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2.2.1The institution assesses the learning levels of the students and organizes special Programmes to cater to differential learning needs of the student

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Diophantine Triples Involving Octagonal Pyramidal Numbers

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***Abstract:** In this work, we strive for three particular polynomials with integer coefficients that may be expanded by non-zero values to the position where the product of any two numbers is a perfect square.*
***Keywords:** Diophantine triples, octagonal pyramidal number, triples, perfect square, pyramidal number.*

Notation

$p_n^8 = \frac{n(n+1)}{6}[6n-3]$, octagonal pyramidal number of rank n

I. INTRODUCTION

In number theory, a Diophantine equation is a polynomial equation with two or more unknowns that solely considers or searches for integer solutions [1-4]. The term "Diophantine" relates to the Greek mathematician Diophantus of Alexandria who, in the third century, pioneered the introduction of symbolism to variable-based mathematics and studied related problems. Numerous mathematicians have investigated the issue of the occurrence of Dio triples and quadruples with the property D(n) for any integer n as well as for any linear polynomial in n [5-8]. In this case, [9-16,18 &19] provides a full study of the many challenges on Diophantine triples. Triple sequences with a half companion sequences were examined in [19].

Our search for Diophantine triples utilising octagonal pyramidal numbers was prompted by these findings. This study tries to build Dio-Triples that satisfy the necessary property when the product of any two of the triple's members plus a non-zero integer or a polynomial with integer coefficients is added. The Diophantine triples from octagonal pyramidal numbers of various ranks are also presented in each of the three parts along with the relevant features.

II. BASIC DEFINITION

A set of three distinct polynomials with integer coefficients (a_1, a_2, a_3) is said to be **Diophantine triple with property $D(n)$** if $a_i * a_j + n$ is a perfect square for all $1 \le i < j \le 3$, where n may be non zero or polynomial with integer coefficients.

III. METHOD OF ANALYSIS

A. Section-A

Construction of the Diophantine triples involving octagonal pyramidal number of rank n and $n-1$

Let $a = 6p_n^8$ and $b = 6p_{n-1}^8$ be octagonal pyramidal numbers of rank n and $n-1$ respectively. Then,

$ab + (-3n^4 - 24n^3 + 42n^2) = (6n^3 - 6n^2 - 4n)^2$

Hence , $ab + (-3n^4 - 24n^3 + 48n^2) = \alpha^2$ (say) (1)

$bc + (-3n^4 - 24n^3 + 48n^2) = \beta^2$ (2)

$ca + (-3n^4 - 24n^3 + 48n^2) = \gamma^2$ (3)

Solving (2) & (3)

$(b-a)(3n^4 + 24n^3 - 48n^2) = (a\beta^2 - b\gamma^2)$ (4)

Put, $\beta = x + by$ and $\gamma = x + ay$

Substituting β, γ in (4)

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An Integral Solution of Negative Pell Equation $x^2 = 5y^2 - 9^t$

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Abstract: ***We look for non-trivial integer solution to the equation*** $x^2 = 5y^2 - 9^t, t \in N$ ***for the singular choices of particular by (i) t = 2k (ii) t = 2k+1,*** $\forall k \in N$***. Additionally, recurrence relations on the solutions are obtained.***

Keywords: Negative Pell equations, Pell equations, Diophantine equations, Integer solutions.

I. INTRODUCTION

It is well known the Pell equation $x^2 - Dy^2 = 1$ (D > 0 and square free) has at all times positive integer solutions. When $N \neq 1$, the Pell equation $x^2 - Dy^2 = -N$ possibly will not boast at all positive integer solutions. In favour of instance, the equations $x^2 = 3y^2 - 1$ and $x^2 = 7y^2 - 4$ comprise refusal integer solutions.

This manuscript concerns the negative Pell equation $x^2 = 5y^2 - 9^t$, where t > 0 and infinitely numerous positive integer solutions are obtained for the choices of t known by (i) $t = 2k$ (ii) $t = 2k+1$. Supplementary recurrence relationships on the solutions are consequent.

II. PRELIMINARY

The Pell equation is a Diophantine equation of the form $x^2 - dy^2 = 1$. Given d, we would like to find all integer pairs (x, y) that satisfy the equation. Since any solution (x, y) yields multiple solutions $(\pm x, \pm y)$, we may restrict our attention to solutions where x and y nonnegative integer. We usually take d in the equation $x^2 - dy^2 = 1$ to be a positive non square integer. Otherwise, there are only uninteresting solutions: if $d < 0$, then $(x, y) = (\pm 1, 0)$ in the case $d<-1$, and $(x, y)=(0, \pm 1)$ or $(\pm 1, 0)$ in the case $d = -1$; if $d = 0$, then $x = \pm 1$ (y arbitrary); and if a nonzero square, then dy^2 and x^2 are consecutive squares, implying that $(x, y)=(\pm 1, 0)$.

Notice that the Pell equation always has trivial solution $(x, y) = (1, 0)$. We now investigate an illustrate case of Pell's equation and

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POWER-3 HERONIAN ODD MEAN LABELING FOR SOME SPECIAL GRAPHS

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Abstract: In this article, we discuss Power-3 Heronian odd Mean Labeling for some families of graphs. A function is said to be Power-3 Heronian odd mean labelling of a graph G with q edges, if f is a objective function from the vertices of G to the set{1,3,5,.......2p-1}such that when each edges uv is assigned the label. The resulting edge labels are distinct numbers.

$$\beta^*(e = uv) = \left[\sqrt[3]{\frac{\beta(u)^3 + (\beta(u)\beta(v))^{\frac{3}{2}} + \beta(v)^3}{3}} \right]$$

Keywords:

Mean labeling, multiplicative labeling, Additive labeling.

Introduction:

In this paper, the graphs are taken as simple, finite and undirected. Let V(G) denotes set of all vertices and E(G) denotes set of all edges .A graph labeling an assignment of integers at its vertices or edges under certain conditions. A vertex labeling is a function of V to a set of labels. A graph with such a vertex labeling function is defined as Vertex – labeled graph. An edge labeling is a function of E to a set of labels and a graph with such a function is called an edge labeled graph. In this article $P_n \odot K_{1,2}$, $P_n \odot K_{1,3}$, T_5, Quadrilateral snakes are discussed Power-3 Heronian odd Mean Labeling of Graphs. All Graphs in

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On Integer Solutions of the Ternary Quadratic Equation $3a^2+3r^2-2ar=332n^2$

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Abstract: *Analysis is conducted on the non-trivial different integral solution to the quadratic equation* $3a^2+3r^2-2ar=332n^2$. *We derive distinct integral solutions in four different patterns. There are a few intriguing connections between the solutions and unique polygonal numbers that are presented.*
Keywords: *Quadratic equation, integral solutions, polygonal numbers, special numbers, square number.*

I. INTRODUCTION

Number theory is a vast and fascinating field of mathematics concerned with the properties of numbers in general and integers in particular as well as the wider classes of problems that arise from their study. Number theory has fascinated and inspired both amateurs and mathematicians for over two millennia. A sound and fundamental body of knowledge, it has been developed by the untiring pursuits of mathematicians all over the world. The study of Number theory is very important because all other branches depend upon this branch for their final results. The older term for number theory is "arithmetic". During the seventeenth century. The term "Number theory" was coined by the French mathematician Pierre Fermat who is consider as the "Father of modern number theory". The first scientific approach to the study of integers, that is the true origin of the theory of numbers, is generally attribution to the Greeks. Around 600BC Pythagoras and his disciples made rather thorough studies of this integer. A Greek mathematician, Diaphantus of Alexandria was able to solve equations with two or three unknowns. These equations are called Diophantine equation the study of these is known as "Diophantine analysis". The basic problem is representation of an integers n by the quadratic form with the integral values x and y .

