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Breaking a Stick to Form a Octagon with Positive Integers

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Abstract: ***In this paper, using a computer programming language, we determine the number of octagons that can be formed by using a stick of given length say n units, n being a positive integer greater than 8.***
Keywords: Octagon, Triangle inequality, Polygon, inequality condition, Programming language.

I. INTRODUCTION

In [1, 2, 3, 4, 5] we formed a triangle, quadrilateral and pentagon through breaking a stick using programming language. In this paper, by using Python language we form all possible octagons with positive integers through braking stick, for any such n. For example, suppose we take a stick of length 12 units and cut this stick at 7 places to form 8 parts of the stick. Let a, b, c, d, e, f, g, h be the lengths of the eight parts of the stick and assume that a, b, c, d, e, f, g, h are positive integers. Hence we have the basic relation a + b + c+ d + e + f +g + h = n. Here number n is given but a, b, c, d, e, f, g, h are variable numbers. For formation of a octagon having side lengths a, b, c, d, e, f, g, h we need to see that the condition a + b + c + d + e + f + g > h and h is the largest side length compare to others i.e, the sum of the remaining side lengths is greater than the largest side length. Here (a, b, c, d, e, f, g, h) = (b, c, d, e, f, g, h, a) = (c, d, e, f, g, h, a, b)=(d, e, f, g, h, a, b, c)=(e, f, g, h, a, b, c, d)=(f, g, h, a, b, c, d, e))=(g, h, a, b, c, d, e, f).)=(h, a, b, c, d, e, f, g).

This is very difficult if the numbers of our selection are considerably large. Now our aim is to form Octagon with Positive Integers using Python language

II. MAIN RESULT

A. *Algorithm*

Step 1 : start
Step 2 : Initialize a, b, c, d, e, f, g, h, l all to zero
Step 3 : read stick length value as n
Step 4 : initialize for loop with h<n
Step 5 : if step 4 satisfies goto step 6 else goto step 29
Step 6 : initialize for loop g=1 with g<h
Step 7 : if step 6 satisfies goto step 8 else goto step 28
Step 8 : initialize for loop f=1 with f<g
Step 9 : if step 8 satisfies goto step 10 else goto step 27
Step 10 : initialize for loop e=1 with e<f
Step 11 : if step 10 satisfies goto step 12 else goto step 26
Step 12 : initialize for loop d=1 with d<e
Step 13 : if step 12 satisfies goto step 14 else goto step 25
Step 14 : initialize for loop c=1 with c<d
Step 15 : if step 14 satisfies goto step 16 else goto step 24
Step 16 : initialize for loop b=1 with b<c
Step 17 : if step 16 satisfies goto step 18 else goto step 23
Step 18 : initialize for loop a=1 with a<b
Step 19 : if step 18 satisfies goto step 20 else goto step 22
Step 20 : if the condition a +b +c +d +e +f + g > h and a + b +c +d +e +f +g +h =n and h>a and h>b and h>c and h>d and h>e and h>f and h>g satisfies goto step 21 else goto step 18

Step 21 : print a, b, c, d, e, f, g, h values as output and increment l value
Step 22 : increment a value by 1
Step 23 : increment b value by 1
Step 24 : increment c value by 1
Step 25 : increment d value by 1
Step 26 : increment e value by 1
Step 27 : increment f value by 1
Step 28 : increment g value by 1
Step 29 : increment h value by 1
Step 30 : print l value as number of octagons
Step 31 : stop

B. Result Analysis

We are required to display all the combinations that follow the triangle inequality. This can be achieved with help of the following steps.
Step 1: Write all permutations in form of triads for a given integer.
Step 2: Eliminate equivalent permutations so that only the combinations remain.
Step 3: Display only the combinations that satisfy the triangle inequality.
The above procedure can be explained below :
For example,
Consider a stick length 12.
Let the combinations are (1, 1, 1, 1, 2, 2, 2, 2), (1, 1, 1, 1, 1, 2, 2, 3), (1, 1, 1, 1, 1, 1, 3, 3), (1, 1, 1, 1, 1, 1, 2, 4), (1, 1, 1, 1, 1, 1, 1, 5).
The total number of hexagons with stick length 12 are 5
We can represent this result in outputs.

