**Topic:**  
**‘Minimax Algorithm’**

The Minimax algorithm is a fundamental decision-making algorithm used in artificial intelligence and game theory, especially for two-player turn-based games. It aims to find the optimal move for a player assuming that the opponent also plays optimally.

**Functions:**

The Minimax algorithm implementation consists of the following key functions:

1. **minimax**
   * Recursively explores all possible moves and their outcomes.
   * If it’s the MAX player’s turn, it selects the move with the maximum value.
   * If it’s the MIN player’s turn, it selects the move with the minimum value.
   * Uses base cases to return numeric (leaf) node values when there are no further moves.

**How It Works:**

1. A nested dictionary (graph) is created, where each key represents a move and its child nodes represent possible outcomes or further decisions.
2. The algorithm starts at the root and alternates between MAX and MIN turns.
3. MAX tries to maximize the score, while MIN tries to minimize it.
4. Recursion continues until all terminal nodes (numeric values) are evaluated.
5. Finally, the algorithm returns the best possible decision for the MAX player.

**Key Concepts:**

* **MAX Player:** The player that tries to achieve the highest possible value.
* **MIN Player:** The opponent that tries to minimize the score.
* **Recursion:** The algorithm repeatedly calls itself for subproblems until base cases are reached.
* **Optimal Decision:** The final output representing the best move for the MAX player.

**Advantages:**

* **Optimal Strategy:** Ensures the best decision is made assuming the opponent plays optimally.
* **Simplicity:** Conceptually easy to understand and implement.
* **Applicability:** Can be used in games like Tic-Tac-Toe, Chess, and Checkers.

**Applications:**

* **Game AI:** Used to simulate intelligent decision-making in two-player games.
* **Decision Systems:** Helps evaluate multiple outcomes where opposing interests exist.
* **Search Problems:** Provides the foundation for more advanced algorithms like Alpha-Beta Pruning.