A linear Diophantine equation is an equation between two sums of monomial of degree zero (or) one. In 628 AD, Brahmagupta an Indian mathematician gave the first explicit solution of the quadratic equation. The word quadratic is derived from the Latin word quadrates for square. The quadratic equation is a second-order polynomial equation in a single variable x.

There are several different ternary quadratic equations. To comprehend something in more detail is [1-4] visible. For the non-trivial integral answers to the ternary quadratic equation [5-7] has been researched. For numerous ternary quadratic equation [8-10] has been cited. In this article, we investigate another intriguing ternary quadratic equation $3a^2+3r^2-2ar=332n^2$ and obtain several non-trivial integral patterns. A few intriguing connections between the solutions and unique polygons, rhombic, centered and Gnomonic number are displayed.

A. Notations

$T_{m,n}$ = Polygonal number of rank n with size m

RD_n = Rhombic dodecagonal number of rank n

P_n^5 = Pentagonal Pyramidal number of rank n

TO_n = Truncated octahedral number of rank n

P_n^4 = Square Pyramidal number of rank n

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On The Ternary Quadratic Diophantine Equation $x^2 + 14xy + y^2 = z^2$

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***Abstract:** The non-zero unique integer solutions to the quadratic Diophantine equation with three unknowns $x^2 + 14xy + y^2 = z^2$ are examined. We derive integral solutions in four different patterns. A few intriguing relationships between the answers and a few unique polygonal integers are shown.*
***Keywords:** Ternary quadratic equation, integral solutions.*

I. INTRODUCTION

There is a wide range of ternary quadratic equations. One might refer to [1-8] for a thorough review of numerous issues. These findings inspired us to look for an endless number of non-zero integral solutions to another intriguing ternary quadratic problem provided by $x^2 + 14xy + y^2 = z^2$ illustrating a cone for figuring out its many non-zero integral points. A few intriguing connections between the solutions are displayed.

II. CONNECTED WORK

Pr_n = Pronic number of the rank 'n'

Gno_n = Gnomonic number of rank 'n'

$T_{m,n}$ = Polygonal number of rank 'n' with sides 'm'

III. METHODOLOGY

The ternary quadratic Diophantine equation to be solved for its non-zero integral solutions is,

$x^2 + 14xy + y^2 = z^2$ (1) Replacement of linear transformations

$x = \alpha + \beta$ and $y = \alpha - \beta$ (2)

(1) results in

$16\alpha^2 - 12\beta^2 = z^2$ (3)

We present below different patterns of solving (3) and thus obtain different choices of integer solutions of (1)

A. Pattern: I

Assume, $z = z(a,b) = 16a^2 - 12b^2$ (4)

Where a and b are non-zero integers.

Substitute (4) in (3) we get,

$(4\alpha + \sqrt{12}\beta^2)(4\alpha - \sqrt{12}\beta^2) = (4a + \sqrt{12}b)^2(4a - \sqrt{12}b)^2$ (5)

Equating rational and irrational terms we get,

$$\alpha = \frac{1}{4}[16a^2 + 12b^2]$$

$$\beta = 8ab$$

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INTEGRAL SOLUTIONS OF THE TRINITY CUBIC EQUATION

$$5(p^2+q^2)-6(pq)+4(p+q+1)=1600r^3$$

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ABSTRACT

The trinity cubic equation $5(p^2+q^2)-6(pq)+4(p+q+1)=1600r^3$ ***is analyzed. To the trinity cubic equation under consideration of sequence of non-zero integral solutions is obtained. A few fascinating properties of the solutions are seen, as well as few distinct polygonal numbers.***

Keywords: Cubic equation, integrable solutions, polygonal number.

INTRODUCTION:

The Diophantine equation has a diverse range. Many people have shown interest in the integer solution of the non-homogeneous cubic equation with three unknowns. Due to the diversity in the way the theory of numbers was discussed in [1-3], it offers a limitless field of study. Numerous concerns gave been examined in depth in [4-9]. Several fascinating properties of the solutions towards the trinity cubic equation $5(p^2+q^2)-6(pq)+4(p+q+1)=1600r^3$ is examined in this communication, as well as some special numbers.

Notations:

$T_{m,n} = n\left[1+\frac{(n-1)(m-2)}{2}\right]$ (Polygonal number)

$P_n^m = \frac{1}{6}n(n+1)[(m-2)n+(5-m)]$ (Pyramidal number)

$O_n = \frac{1}{3}(2n^3+n)$ (Octrahedral number)

$CS_n = n^2+(n-1)^2$ (Centered square number)

$CC_n = (2n-1)(n^2-n+1)$ (Centered cube number)

$Gno_n = 2n-1$ (Gnomonic number)

$SO_n = n(2n^2-1)$ (Stella Octangula number)

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TRANSCENDENTAL EQUATION INVOLVING PALINDROME NUMBER

$$p^5+\sqrt{p^7+q^7-(pq)^5}+\sqrt[3]{r^2+s^2}=20402\,h^3$$

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ABSTRACT

We make an effort to justify the integral solutions of transcendental equation $p^5+\sqrt{p^7+q^7-(pq)^5}+\sqrt[3]{r^2+s^2}=20402h^3$ ***under frequent patterns providing specific numerical examples.***

Keywords : Transcendental equation, Palindrome number, Integral solutions.

I. INTRODUCTION

A mathematical equation is said to be transcendental if all of its constituent variables have transcendental functions. A function is transcendental when it cannot be represented by a polynomial solution and is analytical in nature. These equations are simple to solve because the variables can be roughly known. Numerous equations that appear to allow for only straightforward solutions are used to solve transcendental functions. The opposite of each of the aforementioned functions, as well as the logarithmic, exponential, trigonometric and hyperbolic ones, are instances of well-known transcendental functions. There are also some surprising transcendental function along with specific analytical functions like elliptic, zeta and gamma. In this paper for solving transcendental equation we have to use Palindrome number and sum of its squares of the same palindrome number.

[1-2] has been recommended for fundamental notions and principle in number theory. Fundamental concepts and ideas of number theory have been investigated in [3-7]. Transcendental equation related thoughts and problem were collected in [8-12].

II. METHOD OF ANALYSIS

The equation to be solved is, $p^5+\sqrt{p^7+q^7-(pq)^5}+\sqrt[3]{r^2+s^2}=20402h^3$ (1)

The following linear transformation $p=(u-v)^3,\ q=(v-u)^3,\ r=u^3+3uv^2,\ s=3u^2v-v^3$

leads to $p^5+\sqrt{p^7+q^7-(pq)^5}+\sqrt[3]{r^2+s^2}=u^2+v^2$ hence, $p^5+\sqrt{p^7+q^7-(pq)^5}+\sqrt[3]{r^2+s^2}=u^2+v^2$ reduces to,

$u^2+v^2=20402\,h^3$ (2)

Now, we find various patterns of solutions of (1) using (2).

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LEHMER-4 MEAN LABELING FOR SOME PATH RELATED GRAPHS

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ABSTRACT

A graph G=(V,E) with p vertices and q edges is called Lehmer-4 mean graph, if it is possible to label vertices $x \in V$ with distinct label g(x) from 2,4,6,8,.......... 2p in such a way that when each edge e = uv is labeled with $g(e=uv)=\left\lfloor \frac{g(u)^4+g(v)^4}{g(u)^3+g(v)^3} \right\rfloor$ *(or)* $\left\lceil \frac{g(u)^4+g(v)^4}{g(u)^3+g(v)^3} \right\rceil$, *then the edge labels are distinct. In this case, g is called Lehmer-4 mean labeling of G. In this paper, Lehmer-4 mean labeling for some path related graphs have been introduced.*

Keywords: Star, Tree, Bistar,Graph.

