



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:**

**Roll No: 9543 Name: Madhav Jha**

<b>Practical No:</b>	<b>2</b>
<b>Title:</b>	Tic Tac Toe game implementation by Magic Square Method
<b>Date of Performance:</b>	<b>03-02-2024</b>
<b>Date of Submission:</b>	<b>04-02-2024</b>

**Rubrics for Evaluation:**

<b>Sr. No</b>	<b>Performance Indicator</b>	<b>Excellent</b>	<b>Good</b>	<b>Below Average</b>	<b>Marks</b>
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/indentation/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)	
<b>Total</b>					

**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.

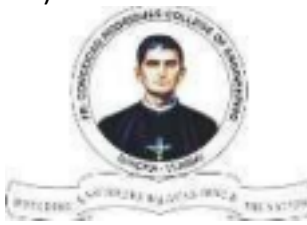
8	3	4	<b>15</b>
1	5	9	<b>15</b>
6	7	2	<b>15</b>

- 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.

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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:

```
Microsoft Windows [Version 10.0.19045.3930]
(c) Microsoft Corporation. All rights reserved.

C:\Users\bisht\OneDrive\Desktop\SEM 6>cd AI

C:\Users\bisht\OneDrive\Desktop\SEM 6\AI>python TicTacToe_Magic_Square.py
- - -
- - -
- - -
Enter your move (1-9): 6
- - -
- - X
- - -
- - -
- - X
0 - -
Enter your move (1-9): 5
- - -
- X X
0 - -
- - -
- X X
0 0 -
Enter your move (1-9): 4
- - -
X X X
0 0 -
X wins!

C:\Users\bisht\OneDrive\Desktop\SEM 6\AI>
```

### Post Lab Assignment:

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

2. No. No.

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Post Lab Assignment : Exp: 2

Q.1] What is the relationship between tic-tac-toe and magic square?

⇒

1. Tic-Tac-Toe and 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 and 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 in Tic-Tac-Toe.

Q.2] What is a magic square of order  $n$ ?

⇒

1. A magic square is a square grid containing numbers arranged in a way that each row, column and diagonal adds up to the same constant sum.
2. The order of a magic square refers to the number of rows and columns it has.
3. For a magic square of order  $n$ , it contains  $n$  rows and  $n$  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 and diagonal in a magic square of order  $n$  is called the magic constant, denoted by  $M$ .

Formula for calculating the magic constant ( $M$ ) of a magic square of order  $n$ :

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

Where  $M \rightarrow$  Magic Constant  
 $n \rightarrow$  order of magic square