III. OUTPUTS

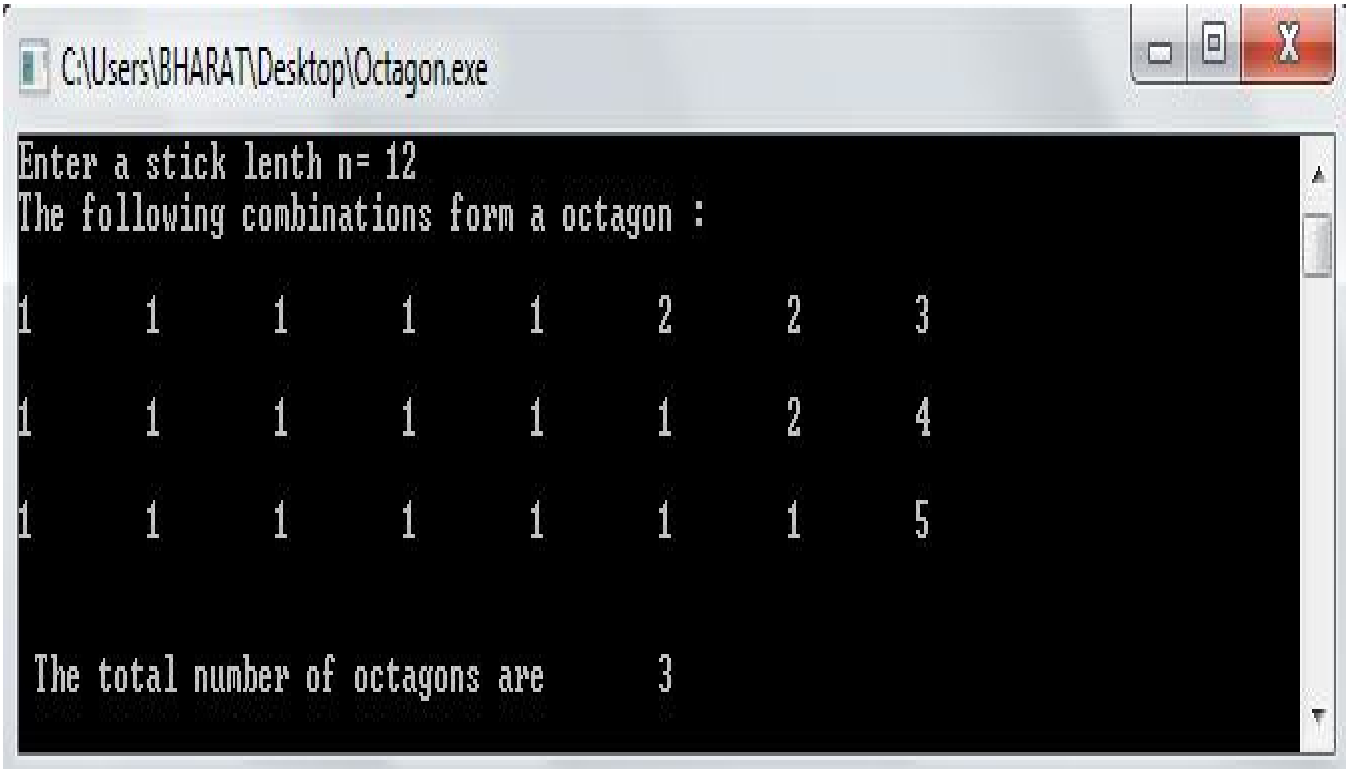

Fig. 1 Stick length n=12

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