**3. Topic – Finding Pythagorean triples upto a desired number using C program**

* **Problem Statement**

A Pythagorean triple is a triple (a, b, c) of positive integers with the property that a^2 + b^2 = c^2 . Write a program that scans a positive integer value k and outputs all Pythagorean triples (a, b, c), with 0 < a ≤ b < c ≤ k.

**Input example:** /\* Here user will give a postive integer k \*/

Enter a positive integer upto which pythagorean triples have to be shown

27

**Output example:**

The pythagorean triples between 1 to 27 are:

3 4 5

6 8 10

5 12 13

9 12 15

8 15 17

12 16 20

15 20 25

7 24 25

10 24 26

* **Proposed C Code**

**/\* ---------- pythagoreantriple.c--------------- \*/**

#include<stdio.h>

int main()

{

int k;

printf("Enter a positive integer upto which pythagorean triples have to be shown\n");

scanf("%d",&k);

/\* The input k is taken from user \*/

printf("The pythagorean triples between 1 to %d are:\n",k);

int a,b,c;

/\* The variables for printing pythagorean triples are declared \*/

/\* The loops for finding the pythagorean triples is written below \*/

for( b = 1 ; b < k ; b++ )

{

/\* At first b is fixed and for each b the inner loop for a is performed where a<=b \*/

for ( a = 1 ; a <=b ; a++ )

{

int square = a\*a + b\*b ;

/\*The sum of the squares combination is stored in square variable \*/

if(square > k\*k)

break;

/\* When square exceeds the range the loop is broken \*/

else

{

c = 1;

while ( c <= k )

{

if(square == c\*c)

/\* The perfect square withen the input number k which can be expressed as a^2 + b^2 = c^2 are found \*/

{

printf("%3d %3d %3d\n",a,b,c);

/\* The pythagorean triples a,b,c where 0<a<=b<c<=k are printed \*/

}

c++;

}

}

}

}

return 0;

}

**/\*------------------------------------------------------------------------------------------------------------------------- \*/**

* **Conclusion**

**The proposed algorithm has a runtime of O(n^3) where n is generally number of input size under consideration.**

* **Limitations : The program will take only integer values withen 0 to 2^32-1 as we are using ‘int’ datatype and mentioning only positive integers for negative integer there will be no case of finding pythagorean triples.**
* **Assumptions: Here we are considering only positive integers as per the question.**