Fr. Conceicao Rodrigues College of Engineering
Fr. Agnel Ashram, Bandstand, Bandra (W), Mumbai - 400050

Department of Computer
Engineering Academic Term II: 23-24

Class: B.E (Computer), Sem – VI Subject Name: Artificial Intelligence

Student Name: Sanat Patil **Roll No: 9566**

Practical No:	**2**
Title:	Tic Tac Toe game implementation by Magic Square Method
Date of Performance:	
Date of Submission:	

Rubrics for Evaluation:

Sr. No	Performance Indicator	Excellent	Good	Below Average	Marks
1	On time Completion & Submission (01)	01 (On Time)	NA	00 (Not on Time)	
2	Logic/Algorithm Complexity analysis (03)	03(Correct)	02(Partial)	01 (Tried)	
3	Coding Standards (03): Comments/indention/Naming conventions Test Cases /Output	03(All used)	02 (Partial)	01 (rarely followed)	
4	Post Lab Assignment (03)	03(done well)	2 (Partially Correct)	1(submitted)	
Total					

Signature of the Teacher:

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Experiment No: 2

Title: Tic Tac Toe game implementation by Magic Square Method

Objective: To write a computer program in such a way that computer wins most of the time using Magic Square Method

Theory:

A player who places his coins first across the same row or same column or same diagonal wins the game. Let us take a magic square of order 3 x 3 (for 3 coins game). The sum of the numbers across rows, columns and diagonals are the same - it is 15. That is, a player who places his coins such that he gets the perfect score of 15 takes the prize.

1) Board is considered to be a magic square of size 3 X 3 with 9 blocks numbered by numbers indicated by the magic square.
2) This representation makes the process of checking for a possible win simpler.
Board Layout as magic square. Each row, column and diagonals add to 15.

8	3	4	**15**
1	5	9	**15**
6	7	2	**15**

3) Maintain the list of each player's blocks in which he has played.
Consider each pair of blocks that the player owns.
Compute difference D between 15 and the sum of the two blocks.

If D < 0 or D > 9 then

i) These two blocks are not collinear and so can be ignored.
ii)Otherwise, if the block representing difference is blank (i.e., not in either list) then a move in that block will produce a win.

OUTPUT:

```
Sanat@Sanz-PC MINGW64 ~/Desktop/Sem - VI/AI/Experiments/E
xperiment 2
 python TicTacToe_Magic_Square.py
-  -  -
-  -  -
-  -  -
Enter your move (1-9): 9
-  -  X
-  -  -
-  -  -
-  -  X
-  -  -
O  -  -
Enter your move (1-9): 3
-  -  X
-  -  -
O  -  X
-  -  X
-  -  -
O  O  X
Enter your move (1-9): 4
-  -  X
X  -  -
O  O  X
-  -  X
X  O  -
O  O  X
Enter your move (1-9): 6
-  -  X
X  O  X
O  O  X
X wins!

Sanat@Sanz-PC MINGW64 ~/Desktop/Sem - VI/AI/Experiments/E
xperiment 2
```

Post Lab Assignment:

1. What is the relationship between tic-tac-toe and magic square?
2. What is a magic square of order n?

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Postlab Experiment-2

Q1] What is the relationship between tic-tac-toe & magic square?

Ans ▷ Tic Tac Toe & magic square are related through the arrangement of the game board.

2) In Tic Tac Toe, players aim to create winning combinations of their marks in rows, columns or diagonals.

3) A magic square is a grid where the sum of numbers in each row, column & diagonal is the same.

4) The numbers in a magic square can represent positions on the tic-tac-toe grid.

5) By using the numbers of a magic square, we can easily identify winning combinations

Q2] What is a magic square of order n?

A) A magic square is a square grid containing numbers arranged in a way such that each row, cloumn & diagonal adds up to the same constant sum.

2) The order of a magic square refers to the number of rows & ~~etc~~ columns it has.

3) For a magic square of order n, it contains n rows & n columns

4) The numbers used in a magic square of order n range from 1 to n^2

5) The sum of each row, column & diagonal in a magic square of order n is called the magic constant denoted by M

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Formulas for ~~the~~ calculating the magic constant (M)

$$M = \frac{n \cdot (n^2 + 1)}{2}$$

M → magic constant

n → order of magic square

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