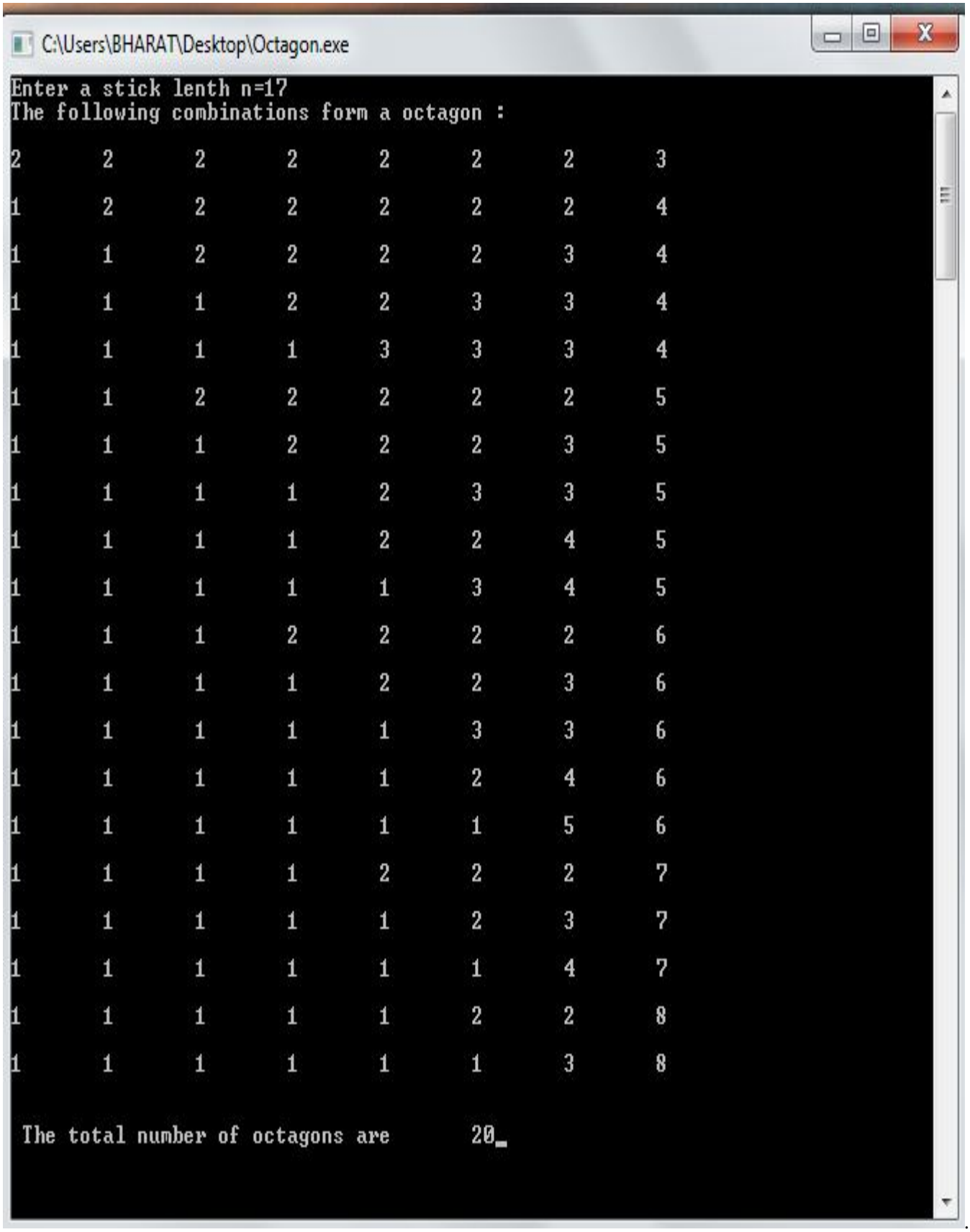

Fig. 2 Stick length n=17

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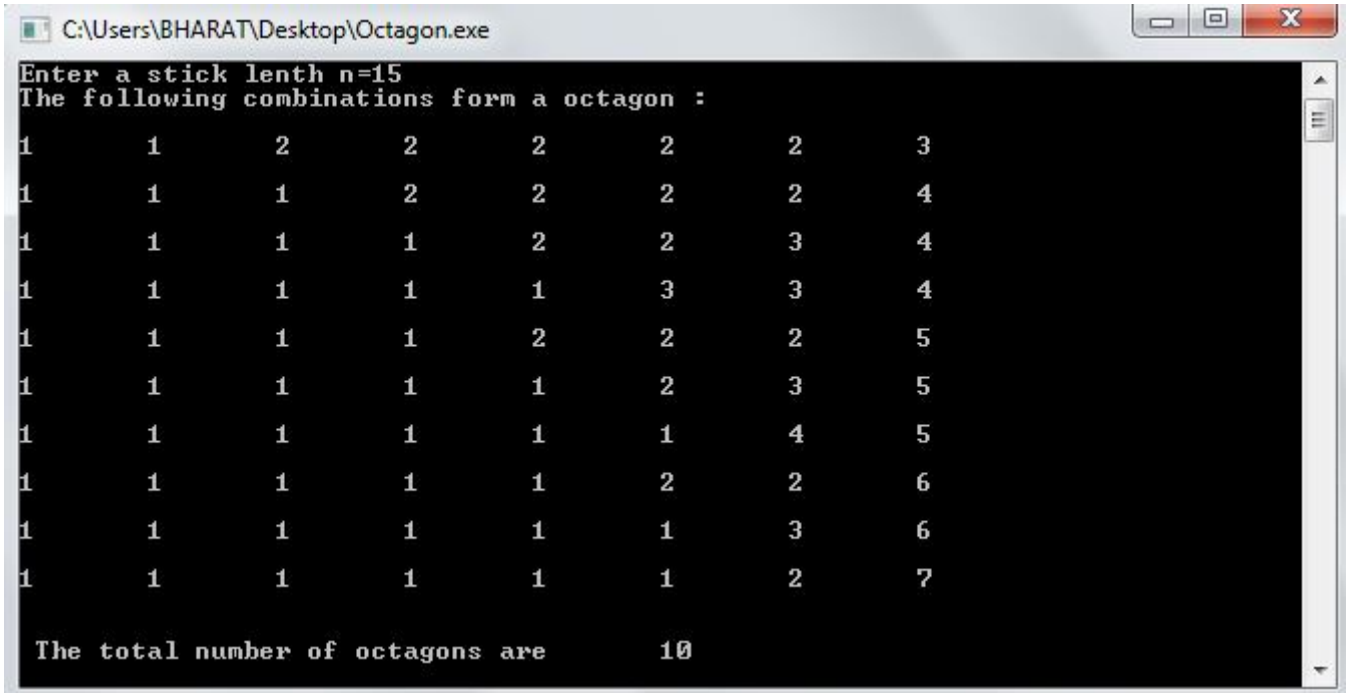

