--Question Starting--  
71. Match the following network layer functionalities with their corresponding protocols or concepts:  
Functionality Protocol/Concept  
I. Logical Address Mapping A. IPv6  
II. Fragmentation and Reassembly B. Sliding Window Protocol  
III. Routing Algorithm Efficiency C. TCP  
IV. Error Detection and Correction D. ARP  
Choose the correct answer from the options given below:  
(1) I-D, II-A, III-B, IV-C  
(2) I-D, II-C, III-A, IV-B  
(3) I-B, II-D, III-C, IV-A  
(4) I-D, II-A, III-C, IV-B  
Answer Key: 4  
Solution:  
• Logical Address Mapping: ARP (Address Resolution Protocol) is used for mapping a logical address like an IP address to a physical address in local area networks.  
• Fragmentation and Reassembly: Typically handled within IPv4 and IPv6, where packets are broken down and reassembled.  
• Routing Algorithm Efficiency: Various routing protocols exist, but the efficiency is based on how well these protocols direct data packets across networks.  
• Error Detection and Correction: Sliding Window Protocol, used in TCP, adjusts the rate at which the data is sent to ensure error-free and reliable data transfer.  
Hence, Option (4) is the right answer.  
  
--Question Starting--  
72. Match the following computational models and their respective language classes:  
Model Language Class  
I. Turing Machine A. Context-Free Languages  
II. Finite Automaton B. Recursive Languages  
III. Pushdown Automaton C. Recursively Enumerable Languages  
IV. Linear Bounded Automaton D. Regular Languages  
Choose the correct answer from the options given below:  
(1) I-C, II-D, III-A, IV-B  
(2) I-B, II-C, III-D, IV-A  
(3) I-B, II-A, III-C, IV-D  
(4) I-A, II-B, III-D, IV-C  
Answer Key: 1  
Solution:  
• Turing Machine: Recognizes recursively enumerable languages, which include all decidable and undecidable problems.  
• Finite Automaton: Recognizes regular languages, defined by regular expressions.  
• Pushdown Automaton: Recognizes context-free languages, useful for parsing nested structures like programming language grammars.  
• Linear Bounded Automaton: Recognizes recursive languages, which are decidable within a bounded space.  
Hence, Option (1) is the right answer.  
  
--Question Starting--  
73. Match the following complexities in computational models with their corresponding characteristics:  
Complexity Characteristic  
I. Time Complexity A. Number of states in the automaton  
II. Space Complexity B. Length of the longest path in computation  
III. State Complexity C. Amount of memory used  
IV. Descriptional Complexity D. Time taken to complete computation  
Choose the correct answer from the options given below:  
(1) I-D, II-C, III-A, IV-B  
(2) I-B, II-D, III-C, IV-A  
(3) I-C, II-B, III-D, IV-A  
(4) I-A, II-B, III-C, IV-D  
Answer Key: 1  
Solution:  
• Time Complexity: It refers to the time taken to complete the computation, often measured in terms of the number of steps.  
• Space Complexity: The amount of memory used during computation, measured in units like bits or bytes.  
• State Complexity: Refers to the number of states in an automaton, impacting how it processes inputs.  
• Descriptional Complexity: Often not a standard term, but could be interpreted as the complexity of describing the computational process, here represented by the length of the longest path.  
Hence, Option (1) is the right answer.  
  
--Question Starting--  
74. Match the following graphics transformations with their matrix representations:  
Transformation Matrix Representation  
I. Translation A. [1 0 dx; 0 1 dy; 0 0 1]  
II. Scaling B. [cos(θ) -sin(θ) 0; sin(θ) cos(θ) 0; 0 0 1]  
III. Rotation C. [sx 0 0; 0 sy 0; 0 0 1]  
IV. Reflection D. [1 0 0; 0 -1 0; 0 0 1]  
Choose the correct answer from the options given below:  
(1) I-A, II-C, III-B, IV-D  
(2) I-B, II-D, III-A, IV-C  
(3) I-C, II-A, III-D, IV-B  
(4) I-D, II-B, III-C, IV-A  
Answer Key: 2  
Solution:  
• Translation: The matrix [1 0 dx; 0 1 dy; 0 0 1] represents a shift by dx units in the x-direction and dy units in the y-direction.  
• Scaling: The matrix [sx 0 0; 0 sy 0; 0 0 1] scales an object by sx times in the x-direction and sy times in the y-direction.  
• Rotation: The matrix [cos(θ) -sin(θ) 0; sin(θ) cos(θ) 0; 0 0 1] rotates an object by θ degrees.  
• Reflection: Reflects an object across the y-axis, represented by [1 0 0; 0 -1 0; 0 0 1].  
Hence, Option (2) is the right answer.