1. INTRODUCTION

Graph labeling is an assignment of integer to its vertices or edges under certain condition. All Graphs in this paper are finite and undirected. The symbols V(G) and E(G) denote the vertex set and edge set of a graph G. The cardinality of the vertex set is called the order of G denoted by p. The cardinality of the edge set is called the size of G denoted by q edges is called a (p,q) graph. A graph labeling is an assignment of integers to the vertices or edges. Bloom and Hsu [2] extended the notion of graceful labeling to directed graphs. Further this work can be extended in the field of automata theory cited as Saridha , Rajaretnam [13,14,15,16,17] which has a wide range of application in automata theory. Saridha and Haridha Banu [18] discussed a new direction towards plus weighted grammar. Shalini, Paul Dhayabaran introduced different types of labelings[19,20]. Different types of labelings have been proved under connected and disconnected graphs[21,22,23,24,25,26,27,28,29,30]. Shalini.P, S.A. Meena [31] introduced "Lehmer -4 mean labelling of graph ".Shalini.P S.Tamizharasi[32,33] studied "Power -3 Heronian Odd Mean Labeling Graphs". Graph Labeling can be further extended to weiner index polynomial is cited as Palani Kumar, Rameshkumar [8,9,10,11,12]

2. BASIC DEFINITIONS

DEFINITION2.1

A graph G is said to be **Lehmer-4 mean graph** if it admits lehmer-4 mean labeling.

DEFINITION2.2

A Star S_n is the complete bipartite graph $K_{1,n}$

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PROPER COLOURINGS IN *r*-REGULAR ZAGREB INDEX GRAPH

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ABSTRACT

In this article, the new concept proper colourings in r - regular Zagreb index graph has been introduced. The first and second Zagreb indices are introduced. New inequalities on chromatic number related with first and second Zagreb indices are being established.

Keywords: Regular graph, Proper Colouring, Zagreb index, Chromatic number.

1. INTRODUCTION

In this article, we consider only finite, simple and undirected graphs. The symbols V(G) and E(G) denote the vertex set and edge set of a graph G. The cardinality of the vertex set is called the order of G denoted by p. The cardinality of edge set is called the size of G denoted by q edges is called a (p,q) graph. If G is a r-regular graph, then $M_1(G) = nr^2$ and $M_2(G) = mr^2 = \frac{1}{2}nr^3$. Proper colourings in r-regular Zagreb index graph is extended by the result proper colourings in magic and anti-magic graphs[17]. Many results and theorems are proved under Zagreb index[1,8,9,10]. This work can be extended to domination which is related with domatic number and Zagreb index [4,5,6]. Further this work can be extended in the field of automata theory [11,12,13,14,15,16,] which has a wide range of application in automata theory. There are many applications in graph labeling under undirected [21,22,23,24,25,26] and directed graph [18,19,20]

2. MAIN RESULTS

Definition 2.1

For a graph, $G = (V(G), E(G))$, the first and the second Zagreb indices were defined as $M_1(G) = \sum_{v \in V(G)} (d(v))^2$ and $M_2(G) = \sum_{uv \in E(G)} (d(u)d(v))$ respectively, where $d(v)$ denote the degree of the vertex v in G.

Theorem 2.1:

If G is a r-regular Zagreb index graph then the chromatic number satisfies the inequality $\frac{K-1}{r(V+E)} \le \psi(G) \le \frac{1}{2}nr, r \ge 2$.

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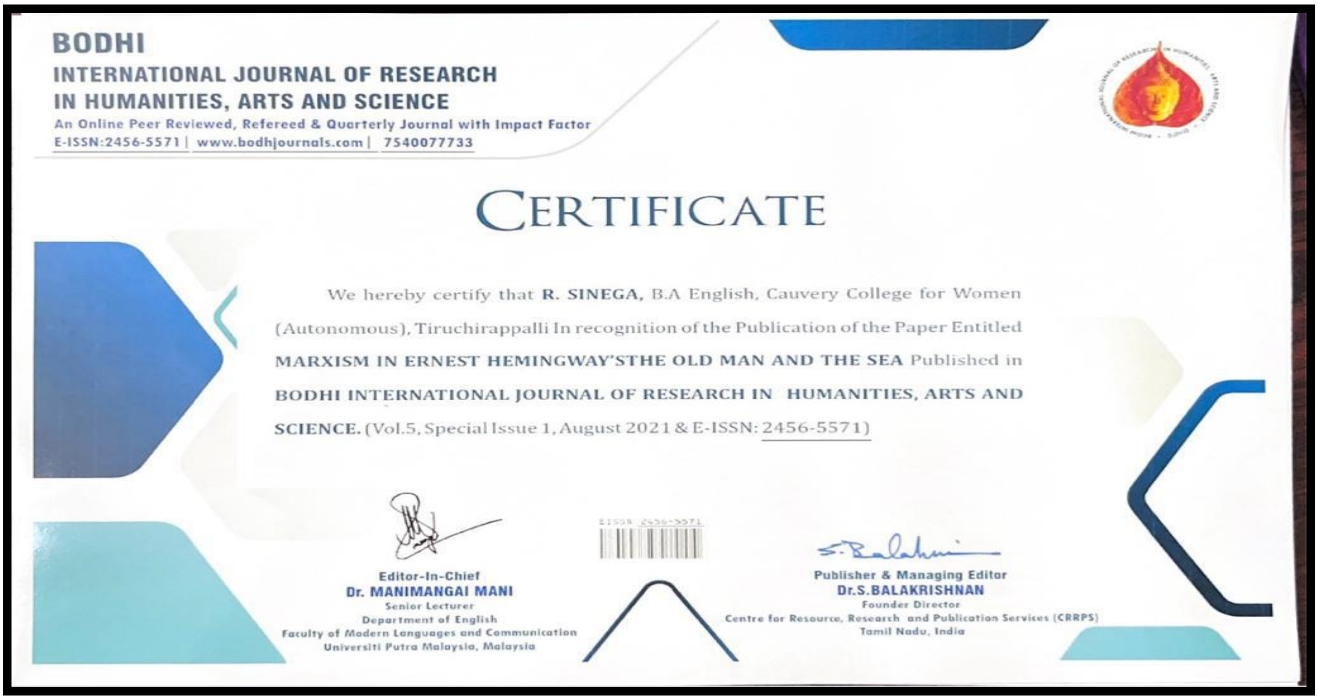