Fig. 2 Stick length n=15

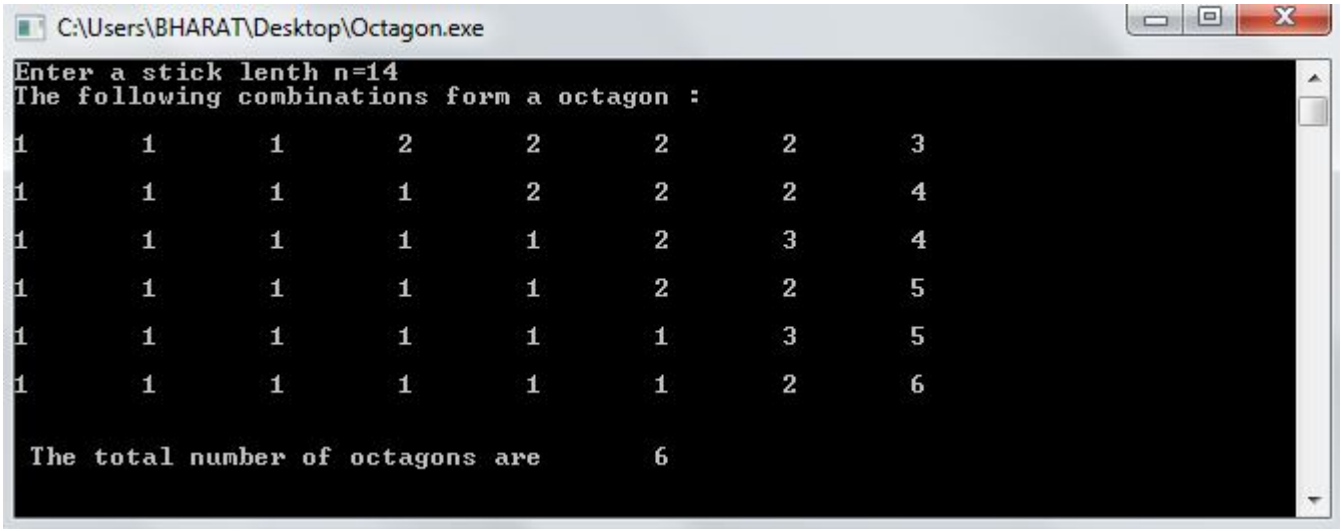

Fig. 4 Stick length n=14

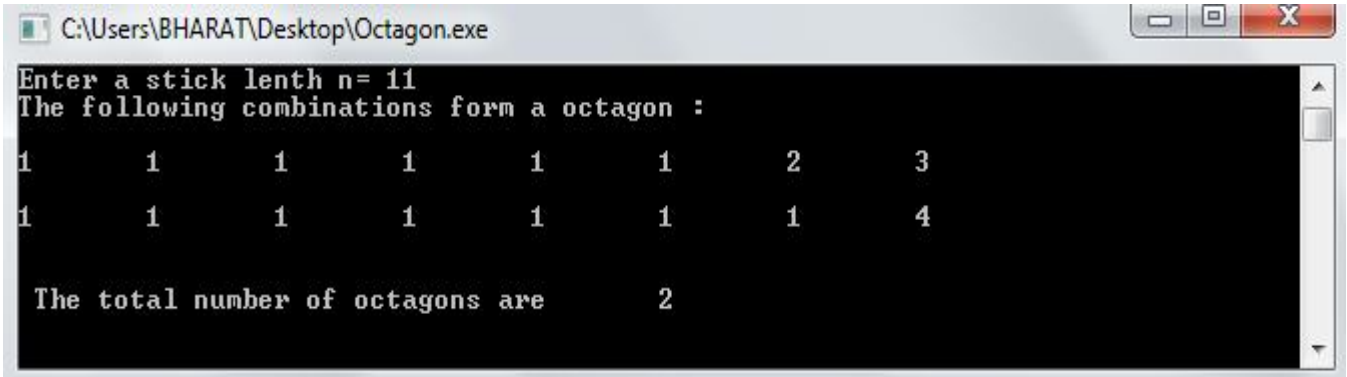

Fig. 5 Stick length n=10

IV. CONCLUSIONS

By using this program, we can easily form a octagon