EXP : 3

1. Programs on Problem Solving

c. Implement MINIMAX algorithm.

AIM:

To solve minmax algorithm.

CODE:

```
def minimax(depth, node_index, is_maximizing, scores, max_depth):
    # Base case: leaf node reached
    if depth == max_depth:
        return scores[node_index]

    if is_maximizing:
        return max(
            minimax(depth + 1, node_index * 2, False, scores, max_depth),
            minimax(depth + 1, node_index * 2 + 1, False, scores, max_depth)
        )
    else:
        return min(
            minimax(depth + 1, node_index * 2, True, scores, max_depth),
            minimax(depth + 1, node_index * 2 + 1, True, scores, max_depth)
        )

# Example usage:
if __name__ == "__main__":
    # Terminal values of the game tree (leaf nodes)
    scores = [3, 5, 6, 9, 1, 2, 0, -1]  # Example scores at depth = 3 (leaf level)
    max_depth = 3  # Depth of the tree
```

```
# Start from root node (index 0) as maximizing player
optimal_value = minimax(0, 0, True, scores, max_depth)
print(f"The optimal value is: {optimal_value}")
```

OUTPUT:

```
The optimal value is: 5
```

RESULT:

Thus the program is compiled and run successfully.