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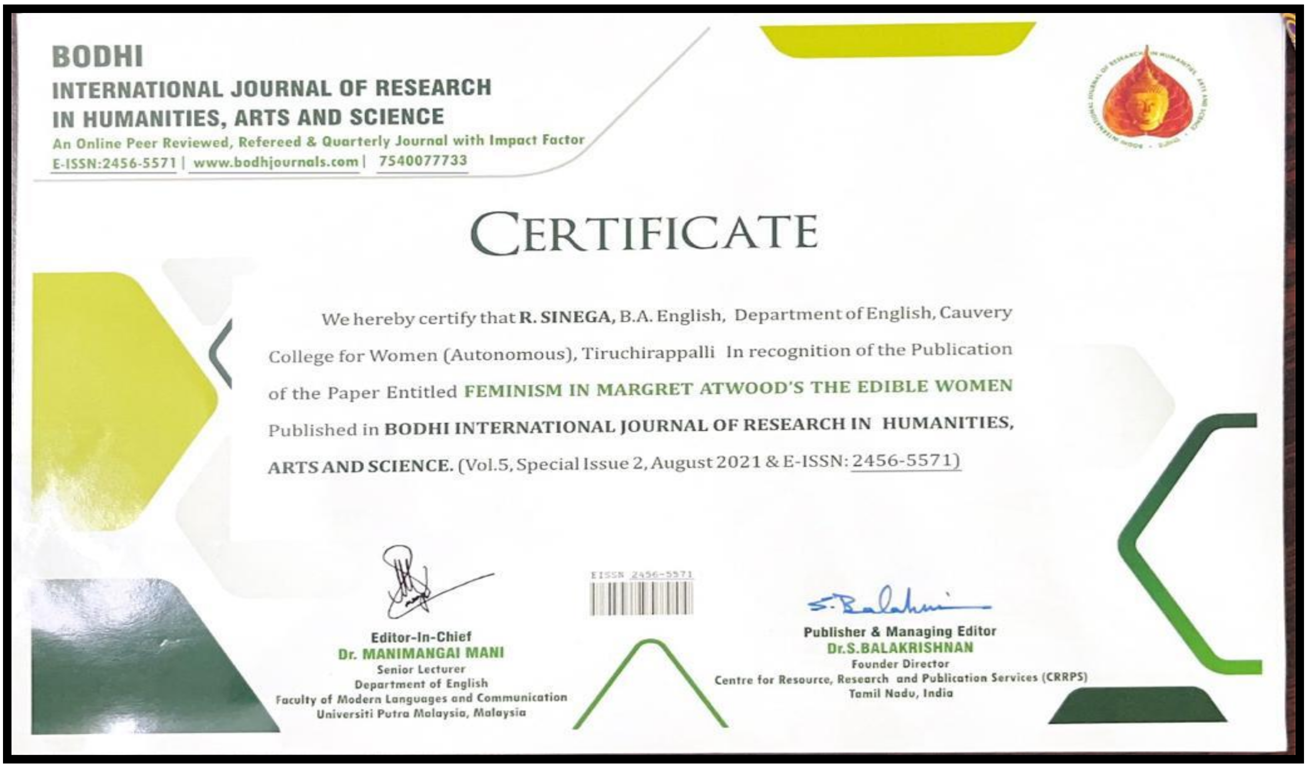

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Role of Culture and Language in Okonkwo's World

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Abstract
This article attempts to make the reader understand the Nigerian culture and language. Understandingthe relationship between language and culture is important for language learners, users, and those involved in language education. Language is the tool for communication; it is the arrangement of traditional spoken, signed, or written symbols through which human beings can share their thoughts. Culture is the ideas, customs, and social behavior of a particular people or society.By analyzing Chinua Achebe's novel Things Fall Apart, this article captures the language and culture of Nigerian people, especially Igbo peopleof the Umuofia clan, along with their history, religions, and political traditions. Chinua Achebe presents the complexities and profundities of African culture to readers of other cultures and readers of his own culture.

Keywords: *Igbo culture and words, okonkwo, chinua achebe, things fall apart,umuofia clan.*

Introduction

Culture is the framework of information shared by a moderately huge gathering of individuals, it is the broadest sense that developed conductthrough friendly learning, and it is a lifestyle of a gathering of individuals with their practice and convictions that they acknowledge for the most part without pondering them. They passed it to the next generation. Language is the foremost strategy for human communication, comprising words utilized in a structured and conventional manner to express themselves by speech, writing, and gesture.

Chinua Achebe was born on November 16, 1930 in Ogidi, Nigeria. He is a Nigerian novelist; most of his works portray the social and psychological disorientation with the Western tradition upon African culture.He was appointed a research fellow at the University of Nigeria, and he worked as a Professor of English from 1976 to 1981. His novels are *Things Fall Apart* (1958), *No Longer at Ease* (1960),*In Arrow of God* (1964), *A Man of the People* (1966), and *Anthills of the Savannah* (1987). He won the Man Booker International Prize in 2007.

The novel *Things Fall Apart* is a story based on the traditional beliefs and customs of the Igbo tribe. It begins with Okonkwo, who is a wealthy and respected warrior of the Umuofia clan, a lower Nigerian tribe that consists of nine connected villages. He has a son named Nwoye, whom he finds lazy; in settlement with a neighboring tribe Umuofia wins a virgin, and a fifteen-year-old boy Ikemefuna, Okonkwo, assumes the responsibility of that boy. During the Week of Peace, Okonkwo beats his youngest wife Ojiugo and makes sacrifices to show his repentance. Ikemefuna stays with Okonkwo's family for three years; Nwoye looksat him as his older brother. Ogbuefi Ezeudu, village elder, informed Okonkwo about the killing of Ikemefuna and asks him not to take part, but Okonkwo accompanies Ikemefuna when they are moving,some people from the clan attacked him, suddenly he moved near to Okonkwo for help, but he killed him.

The death of Ogbuefi Ezeudu was announced to the surrounding villages;at Ogbuefi Ezeudu's funeral, the clan's men beat drums and fired their guns that time Okonkwo's gun exploded and killedOgbuefi's sixteen-year-old son. Killing the clansman is considered a crime,so the people of Umuofia send Okonkwo along with his family for the exile of seven years, so they went to his mother's village Mbanta.During the second year of Okonkwo's exile, Obierika brings several bags of cowries and informs him about Abame, which was destroyed by Whiteman.

Six missionaries visited Mbanta with an interpreter the missionaries' leader, Mr. Brown, conversed with the

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Special Diophantine Triples InvolvingSquare Pyramidal Numbers

C.Saranya, B. Achya

Abstract:In this communication, we accomplish special Diophantine triples comprising of square pyramidal numbers such that the product of any two members of the set added by their sum and increased by a polynomial with integer coefficient is a perfect square

Keywords:Special Diophantine Triples, Square Pyramidal Number, Perfect Square.

I. INTRODUCTION

Number theory is fascinating on the grounds that it has such a large number of open problems that seem accessible from the outside. Of course, open problems in number theory are open for a reason. Numbers, despite being simple, have an incredibly rich structure which we only understand to a limited degree. In the mid twentieth century, Thue made an important breakthrough in the study of Diophantine equations. His proof is one of the polynomial methods His proof impacted a great deal of later work in number theory, including Diophantine equations. Various mathematicians considered the problem of the existence of Diophantine triples with the property D(n) for any integer n and besides for any linear polynomial in n [1-5]. Right now, one may suggest for an extensive survey of different issues on Diophantine triples[6-7]. In [8-9], square pyramidal numbers were evaluated using Z-transform and division algorithm. In [10-12], Diophantine triples were discussed. In this paper, we exhibit special Diophantine triples (a, b, c) involving square pyramidal number such that the product of any two elements of the set added by their sum and increased by a polynomial with integerco-efficient is a perfect square.

II. NOTATION

p_n^4 : square pyramidal number of rank n.

III. BASIC DEFINITION

A set of three different polynomials with integer coefficients (a_1, a_2, a_3) is said to be a special Diophantine triple with property D(n) if $a_i * a_j + (a_i + a_j) + n$ is a perfect square for all $1 \leq i < j \leq 3$, where n may be non-zero integer or polynomial with integer coefficients.

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IV. METHOD OF ANALYSIS

A. Construction of the special dio-3 triples involving square pyramidal number of rankn and n − 1

Let $a = 6p_n^4$ and $b = 6p_{n-1}^4$ be square pyramidal numbers of rank n and n − 1 respectively.

Now, $a = 6p_n^4$ and $b = 6p_{n-1}^4$

$$ab + (a + b) + n^4 - 4n + 1$$
$$= 4n^6 - 4n^4 + 4n^3 + n^2 - 2n + 1$$
$$= (2n^3 - n + 1)^2 = \alpha^2 \quad (1)$$

Equation (1) is a perfect square.

