--Question Starting--  
Match the following programming constructs in C with their corresponding descriptions:  
1. Programming Constructs Description  
I. Pointers A. Allows for data grouping of different types  
II. Structures B. Used for storing sequences of elements of the same type  
III. Arrays C. Enables manipulation of variables through their addresses  
IV. Functions D. Code blocks designed to perform specific tasks  
Choose the correct answer from the options given below:  
(1) I-D, II-A, III-B, IV-C  
(2) I-C, II-A, III-B, IV-D  
(3) I-B, II-C, III-A, IV-D  
(4) I-A, II-B, III-D, IV-C  
Answer Key: 2   
Solution:   
• Pointers: Directly address memory locations, hence they enable manipulation of variable values through their addresses.  
• Structures: Allow the programmer to create a data type that groups different types of elements.  
• Arrays: Are used to store multiple items of the same type in a contiguous block of memory.  
• Functions: Segregate code into specific blocks, which perform distinct tasks or calculations.  
Hence, Option (2) is the right answer.  
  
--Question Starting--  
Match the following algorithmic design techniques with their primary characteristic:  
1. Design Techniques Characteristic  
I. Divide and Conquer A. Builds up a solution by choosing the current best option  
II. Dynamic Programming B. Splits the problem into smaller subproblems of the same type  
III. Greedy Algorithms C. Optimizes by remembering past results  
IV. Backtracking D. Explores possibilities until an unsuitable one is found, then backtracks  
Choose the correct answer from the options given below:  
(1) I-C, II-A, III-B, IV-D  
(2) I-D, II-C, III-A, IV-B  
(3) I-B, II-C, III-A, IV-D  
(4) I-A, II-B, III-D, IV-C  
Answer Key: 3   
Solution:   
• Divide and Conquer: Breaks down a problem into smaller, more manageable subproblems, each of the same type as the original.  
• Dynamic Programming: Uses memorization or tabulation to save the results of previous computations, optimizing the solution process.  
• Greedy Algorithms: Makes a locally optimal choice at each step with the hope of finding a global optimum.  
• Backtracking: Involves making a series of choices and reversing them if they lead to an impasse.  
Hence, Option (3) is the right answer.  
  
--Question Starting--  
Match the following concepts in theory of computation with their corresponding ideas:  
1. Concepts Ideas  
I. Formal Language A. Argument about the limits of computational problems  
II. Non-Computational Problems B. Defined by specific grammatical rules  
III. Diagonal Argument C. Problems that cannot be computed even by a Turing machine  
IV. Russell’s Paradox D. Shows the self-contradictory nature of some sets of sets  
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-D, II-B, III-A, IV-C  
(4) I-A, II-C, III-B, IV-D  
Answer Key: 1   
Solution:   
• Formal Language: Characterized by a set of syntax rules known as grammar, defining a language within computational theory.  
• Non-Computational Problems: These are problems that lie outside the realm of what can be solved by any algorithm, hence they are inherently unsolvable by Turing machines.  
• Diagonal Argument: Used in proofs involving the limits of what can be computed, such as Cantor's proof that real numbers are uncountable.  
• Russell’s Paradox: An example of a logical inconsistency that arises when considering a set of all sets that do not contain themselves.  
Hence, Option (1) is the right answer.