by breaking a stick with positive integers, it becomes novel and easy process.

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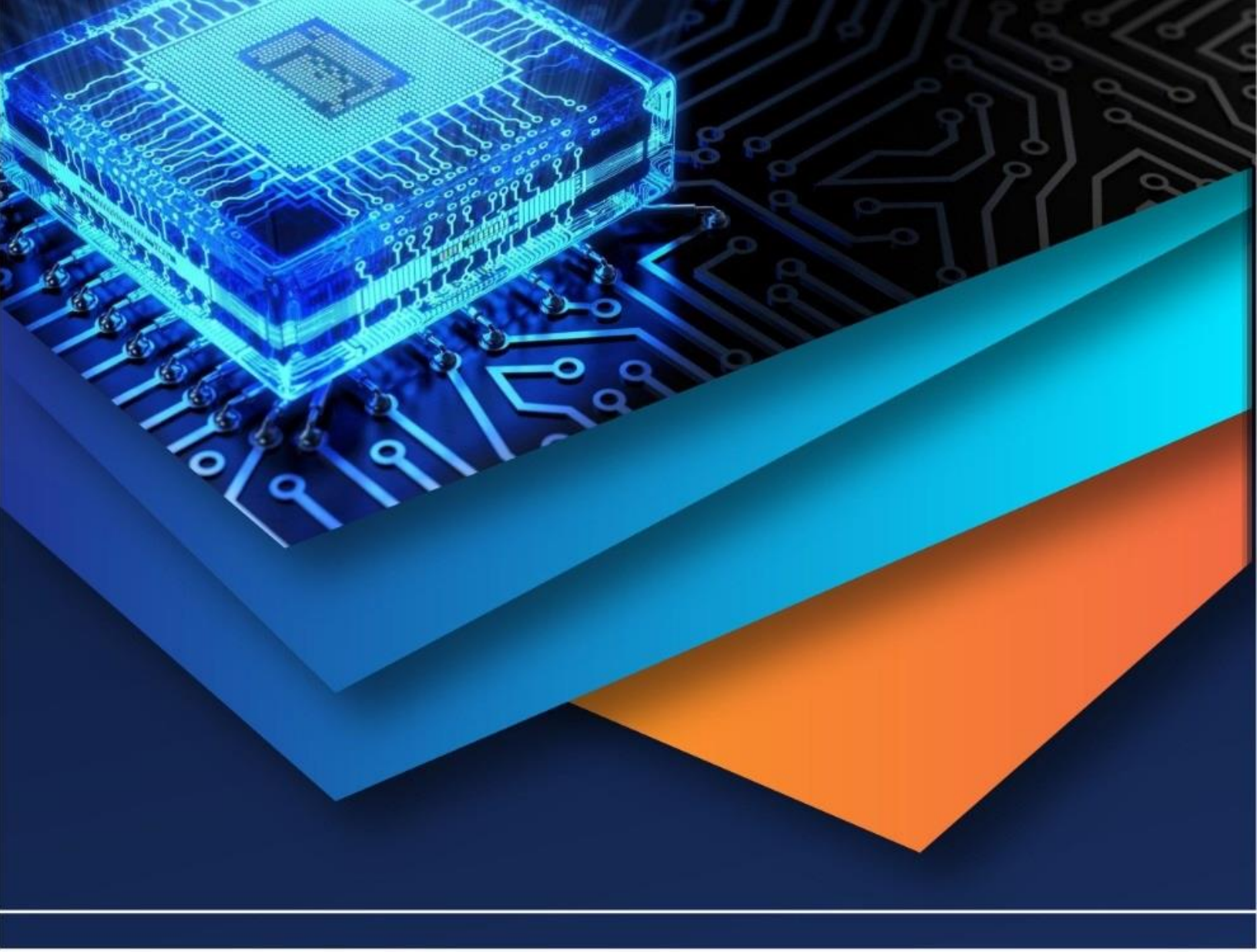

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