$ab + (a + b) + n^4 - 4n + 1 = \alpha^2$ where $\alpha = 2n^3 - n + 1$

Let c be non zero-integer such that,

$$ac + (a + c) + n^4 - 4n + 1 = \beta^2 \quad (2)$$
$$bc + (b + c) + n^4 - 4n + 1 = \gamma^2 \quad (3)$$

Solving (2) & (3) $\Rightarrow c(b - a) + (b - a) = b\beta^2 - a\gamma^2$ (4)

(3) -(2) $\Rightarrow \gamma^2 - \beta^2 = c(b - a) + b - a$

Therefore (4) becomes,

$$\gamma^2 - \beta^2 = b\beta^2 - a\gamma^2$$
$$(b + 1)\beta^2 - (a + 1)\gamma^2$$

Setting $\beta = x + (a + 1)y$ and $\gamma = x + (b + 1)y$,

$$\Rightarrow (b + 1)(x + (a + 1)y)^2 - (a + 1)(x + (b + 1)y)^2 \quad (5)$$

Now put $y = 1$,

$$x^2 = (2n^3 - n + 1)^2$$
$$\Rightarrow x = (2n^3 - n + 1)$$

The initial solution of (5) is given by,

$x_0 = (2n^3 - n + 1), y_0 = 1$

Since, $\beta = x + (a + 1)y$ and $\gamma = x + (b + 1)y$, we obtain that,

$\beta = 4n^3 + 3n^2 + 2$

Therefore, the equation (2) becomes,

$$(2) \Rightarrow ac + (a + c) + n^4 - 4n + 1 = \beta^2$$
$$\Rightarrow c(a + 1) + a + n^4 - 4n + 1 = \beta^2$$
$$\Rightarrow c(2n^3 + 3n^2 + n + 1) + (2n^3 + 3n^2 + n) + n^4 - 4n + 1 = \beta^2$$
$$\Rightarrow c(2n^3 + 3n^2 + n + 1) + (2n^3 + 3n^2 + n) + n^4 - 4n + 1 = (4n^3 + 3n^2 + 2)^2$$
$$\Rightarrow c = 8n^3 + 3$$
$$\Rightarrow c = (2(a + b - 4n + 3))$$

Therefore, the triples

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Dio- Triples Involving Pentagonal Pyramidal Numbers

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Abstract— We scrutinize for three particular polynomials with integer coefficients to such an extent that the result of any two numbers expanded by a non-zero number (or polynomials with number coefficients) is an ideal square.

Keywords— Diophantine triples, Pentagonal Pyramidal number, Polynomials & Perfect square.

I. INTRODUCTION

In Mathematics, a Diophantine equation is a polynomial equation, ordinarily in at least two questions, to such an extent that solitary the whole number arrangements are looked for or examined (a whole number arrangement is an answer to such an extent that all the questions take whole number values).The word Diophantine alludes to the Hellenistic mathematician of the third century, Diophantus of Alexandria, who made an investigation of such conditions and was one of the principal mathematician to bring imagery into variable based math. The numerical investigation of Diophantine issues that Diophantus started is currently called Diophantine analysis. While singular conditions present a sort of confuse and have been considered from the beginning of time, the definition of general hypotheses of Diophantine conditions (past the hypothesis of quadratic structures) was an accomplishment of the twentieth century.

In [1-6], hypothesis of numbers were talked about. In [7-13], Diophantine triples with the property $D(n)$ for any integer n and furthermore for any straight polynomials were talked about and Dio triples for different numbers are constructed. This paper targets developing Dio-Triples where the result of any two individuals from the triple with the expansion of a non-zero whole number or a polynomial with number coefficients fulfils the necessary property. Likewise, we present three segments where in every one of which we discover the Diophantine triples from Pentagonal Pyramidal number of various ranks with their relating properties.

II. RELATED WORK

Notation:

PP_n = Pentagonal Pyramidal number of rank n.

Basic Definition:

A set of positive integers $\{a_1, a_2, \dots, a_m\}$ is said to have the property $D(n)$ if $a_i a_j + n$ is a perfect square for all $1 \le i < j \le m$; such a set is called a Diophantine m-tuple of size m, where n may be non-zero integer or polynomial with integer coefficients.

III. METHODOLOGY

Section A:

Let $a = 4PP_n$ and $b = 4PP_{n-1}$ be Pentagonal pyramidal numbers of rank n and $n-1$ respectively such that $ab + (n^4 + 2n^3 - n^2 - 2n + 1)$ is a perfect square say X^2.

Let c be any non-zero integer such that

$$ac + (n^4 + 2n^3 - n^2 - 2n + 1) = Y^2 \quad (1)$$

$$bc + (n^4 + 2n^3 - n^2 - 2n + 1) = Z^2 \quad (2)$$

Setting $Y = a + X$ and $Z = b + X$ and subtracting (1) from (2), we get

$$c(b-a) = Z^2 - Y^2 = (Z+Y)(Z-Y)$$
$$= (a+b+2X)(b-a)$$

Thus, we get $c = a + b + 2X$

Similarly by choosing $Y = a - X$ and $Z = b - X$, we obtain $c = a + b - 2X$

Here we have $X = 2n^3 - n^2 - n + 1$ and thus two values of c are given by $c = 8n^3 - 4n^2 + 2$ and $c = 4n - 2$.

Thus, we observe that

$\{4PP_n, 4PP_{n-1}, 16PP_{n+1} - (36n^2 + 8n + 46)\}$ and

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DIOPHANTINE TRIPLES INVOLVING SQUARE PYRAMIDAL NUMBERS

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Abstract

In this paper, we scan for three particular polynomials with whole number coefficients to such an extent that the result of any two numbers expanded by a non-zero number (or polynomials with number coefficients) is an ideal square.

Introduction

In mathematics, a Diophantine condition is a polynomial condition, conventionally in at any rate two inquiries, so much that lone the entire number game plans are searched for or analyzed (an entire number course of action is a response so much that all the inquiries take entire number values). The word Diophantine suggests the Greek mathematician of the third century, Diophantus of Alexandria, who made an examination of such conditions and was one of the foremost mathematicians to bring symbolism into variable based math. The mathematical examination of Diophantine issues that Diophantus began is as of now called Diophantine analysis. While particular conditions present such a confound and have been considered from the start of time, the meaning of general speculations of Diophantine conditions (past the theory of quadratic constructions) was an achievement of

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Keywords: Diophantine triples, Square pyramidal number.
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OBSERVATIONS ON TERNARY QUADRATIC EQUATION $3x^2 + 2y^2 = 275z^2$

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Abstract

The Ternary Quadratic Diophantine Equation $3x^2 + 2y^2 = 275z^2$ is analyzed for its infinite number of non-zero integral solutions.

Introduction

Diophantine equations have stimulated the interest of various mathematicians. Diophantine equations with higher degree greater than three can be reduced into equations of degree 2 or 3 and it can be easily solved. In [1-3], theory of numbers is discussed. In [4-5], quadratic Diophantine equations are discussed. In [6-11], cubic, biquadratic and higher order equations are considered for its integral solutions.

This communication concerns with yet another interesting ternary quadratic equation $3x^2 + 2y^2 = 275z^2$ representing a cone for determining its infinitely many non-zero integral points. Also, a few interesting relations among the solutions are presented.

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Special Dio 3-Tuples Involving Square Pyramidal Numbers

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***Abstract:** In this communication, we accomplish special dio 3-tuples comprising of square pyramidal numbers such that the product of any two members of the set subtracted by their sum and increased by a polynomial with integer coefficients is a perfect square.*
***Keywords:** Special dio 3-tuples, Pyramidal number, perfect square, square pyramidal number.*

NOTATION: p_n^4: square pyramidal number of rank n.

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In Mathematics, a Diophantine equation is a polynomial equation, ordinarily in at least two questions, to such an extent that solitary the whole number arrangements are looked for or examined (a whole number arrangement is an answer to such an extent that all the questions take whole number values).The word Diophantine alludes to the Hellenistic mathematician of the third century, Diophantus of Alexandria, who made an investigation of such conditions and was one of the principal mathematician to bring imagery into variable based math. The numerical investigation of Diophantine issues that Diophantus started is currently called Diophantine analysis. While singular conditions present a sort of confuse and have been considered from the beginning of time, the definition of general hypotheses of Diophantine conditions (past the hypothesis of quadratic structures) was an accomplishment of the twentieth century.

