Hence, Option (4) is the right answer.

Match the following runtime system components with their functionalities:

1. Components Functionalities

I. Activation Tree A. Manages memory for program execution

II. Stack Allocation of Activation Records B. Defines program's execution entities

III. Symbol Table C. Tracks variables and their bindings

IV. Parameter Passing Mechanisms D. Transfers data between functions

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-B, III-D, IV-C

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

Answer Key: 3

Solution:

? Activation Tree visually represents the calling relationships between functions during the execution of a program.

? Stack Allocation of Activation Records is a method of managing memory by stacking records that store data about the active subroutines.

? Symbol Table is used to keep track of identifier names and their corresponding attributes within the scope of the program.

? Parameter Passing Mechanisms are crucial for specifying how values are passed between procedures or function calls.

Hence, Option (3) is the right answer.

Match the following code optimization techniques with their respective focus areas:

1. Techniques Focus Areas

I. Local Optimization A. Optimizes across multiple blocks of code

II. Global Optimization B. Reduces overhead within individual code blocks

III. Loop Optimization C. Enhances performance of iterative constructs

IV. Peep-Hole Optimization D. Examines small sequences of instructions for quick wins

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-D, IV-B

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

Answer Key: 1

Solution:

? Local Optimization focuses on making code changes within a single block to improve efficiency without altering the logic.

? Global Optimization extends these improvements beyond single blocks, enhancing the program's overall performance.

? Loop Optimization specifically targets loops to reduce unnecessary computations and improve loop execution times.

? Peep-Hole Optimization looks at very small parts of the code to make quick optimizations that can cumulatively lead to significant improvements.

Hence, Option (1) is the right answer.

Match the following CPU scheduling criteria with their most aligned scheduling algorithm:

1. Criteria Algorithm

I. Scheduling Criteria A. Multiple Processor Scheduling

II. Thread Scheduling B. Real-Time CPU Scheduling

III. Multiple Processor Scheduling C. Thread Scheduling

IV. Real-Time CPU Scheduling D. Scheduling Criteria

Choose the correct answer from the options given below:

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

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

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

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

Answer Key: 1

Solution:

? Scheduling Criteria typically involves factors like throughput, CPU utilization, and response times, which are general considerations in CPU scheduling.

? Thread Scheduling focuses on the management of threads within the operating system, which can be part of larger task scheduling strategies.

? Multiple Processor Scheduling deals with the distribution and coordination of tasks across multiple processors.

? Real-Time CPU Scheduling ensures that critical real-time tasks meet their deadlines, which is crucial in systems where timing is critical.

Hence, Option (1) is the right answer.

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.

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.

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.

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.

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.

Match the following data storage concepts with their associated technologies:

1. Storage Concept Technology

I. Volatile Memory A. SSD

II. Non-Volatile Memory B. RAM

III. Primary Storage C. Magnetic Tape

IV. Secondary Storage D. Hard Disk Drive

Choose the correct answer from the options given below:

(1) I-B, II-A, III-B, IV-D

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

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

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

Answer Key: 1

Solution:

? Volatile Memory: Typically refers to memory that requires power to maintain the stored information, such as RAM.

? Non-Volatile Memory: Memory that can retain data without the need for power, examples include SSDs.

? Primary Storage: Directly accessible by the CPU, often refers to RAM.

? Secondary Storage: Used for long-term data storage, such as HDDs or SSDs.

Hence, Option (1) is the right answer.

Match the following genetic algorithm components with their uses in problem-solving:

1. GA Component Use

I. Selection A. Exploring new gene combinations

II. Crossover B. Maintaining diversity in the gene pool

III. Mutation C. Improving fitness of offspring

IV. Elitism D. Preserving the best solutions found

Choose the correct answer from the options given below:

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

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

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

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

Answer Key: 2

Solution:

? Selection: Process used to choose which individuals to reproduce based on their fitness.

? Crossover: Genetic operator used to combine the genetic information of two parents to generate new offspring.

? Mutation: Introduces variability into the gene pool, which can lead to discovering new genetic combinations.

? Elitism: Ensures that the best-performing individuals are carried over to the next generation, preserving excellent solutions.

Hence, Option (2) is the right answer.

Match the following design principles with their implications in software engineering:

1. Design Principle Implication

I. Modularity A. Reduces complexity by dividing the system into smaller, manageable parts

II. Cohesion B. Each module performs a single task

III. Coupling C. Minimizes the dependencies between modules

IV. Abstraction D. Helps in hiding the unnecessary details from the user

Choose the correct answer from the options given below:

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

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

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

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

Answer Key: 2

Solution:

? Modularity: Involves breaking down a software system into manageable, independent modules.

? Cohesion: Refers to the degree to which elements of a module are functionally related; higher cohesion within a module is desired.

? Coupling: Describes how tightly connected software modules are to one another; lower coupling is preferred.

? Abstraction: Allows a developer to hide details that are not necessary, presenting only the essential features of an object or function.

Hence, Option (2) is the right answer.

Match the following genetic algorithm terms with their corresponding descriptions:

1. GA Term Description

I. Fitness Function A. Measures how well a solution solves the problem

II. Encoding B. Represents possible solutions using strings of bits, characters, or numbers

III. Genetic Operator C. Techniques used to alter the genetic composition of offspring

IV. Population D. A group of candidate solutions

Choose the correct answer from the options given below:

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

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

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

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

Answer Key: 2

Solution:

? Fitness Function: Used to evaluate how good a given solution is at solving the problem.

? Encoding: How solutions are represented within the genetic algorithm, typically as strings.

? Genetic Operator: Includes mechanisms like mutation and crossover that modify genetic material.

? Population: The set of all solutions currently considered by the algorithm.

Hence, Option (2) is the right answer.

Match the following network concepts with their correct descriptions:

1. Network Concept Description

I. OSI Model A. Foundation for understanding network architecture

II. TCP/IP B. Used for routing data across the internet

III. Switching C. Process of moving data packets between devices

IV. Addresses D. Identifies devices on a network

Choose the correct answer from the options given below:

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

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

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

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

Answer Key: 1

Solution:

? OSI Model: A conceptual framework used to understand network interactions in seven layers.

? TCP/IP: The protocol suite used by the internet for transmitting data.

? Switching: Refers to the technology and processes involved in transferring data packets between network nodes.

? Addresses: Used to uniquely identify each device on a network, enabling communication.

Hence, Option (1) is the right answer.