Skipped Chunk 1:  
1. Consider the following statements regarding pipeline and vector processing:  
I. In a non-pipelined processor, the total execution time for n instructions is proportional to n × k, where k is the number of stages.  
II. Vector processors use deep pipelines and are optimized for operations on large arrays.  
III. Instruction-level parallelism (ILP) is primarily exploited in scalar pipeline architectures, not in vector processors.  
IV. Pipeline hazards can be categorized as structural, data, and control hazards.  
V. In an ideal pipelined processor, n instructions complete in n + k - 1 cycles, assuming no stalls.  
Choose the correct answer from the options given below:  
(1) I, II, and III only  
(2) I, II, IV and V only  
(3) I, II, III and V only  
(4) I, III, IV and V only  
Answer Key: 2  
Solution:  
• Statement I(Correct): In a non-pipelined processor, each instruction must go through all stages sequentially. So, time to execute n instructions = n × k clock cycles.  
No overlap of stages = linear increase in time.  
• Statement II(Correct): Vector processors use deep pipelines and vector registers. They’re optimized for data-parallel tasks such as array processing, matrix operations, etc.  
For example: Cray vector machines.  
• Statement IV(Correct): There are three types of pipeline hazards:  
Structural hazard – due to resource conflicts  
Data hazard – due to data dependencies  
Control hazard – due to branch/instruction flow changes  
• Statement V(Correct): In ideal pipelining, time to execute n instructions = n + k - 1 cycles, where k is the number of stages. This accounts for pipeline filling and draining.  
• Statement III(Incorrect): Instruction-Level Parallelism (ILP) is also exploited in vector processors, especially pipelined vector units. Scalar pipelines exploit ILP via superscalar/multicycle techniques, but vector processors also use ILP efficiently for vector operations. Hence, the distinction is not exclusive.  
Hence, Option (2) is the right answer.  
  
2. Consider the following statements about various AI algorithms and techniques:  
I. In A\\* algorithm, the evaluation function f(n) = g(n) + h(n) ensures optimality only if h(n) is admissible and consistent.  
II. Hill Climbing algorithm is complete and guarantees a global optimum if the heuristic function is monotonic.  
III. Minimax algorithm assumes that the opponent plays optimally and is mainly used in two-player deterministic games.  
IV. Alpha-Beta pruning does not affect the final outcome of minimax but reduces the number of nodes evaluated.  
V. Genetic Algorithms operate based on the principles of reinforcement learning to find optimal solutions.  
Choose the correct answer from the options given below:  
(1) I, II, and III only  
(2) I, II, IV and V only  
(3) I, III and IV only  
(4) I, III, IV and V only  
Answer Key: 3  
Solution:  
• Statement I(Correct): In A\\* search, the heuristic h(n) must be admissible (never overestimates cost) and consistent (also known as monotonic) to ensure optimality. This is a foundational requirement for A\\* to always find the shortest path.  
• Statement III(Correct): Minimax is used in two-player zero-sum games and assumes that both players play optimally. The opponent's optimal moves are simulated to determine the best move for the player.  
• Statement IV(Correct): Alpha-Beta pruning improves efficiency of minimax by pruning branches that won’t affect the final decision. It doesn’t change the result, only reduces search time.  
• Statement II(Incorrect): Hill Climbing is not complete and often gets stuck in local maxima, even with a monotonic heuristic. It lacks backtracking and may fail even when a solution exists.  
• Statement V(Incorrect): Genetic Algorithms are based on evolutionary principles like selection, crossover, and mutation. They are not based on reinforcement learning, which uses reward signals to learn policies.  
Hence, Option (3) is the right answer.