In [1-5], hypothesis of numbers were talked about. In [6-14], Diophantine triples with the property $D(n)$ for any integer n and furthermore for any straight polynomials were talked about and Dio triples for different numbers are constructed. In this paper, we exhibit special dio 3-tuples (a, b, c) involving square pyramidal number such that the product of any two elements of the set subtracted by their sum and increased by a polynomial with integer coefficients is a perfect square.

II. BASIC DEFINITION

A set of three different polynomials with integer coefficients (a_1, a_2, a_3) is said to be a special dio 3-tuple with property D(n) if $a_i * a_j - (a_i + a_j) + n$ is a perfect square for all $1 \le i < j \le 3$,where n may be non-zero integer or polynomial with integer coefficients.

III. METHOD OF ANALYSIS

A. Section-A

Construction of the special dio-3 tuples involving square pyramidal number of rank n and $n-1$:

Let $a = 6p_n^4$ and $b = 6p_{n-1}^4$ be square pyramidal numbers of rank n and $n-1$ respectively, such that

$$ab - (a+b) + n^4 + 4n + 1 = \alpha^2 \qquad (1)$$

Equation (1) is a perfect square, where $\alpha = 2n^3 - n - 1$

Let c be non zero-integer such that,

$$ac - (a+c) + n^4 + 4n + 1 = \beta^2 \qquad (2)$$

$$bc - (b+c) + n^4 + 4n + 1 = \gamma^2 \qquad (3)$$

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Research Paper

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Observations on the Ternary Quadratic Diophantine Equation $9(x^2 + y^2)-17xy+4x+4y+16=84z^2$

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Abstract— The Ternary Quadratic Diophantine Equation representing non-homogeneous cone is analyzed for its non-zero distinct integer points on it. Six different patterns of integral solutions satisfying the cone under consideration are obtained. A few interesting relations between the solutions and some special number patterns are presented.

Keywords— Ternary non-homogeneous Quadratic, Diophantine equation, integral solutions.

I. INTRODUCTION

Ternary quadratic equations are rich in variety. For an extensive review of various problems one may refer [1-7]. In [8], the ternary quadratic Diophantine equation of the form $kxy + m(x + y) = z^2$ has been studied for non-trivial integral solutions. In [9–15], the various Diophantine equations are studied for their non-zero integral solutions. These results have motivated us to search for infinitely many non-zero integral solutions of another interesting ternary quadratic equation given by $9(x^2 + y^2) - 17xy + 4x + 4y + 16 = 84z^2$ representing a cone for determining its infinitely many non-zero integral points. Also, a few interesting relations among the solutions are presented.

II. RELATED WORK

Pr_n = Pronic number of rank 'n'.

$T_{m,n}$ = Polygonal number of rank 'n' with sides 'm'.

$4DF_n$ = Four Dimensional Figurate number of rank 'n'.

CS_n = Centered Square number of rank 'n'.

Gno_n = number Gnomonic of rank 'n'.

$Star_n$ = Star number of rank 'n'.

III. METHODOLOGY

The ternary quadratic Diophantine equation to be solved for its non-zero integral solutions is

$$9(x^2 + y^2) - 17xy + 4x + 4y + 16 = 84z^2 \quad (1)$$

The substitution of linear transformations

$$x = u + v \quad \text{and} \quad y = u - v \quad (2)$$

in (1) leads to, $(u+4)^2 + 35v^2 = 84z^2$ (3)

We illustrate below six different patterns of non-zero distinct integer solutions to (1).

PATTERN:1

Assume $z = z(a,b) = a^2 + 35b^2$ (4)

where a and b are non-zero integers.

and write $84 = (7 + i\sqrt{35})(7 - i\sqrt{35})$ (5)

Using (4) and (5) in (3), and using factorization method,

$$\left((u+4) + i\sqrt{35}v\right)\left((u+4) - i\sqrt{35}v\right) = (7 + i\sqrt{35})(7 - i\sqrt{35})\left[\left(a + i\sqrt{35}b\right)^2\left(a - i\sqrt{35}b\right)^2\right] \quad (6)$$

Equating the like terms and comparing real and imaginary parts, we get

$$u = u(a,b) = 7a^2 - 245b^2 - 70ab - 4$$

$$v = v(a,b) = a^2 - 35b^2 + 14ab$$

Substituting the above values of u and v in equation (2), the corresponding integer solutions of (1) are given by

$$x = x(a,b) = 8a^2 - 280b^2 - 56ab - 4$$

$$y = y(a,b) = 6a^2 - 210b^2 - 84ab - 4$$

$$z = z(a,b) = a^2 + 35b^2$$

OBSERVATIONS:

1. $x(a,a) - y(a,a) + 4z(a,a) - 52T_{4,a} - 26Gno_a \equiv 0 \pmod{26}$.
2. $9\left(y(a,a) - x(a,a)\right) + 6z(a,a)$ is a perfect square.
3. $y(a,a) - x(a,a) + z(a,a) - 38T_{4,a} \equiv 0 \pmod{38}$.
4. $y(a,a) - x(a,a) + z(a,a) - 38T_{4,a} - 19Gno_a \equiv 0 \pmod{19}$.
5. Each of the following expressions represents a Nasty number.

(i) $6z(a,a)$

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SOME OPERATIONS ON n^{th} TYPE INTUITIONISTIC FUZZY SET

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***Abstract*-- The primary intention of the paper is to generalize the Intuitionistic Fuzzy Set types that is n^{th} type Intuitionistic Fuzzy Set (IFNT) along with new formula to evaluate the degree of uncertainty and also to define the basic operations and modal operators namely Necessity and Possibility operators over IFNT and to demonstrate the relation between the modal operators.**

***Keywords*-- Fuzzy Set (F), Intuitionistic Fuzzy Set (IF), Intuitionistic Fuzzy Set of Second Type (IFST), Intuitionistic Fuzzy Set of Third Type (IFTT), n^{th} Type Intuitionistic Fuzzy Set (IFNT).**

I. INTRODUCTION

The concept of Modern Set Theory, the fundamental for the whole Mathematics was first formulated by George Cantor. A trouble associated with the concept of a set is uncertainty. Because, Mathematics needs its entire notions to be perfect. For a long while this vagueness has been a problem. Recently, it became a critical issue in the field of artificial intelligence. Finally to end this crucial issue (criteria) various concepts were suggested.

One among the suggested concepts was Fuzzy Sets. Lofti Zadeh developed the concept of Fuzzy Set Theory in 1965, in that concept Fuzzy Sets [6] are the collection of objects which has graded membership. Fuzzy sets offers many solution to uncertainties in the area of computer programming, engineering and artificial intelligence. In Fuzzy Set, Membership function replaced the characteristic function in crisp set that take members (elements) from a universe of discourse X to form image in closed interval [0, 1]. In 1983, the idea of Intuitionistic Fuzzy Set (IF) was proposed by Krassimir. T. Atanassov which involves degree of non-membership in addition to the degree of membership of the Fuzzy set. IF reflect better the aspects human behavior.

Following the definition of IF, the extensions of IF namely, IF of second type (IFST) was introduced by Krassimir. T. Atanassov [1]. Syed Siddique Begum and R. Srinivasan introduced the concept of IF of third type (IFTT). In this paper, the IFS types are generalized as n^{th} Type Intuitionistic Fuzzy Set (IFNT) accompanied by new formula to calculate the degree of uncertainty (non-determinacy). The basic operators and modal operators over IFNT are discussed.

In section 2, the vital definitions of Intuitionistic Fuzzy Sets and their extensions are defined. In the next section, the basic operations like union, intersection, subset and complement on IFNT are presented and also the modal operators namely necessity and possibility operators on IFNT are defined. In section 4, the relations between the modal operators are proposed. Finally, few more applications of IFNT in real world are recommended.

MINIMIZATION OF MULTIPLICATIVE LABELING FOR SOME FAMILIES OF GRAPHS

[1]Dr. P. Shalini & [2]A. Sudar

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ABSTRACT

In this paper, we discuss minimization of multiplicative labeling for some families of Graphs. A function f is called a minimization of multiplicative labeling of a graph G with q edges, if f is a bijective function from the vertices of G to the set $\{1,2,3,.......p\}$ such that when each edge uv is assigned the label $f(uv) = f(u)*f(v) - \min\{f(u), f(v)\}$, then the resulting edge labels are distinct numbers. We investigated some families of graphs such as slingshot, stair, stethoscope, spectacles which admits minimization of multiplicative labeling.

KEYWORDS: Graph labeling, Multiplicative graph labeling, Graceful labeling.

1.1 INTRODUCTION

The field of mathematics plays a very important role in different fields of Science and Engineering. One of the most important areas in mathematics is graph theory. In graph theory, one of the main concepts is graph labeling. A graph can be labeled or unlabeled. Labeled graph are used to identification. Labeling can be used not only to identify vertices or edges, but also to signify some additional properties depending on the particular labeling. Graph labeling is an assignment of integer, to its vertices or edges subject to some certain conditions.

All graphs in this paper are finite and undirected. The symbols V (G) and E (G) denotes the vertex set and edge set of a graph G. A dynamic survey on graph labeling is regularly updated by Gallian [3] and it is published by Electronic journal of combinatories. Some basic concepts are taken from Frank Harary [4]. Shalini and Paul Dhayabaran [9] introduced the concept of minimization of multiplicative labeling. In this paper, we investigated some families of graphs such as slingshot, stair, stethoscope, spectacles which admits minimization of multiplicative labeling.

Definition 1.1

Let G = (V (G), E (G)) be a graph. A graph G is said to be minimization of multiplicative labeling if there exists a bijective function $f: V(G) \to \{1,2,3,......p\}$ such that, when each edge uv is assigned the label $f(uv) = f(u)*f(v) - \min\{f(u), f(v)\}$, then the resulting edge labels are distinct numbers.

Definition 1.2

A graph G is said to be minimization of multiplicative graph if it admits a minimization of multiplicative labeling.

2.1 Main Results

Theorem 2.1

The Slingshot $Slgt_n$ is a minimization of multiplicative graph.

Proof:

Let G be a graph of Slingshot $Slgt_n$

Let $\{v_1, v_2, v_3, ..., v_n, v_{n+1}\}$ be the vertices of $Slgt_n$ and $\{e_1, e_2, e_3, ..., e_n, e_{n+1}\}$ be the edges of $Slgt_n$ which are denoted as in the Figure 2.1

MINIMIZATION OF MULTIPLICATIVE LABELING FOR ANTENNA, DUMPY LEVEL INSTRUMENT, NET GRAPHS

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Inter Relationship of The Mappings with Separation Axioms in Minimal Structure

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***Abstract*— In this paper, we analyse and study at the class of some sets and also related their functions. Furthermore, some of their equivalent conditions among them are analysed with the separation axioms.**

***Keywords*— m_x-feebly open, m_x-feebly closed, m_x-feebly interior, m_x-feebly closure, m_x-feebly clopen, m_x-feebly clopen-T_1 and m_x-feebly clopen-T_2.**

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The family of all α-open (resp., semi-open, preopen, b-open, β-open, feebly open, feebly closed) sets in (X, τ) is denoted by $\alpha(X)$ (resp., $SO(X), PO(X), BO(X), \beta(X), FO(X)$).

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A STUDY ON MAXIMIZATION OF MULTIPLICATIVE LABELING FOR SOME SPECIAL GRAPHS

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KEYWORDS: Graph labeling, Multiplicative graph labeling, Graceful labeling.

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RESEARCH ARTICLE OPEN ACCESS

A Study on Connectedness in the Digital Topology Via Graph Theory

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Abstract:
In this paper we define at the two operators at Cartesian complex in digital topology based on graph theory and also investigate at the new classes of separation, connectedness and disconnectedness among the pixels with the topological axioms in digital plane. The related theorems are proved based on these concepts.

***Keywords* — Cut point, pixels, interior operator, closure operator, separation, connectedness, disconnectedness.**

****

I. Introduction

Digital topology is to study at the topological properties of digital, image arrays. The Cartesian complex have the collection of the pixel. In this case one can specify at the pixels on the simple closed curves which states that simple closed curves separate at the plane into two connected sets. When a pixel is extended to be such a set of pixels possess connectivity and is called a region. The use of digital topological ideas to explore various aspects of graph theory. A graph (resp., directed graph or digraph) (R.J. Wilson, 1996), G=(V(G), E(G)) consists of a vertex set V(G) and an edge set E(G) of unordered (resp., ordered) pairs of elements of V(G). To avoid ambiguities, we assume that the vertex and edge sets are disjoint. A subgraph (W.D. Wallis, 2007), of a graph G is a graph, each of whose vertices belong to V(G) and each of whose edges belong to E(G). A walk in which no vertex appears more than once is called a path. For other notions or notations in topology not defined here we follow closely (R. Englking, 1989; S. Willard, 1970).

II. Preliminaries

Definition 2.1[1]: A point x in X is called a cut point (respectively endpoint) if X-{x} has two (one) components. (In the literature our cut-point is usually called a strong cut-point, but here it turns out that these two notions coincide.) The parts of X-{x} are its components if there are two, and X-{x}, φ if there is only one.

Definition 2.2[5]: A nonempty set S is called a locally finite (LF) space if to each element e of S certain subsets of S are assigned as neighbourhoods of e and some of them are finite.

Definition 2.3 [5]: Axiom 1. For each space element e of the space S there are certain subsets containing e, which are neighbourhoods of e. The intersection of two neighbourhoods of eis again a neighbourhood of e. Since the space is locally finite, there exists the smallest neighbourhood of e that is the intersection of all neighbourhoods of e. Thus, each neighbourhood of e contains its smallest neighbourhood. We shall denote the smallest neighbourhood of e by SN(e).

Definition 2.4[5]: Axiom 2. There are space elements, which have in their SN more than one element.

Definition 2.5[5]: If $b \in SN(a)$ or $a \in SN(b)$, then the elements a and b are called incident to each other.

Definition 2.6[4]: A path is a sequence $(p_i / 0 \leq i \leq n)$, and p_i is adjacent to p_{i+1}. In another way Let Tbe a subset of the space S. In another way [5] a sequence $(a_1, a_2, \ldots, a_k)$, $a_i \in T$, $i = 1, 2, \ldots, k$; in which each two subsequent elements are incident to each other, is called an incidence path in T from a_1 to a_k.

Definition 2.7 [4]: A set of pixels is said to be connected if there is a path between any two pixels.

Remark 2.8[5]: In another way A subset T of the space S is connected iff for any two elements of T there exists an incidence path containing these two elements, which completely lies in T

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Analyzation About Some New Type of m_x-Open Sets with its Related Mappings

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Abstract— **In this paper, we extend at the study of inter relationship of the mappings with separation axioms in minimal structure and introduce m_x-feebly regular interior point, m_x-feebly exterior point and m_x—feebly regular frontier point with its related mappings based on some new type of m_x-open sets.**

Keywords— **m_x-feebly open, m_x-feebly closed, m_x-feebly interior, m_x-feebly closure, m_x-feebly clopen, m_x-feebly clopen-T_1 and m_x-feebly clopen-T_2.**

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GENERALIZATION OF PRODUCT DIGITAL TOPOLOGY WITH THE MAPPING AMONG THE PIXELS

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Abstract- In this paper the continuous functions based on frontier and also smallest neighborhood system is defined among the pixels at the product digital topology with the axioms C_1, C_2, C_3 in the cartesian complex and also generalized at these concepts, related theorems are proved.

Keywords-cut point, classical axioms of the topological space, incidence, path, opponent, frontier, locally finite space, smallest neighbourhood, interior, closure.

1. Introduction

Digital topology is to study at the topological properties of digital image arrays. These properties on cathode ray tubes are virtually important in a wide range of diverse applications, including computer graphics, computer tomography, pattern analysis and robotic design. A topological framework contains many pixels or 2-cell. A digital picture can be stored at them. These framework settings are in some of the devices for the focus purpose. In this case one can specify at the pixels on the simple closed curves which states that a simple closed curve separates at the plane into two connected sets. When a pixel is extended to be such a set of pixels possess connectivity and is called a region.

2. Preliminaries

Definition 2.1[2]: A point x in X is called a cut point (respectively endpoint) if X-{x} has two (one) components. (In the literature our cut-point is usually called a strong cut-point, but here it turns out that these two notions coincide.) The parts of X-{x} are its components if there are two, and X-{x}, φ if there is only one.

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Definition 2.10[5]: A subset $O \subset S$ is called open in S if it contains no elements of its frontier Fr (O, S). A subset $C \subset S$ is called closed in S if it contains all elements of Fr (C, S).
Definition 2.11[5]: The neighbourhood relation N is a binary relation in the set of the elements of the space S. The ordered pair (a, b) is in N iff $a \in SN(b)$. We also write aNb for (a, b) in N.

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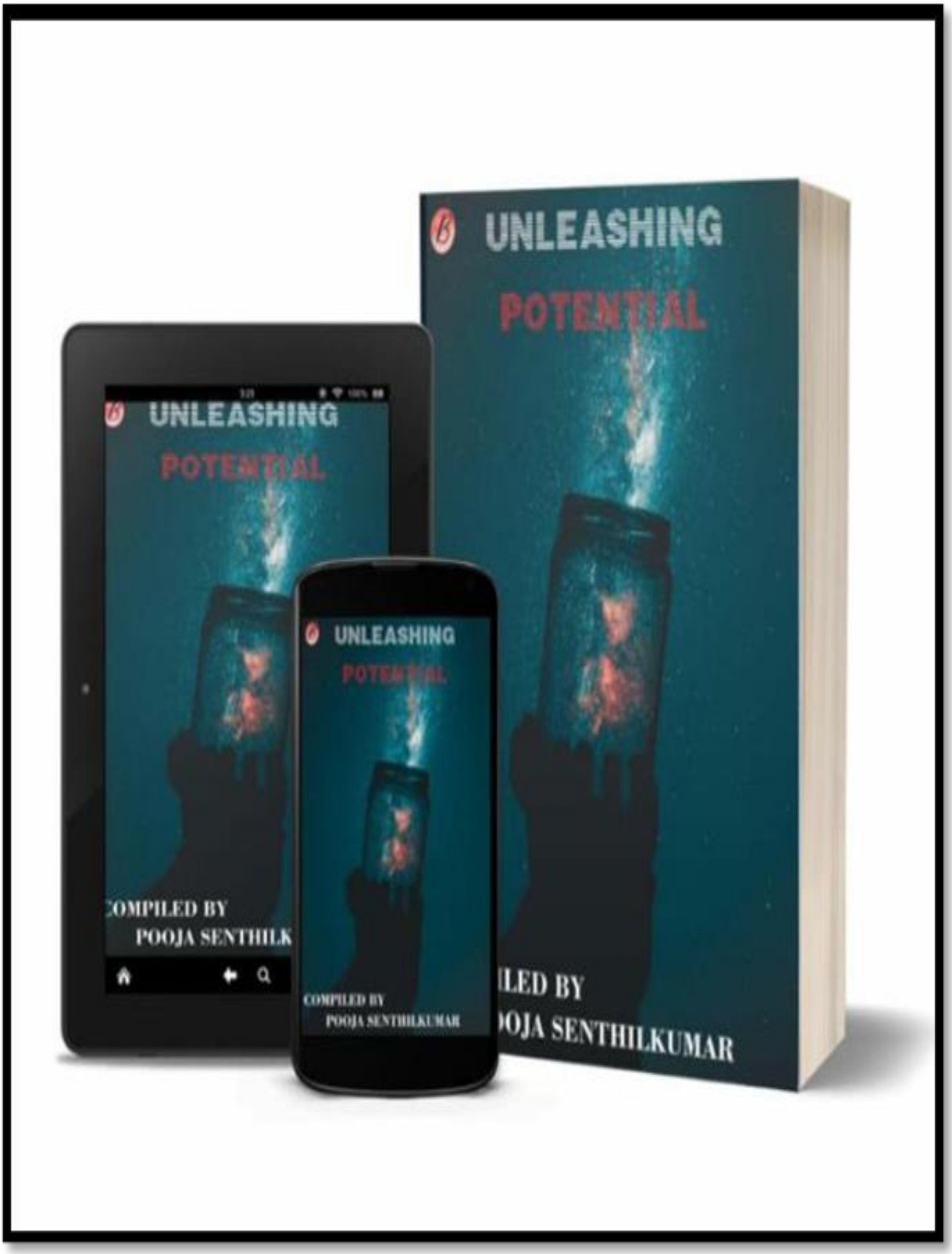

The Growing Importance of Digital Marketing

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Abstract--- Marketing has always been about connecting with your audience in the right place and at the right time. Today, that means you need to meet them where they are already spending time: on the internet. Digital marketing encompasses all marketing efforts that use an electronic device or the internet. Businesses leverage digital channels such as search engines, social media, email, and other websites to connect with current and prospective customers.

Keywords--- Digital Marketing, Social Media, Face book.

INTRODUCTION

Digital marketing, also called online **marketing**, is the promotion of brands to connect with potential customers using the **internet** and other forms of **digital** communication. This includes not only email, social media, and web-based advertising, but also text and multimedia messages as a **marketing** channel.

The benefits of digital marketing include:

- **Global reach** - a website allows you to find new markets and trade globally for only a small investment.
- **Lower cost** - a properly planned and well targeted digital marketing campaign can reach the right customers at a much lower cost than traditional marketing methods.
- **Trackable, measurable results** - **measuring your online marketing** with web analytics and other online metric tools makes it easier to establish how effective your campaign has been. You can obtain detailed information about how customers use your website or respond to your advertising.
- **Personalisation** - if your customer database is linked to your website, then whenever someone visits the site, you can greet them with targeted offers. The more they buy from you, the more you can refine your customer profile and market effectively to them.
- **Openness** - by getting involved with **social media** and managing it carefully, you can build customer loyalty and create a reputation for being easy to engage with.
- **Social currency** - digital marketing lets you create engaging campaigns using **content marketing** tactics. This content (images, videos, articles) can gain social currency - being passed from user to user and becoming viral.
- **Improved conversion rates** - if you have a website, then your customers are only ever a few clicks away from making a purchase. Unlike other media which require people to get up and make a phone call, or go to a shop, digital marketing can be seamless and immediate.

Together, all of these aspects of digital marketing have the potential to add up to more sales.

Disadvantages of Digital Marketing

Some of the downsides and challenges of digital marketing you should be aware of include:

- **Skills and training** - You will need to ensure that your staff have the right knowledge and expertise to carry out digital marketing with success. Tools, platforms and trends change rapidly and it's vital that you keep up-to-date.
- **Time consuming** - tasks such as optimising online advertising campaigns and creating marketing content can take up a lot of time. It's important to measure your results to ensure a return-on-investment.

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