EXPERIMENT:13 Write the python program to implement Minimax algorithm for gaming

PROGRAM:

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import math

def print_board(board):
    for row in board:
        print(" | ".join(row))
        print("-" * 5)

def check_winner(board):
    for row in board:
        if row.count(row[0]) == 3 and row[0] != " ":
            return row[0]
    for col in range(3):
        if board[0][col] == board[1][col] == board[2][col] != " ":
            return board[0][col]
    if board[0][0] == board[1][1] == board[2][2] != " " or board[0][2] == board[1][1] ==
board[2][0] != " ":
        return board[1][1]
    return None

def minimax(board, depth, is_max):
    winner = check_winner(board)
    if winner == "O": return 1
    if winner == "X": return -1
    if all(cell != " " for row in board for cell in row): return 0

    if is_max:
        best = -math.inf
        for i in range(3):
            for j in range(3):
                if board[i][j] == " ":
                    board[i][j] = "O"
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                best = max(best, minimax(board, depth+1, False))
                board[i][j] = " "
        return best
    else:
        best = math.inf
        for i in range(3):
            for j in range(3):
                if board[i][j] == " ":
                    board[i][j] = "X"
                    best = min(best, minimax(board, depth+1, True))
                    board[i][j] = " "
        return best

def best_move(board):
    best_val = -math.inf
    move = (-1, -1)
    for i in range(3):
        for j in range(3):
            if board[i][j] == " ":
                board[i][j] = "O"
                move_val = minimax(board, 0, False)
                board[i][j] = " "
                if move_val > best_val:
                    move = (i, j)
                    best_val = move_val
    return move

board = [[" "]*3 for _ in range(3)]
while True:
    print_board(board)
    r = int(input("Enter row (0-2): "))
    c = int(input("Enter col (0-2): "))
    if board[r][c] != " ":
        print("Invalid move!")
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```
            continue
        board[r][c] = "X"
        if check_winner(board) == "X":
            print_board(board)
            print("You win!")
            break
        if all(cell != " " for row in board for cell in row):
            print_board(board)
            print("Draw!")
            break
        ai_r, ai_c = best_move(board)
        board[ai_r][ai_c] = "O"
        if check_winner(board) == "O":
            print_board(board)
            print("AI wins!")
            break
```

OUTPUT: