·ormulation of dio-quadruple with property $D(k^2+1)$

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·tract— This paper concerns with the problem of constructing dio-quadruple $(1,n,c_s,c_{s+1})$ such that the product of any two ·nbers of the set subtracted by their sum and added with k^2+1 is a perfect square.

·words— **Dio-Quadruples, Pell equation, Integer solutions.**

I. INTRODUCTION

A set of m distinct positive integers $\{a_1,a_2,a_3,\dots a_m\}$ with $a_ia_j\pm(a_i+a_j)+n$ as a perfect square for all $1\le i<j\le m$ is ·d a Special Dio m-tuple with property $D(n)$. In [1-7], problems on special dio-quadruples with suitable properties are ·sed. This motivated us to construct sequences of special dio-quadruples with property $D(k^2+1)$.

II. METHOD OF ANALYSIS

Let $a=1$ and $b=n$ be two integers such that $ab-(a+b)+k^2+1$ is a perfect square. Therefore (a, b) is the special dio-·le with property $D(k^2+1)$.

· be any non-zero integer such that

$$ac-(a+c)+k^2+1=p^2 \tag{1}$$

$$bc-(b+c)+k^2+1=q^2 \tag{2}$$

·hat (1) is satisfied automatically.

$$(2)\Rightarrow\quad (n-1)c+k^2-n+1=q^2 \tag{3}$$

·is satisfied by $c_0=1$, $q_0=k$

·$,q_1)$ be the second solution of (3), where

$$c_1=c_0+h_0\ ,\ q_1=h_0-q_0 \tag{4}$$

·h h_0 is an unknown to be determined.

·tion of (4) in (3) gives

$$h_0=n-1+2q_0 \tag{5}$$

· of (4), we have

$$c_1=n+2q_0\ ,\ q_1=n-1+q_0$$

Special Pythagorean Triangle In Relation With Pronic Numbers

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Abstract:

This paper illustrates Pythagorean triangles, where, in each Pythagorean triangle, the ratio $\frac{2*Area}{Perimeter}$ *is a Pronic number.*

Keywords: *Pythagorean triangles, Primitive Pythagorean triangle, Non primitive Pythagorean triangle, Pronic numbers.*

Introduction:

It is well known that there is a one-to-one correspondence between the polygonal numbers and the sides of polygon. In addition to polygon numbers, there are other patterns of numbers namely Nasty numbers, Harshad numbers, Dhuruva numbers, Sphenic numbers, Jarasandha numbers, Armstrong numbers and so on. In particular, refer [1-17] for Pythagorean triangles in connection with each of the above special number patterns. The above results motivated us for searching Pythagorean triangles in connection with a new number pattern. This paper illustrates Pythagorean triangles, where, in each Pythagorean triangle, the ratio $\frac{2*Area}{Perimeter}$ is a Pronic number.

Method of Analysis:

Let $T(x, y, z)$ be a Pythagorean triangle, where

$$x = 2pq\ ,\quad y = p^2 - q^2\ ,\quad z = p^2 + q^2\ ,\quad p > q > 0 \tag{1}$$

Denote the area and perimeter of $T(x, y, z)$ by A and P respectively.

The mathematical statement of the problem is

$$\frac{2A}{P} = n(n+1)\ , \text{ pronic number of rank n} \tag{2}$$

$$\Rightarrow q(p-q) = n(n+1) \tag{3}$$

It is observed that (3) is satisfied by the following two sets of values of p and q: Set 1: $p = 2n+1,\quad q = n$

Set 2: $p = 2n+1,\quad q = n+1$

However, there are other choices for p and q that satisfy (3). To obtain them, treating (2) as a quadratic in q and solving for q, it is seen that

$$q = \frac{1}{2}\left[p + \sqrt{p^2 - 4n(n+1)}\right] \tag{4}$$

To eliminate the square root on the R.H.S of (4), assume

CONSTRUCTION OF DIOPHANTINE 3-TUPLES THROUGH 3D NUMBERS

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ABSTRACT

This paper deals with the construction of diophantine 3-tuples based on two given $3D$ ***numbers such that the product of any two elements of the set added by a polynomial with integer coefficient is a perfect square.***

KEYWORDS: ***Diophantine 3-tuple, Pyramidal numbers.***

2010 Mathematics Subject Classification: 11D99

Notations:

- $SO_n = n(2n^2 - 1)$ = Stella Octangula number of rank n
- $P_n^5 = \frac{n^2(n+1)}{2}$ = Pentagonal Pyramidal number of rank n
- $CP_n^3 = \frac{n(n^2+1)}{2}$ = Centered triangular Pyramidal number of rank n

A Special Dio- Quintuple with property D(2)

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Abstract— **In this paper, a numerical illustration of a special Dio- Quintuple with property D(2) is exhibited.**

Keywords— **Dio-Quintuple, pell equation, integer solutions.**

I. Introduction

A set of 5 non- zero distinct integers denoted by (a,b,c,d,e) is called special Dio- Quintuple with property D(N), if the product of any two members of the set added with the same numbers and increased by a non- zero integer N is a perfect square. In [1-3], the authors have presented special Dio-Quadruples with suitable properties. As far us our knowledge goes, it seems that much work has not been done in constructing special Dio-Quintuple with suitable property. This motivated us for obtaining special Dio-Quintuples. This paper exhibits a numerical illustration of a special Dio-Quintuple with property D(2).

II. METHOD OF ANALYSIS

Let $a=4$, $b=15$ be two given non-zero distinct positive integers.

Note that

$$a*b+(a+b)+2=81=9^2$$

Therefore, (a,b) represents a special Dio- 2 tuple with property D(2).

Let c_{n+1} be any non-zero integer, such that

$$ac_{n+1}+(a+c_{n+1})+2=5c_{n+1}+6=p_{n+1}^{\ 2} \quad (1)$$

$$bc_{n+1}+(b+c_{n+1})+2=16c_{n+1}+17=q_{n+1}^{\ 2} \quad (2)$$

Eliminating c_{n+1}, between (1) and (2), the resulting equation is

$$16p_{n+1}^{\ 2}-5q_{n+1}^{\ 2}=11 \quad (3)$$

Introduction of the transformations

$$p_{n+1}=X_{n+1}+5T_{n+1} \quad (4)$$

$$q_{n+1}=X_{n+1}+16T_{n+1} \quad (5)$$

in (3) gives

$$X_{n+1}^{\ 2}=80T_{n+1}^{\ 2}+1$$

which is the well known pellian equation whose smallest positive integer solution is

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SPECIAL CHARACTERIZATIONS OF RECTANGLES IN CONNECTION WITH TRIMORPHIC NUMBERS

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ABSTRACT. This paper consists of two sections A and B. Section A exhibits rectangles, where, in each rectangle, the area added with its semi-perimeter is a Trimorphic number. Section B presents rectangles, where, in each rectangle, the area minus its semi-perimeter is a Trimorphic number.

1. INTRODUCTION

In [1-16], the diophantine problems relate geometrical representations with special numbers, namely, Armstrong numbers, Sphenic numbers, Harshad numbers, etc. The above results motivated us for obtaining rectangles with special characterizations in connection with Trimorphic numbers.

It seems that the above problems has not been considered earlier.

2. METHOD OF ANALYSIS:

Let R be a rectangle with dimensions x and y . Let A and S be represents the Area and Semi-perimeter of R.

2.1. Section-A: A+S = Trimorphic number with digits 2, 3, 4, 5

. The problem under consideration is mathematically equivalent to solving the binary quadratic diophantine equation represented by

$$xy + (x + y) = \alpha \tag{A-1}$$

where α is a Trimorphic number in turn.

Rewrite (A-1) as

$$x = \frac{\alpha - y}{y + 1} \tag{A-2}$$

2010 *Mathematics Subject Classification.* 11D99.

Key words and phrases. Rectangle; Trimorphic number; Primitive rectangle; Non-Primitive rectangle.
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Special Pythagorean Triangle with $\frac{2 * \text{Area}}{\text{Perimeter}} + \text{Hypotenous} - \text{a leg}$ as a Pronic number

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Abstract — This paper illustrates Pythagorean triangles, where, in each Pythagorean triangle, the ratio $\frac{2 * \text{Area}}{\text{Perimeter}} + \text{Hypotenous} - \text{a leg}$ is a Pronic number.

Keywords — Include at least 5 keywords or phrases

I. INTRODUCTION

It is well known that there is a one-to-one correspondence between the polygonal numbers and the sides of polygon. In addition to polygon numbers, there are other patterns of numbers namely Nasty numbers, Harshad numbers, Dhuruva numbers, Sphenic numbers, Jarasandha numbers, Armstrong numbers and so on. In particular, refer [1-18] for Pythagorean triangles in connection with each of the above special number patterns. The above results motivated us for searching Pythagorean triangles in connection with a new number pattern. This paper illustrates Pythagorean triangles, where, in each Pythagorean triangle, the ratio $\frac{2 * \text{Area}}{\text{Perimeter}} + \text{Hypotenous} - \text{a leg}$ is a pronic number.

II. METHOD OF ANALYSIS

Let $T(x, y, z)$ be a Pythagorean triangle, where

$$x = 2pq, \quad y = p^2 - q^2, \quad z = p^2 + q^2, \quad p > q > 0 \tag{1}$$

Denote the area and perimeter of $T(x, y, z)$ by A and P respectively.

The mathematical statement of the problem is

$$\frac{2 * \text{Area}}{\text{Perimeter}} + \text{Hypotenuse} - x = n(n+1), \text{ pronic number of rank n} \tag{2}$$

$$\Rightarrow \quad p(p-q) = n(n+1) \tag{3}$$

which is satisfied by $p = n+1, \quad q = 1$

On the Pair of Equations $x+y=z+w,\ y+z=(x-w)^3$

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Abstract— **This paper illustrates two different methods for obtaining non-zero distinct integer solutions to the pair of equations $x+y=z+w$, $y+z=(x-w)^3$.**

Keywords— **Pair of equation, integer solutions, Diophantine 3-tuples.**

I. Introduction

Number Theory has occupied a significant position in the world of Mathematics. One of the enjoyable areas of Number Theory that has not only attracted but also motivated many Mathematicians since antiquity is the subject of patterns in numbers. Man's love for numbers is perhaps older than Number Theory. Nearly every century has witnessed new and fascinating discoveries about the properties of numbers [1-5]. They form sequences, they form patterns and so on. Numerous discoveries arise from these peculiar number patterns.

Now, consider the positive integers 5, 9, 30, 34. Note that, $9+30=5+34$ and $30+34=(9-5)^3$. This illustration motivated us for searching non-zero distinct integer quadruples (x,y,z,w) such that, $x+y=z+w$, $y+z=(x-w)^3$. A few interesting properties among the solutions are presented. Sequences of diophantine 3-tuples with suitable properties are exhibited.

II. Method of Analysis

This paper illustrates two different methods for obtaining non-zero distinct integer solutions to the pair of equations

$$x+y=z+w \tag{1}$$

$$y+z=(x-w)^3 \tag{2}$$

A. Method 1:

Consider the linear transformations

$$x=u+v, w=u-v, u\neq v\neq 0 \tag{3}$$

Substituting (3) in (1) and (2) and simplifying, we have,

$$z=4v^3+v, y=4v^3-v \tag{4}$$

Note that (3) and (4) satisfy (1) and (2).

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On Two Interesting Systems of Diophantine Equations

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act— A search is made for pairs of non-zero distinct integers (x, y) such that, in each pair, $x+y=a^2, 2x+y=b^2, x+2y=a^3$ and (ii) $x+y=a^2, 2x+y=b^2, x+2y=c^3$ correspondingly.

ords— Pairs of integers, system of equations.

I. Introduction

The classification of number patterns is one of the major areas in Number Theory. It is obviously a broad topic and has a llous effect on credulous people due to unlimited supply of exciting, non-routine and challenging problems. In particular, ay refer [1 - 9].

In this communication, an attempt has been made to obtain pairs of non-zero distinct integers such that, in each pair,
) $x+y=a^2, 2x+y=b^2, x+2y=a^3$ and (ii) $x+y=a^2, 2x+y=b^2, x+2y=c^3$

II. METHOD OF ANALYSIS

LEM 1:

ch is made to obtain non-zero distinct integers x, y such that

$$x+y=a^2 \tag{1}$$

$$2x+y=b^2 \tag{2}$$

$$x+2y=a^3 \tag{3}$$

mination of x, y between (1) to (3) leads to

$$3a^2-a^3=b^2 \tag{4}$$

bstitution of the transformation

$$a=3-\alpha^2$$

ives,

$$b=\alpha(3-\alpha^2)$$

2) − (1) gives,

$$x=x(\alpha)=b^2-a^2=(3-\alpha^2)^2(\alpha^2-1) \qquad (\alpha\neq\pm1) \tag{5}$$

1), $$y=y(\alpha)=a^2-x=(3-\alpha^2)^2(2-\alpha^2) \tag{6}$$

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ON PAIRS OF RECTANGLES AND GOPA - VIDH NUMBERS

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ABSTRACT
This paper aims at determining pairs of rectangles such that, in each pair, the sum of their areas is represented by a Gopa - Vidh number. Also, the number of primitive and non-primitive rectangles for each Gopa - Vidh number is given.

KEYWORDS: Pairs of rectangles, Area, Gopa - Vidh number.

1. INTRODUCTION
Any sequence of numbers represented by a mathematical function may be considered as pattern. In fact, mathematics can be considered as a characterization of patterns. For clear understanding, any regularity that can be illustrated by a scientific theory is a pattern. In other words, a pattern is a group of numbers, shapes or objects that follow a rule. A careful observer of patterns may note that there is a one to one correspondence between the polygonal numbers and the number of sides of the polygon. Apart from the above patterns we have some more fascinating patterns of numbers namely Nasty number, Dhuruva numbers and Jarasandha numbers. For illustrations, one may refer [1- 13].

2. DEFINITION
Gopa - Vidh Number: Let N be a non-zero positive integer. Let a represent the sum of the digits in N^2. If N^2 is a square multiple of a, then, the integer N is referred as Gopa – Vidh number.

3. METHOD OF ANALYSIS
Let $R_1(x,y)$ and $R_2(z,w)$ be two distinct rectangles whose corresponding areas are A_1, A_2.
Consider

$A_1 + A_2 = 20$, a Gopa - Vidh number

That is,

$$xy + zw = 20 \quad (1)$$

Let q, r, s be three non-zero distinct positive integers and $r > s$.
Introduction of the linear transformations

$$x = s,\ y = 2q + s,\ z = r - s,\ w = r + s \quad (2)$$

in (1) leads to

$$r^2 = 20 - 2qs \quad (3)$$

Solving (3) for q, r, s and using (2), the corresponding values of rectangles R_1 and R_2 are obtained and presented in Table: 1 below:

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ON PAIRS OF RECTANGLES AND TRIMORPHIC NUMBERS

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***Abstract*— This paper aims at determining pairs of rectangles such that, in each pair, the sum of their areas is represented by a Trimorphic number. Also, the number of primitive and non-primitive rectangles for each Trimorphic number is given.**

***Keywords*— Pairs of rectangles, Area, Trimorphic number.**
2010 Mathematics Subject Classification: 11D09

I. INTRODUCTION

Any sequence of numbers represented by a mathematical function may be considered as pattern. In fact, mathematics can be considered as a characterization of patterns. For clear understanding, any regularity that can be illustrated by a scientific theory is a pattern. In other words, a pattern is a group of numbers, shapes or objects that follow a rule. A careful observer of patterns may note that there is a one to one correspondence between the polygonal numbers and the number of sides of the polygon. Apart from the above patterns we have some more fascinating patterns of numbers namely Nasty number, Dhuruva numbers and Jarasandha numbers. For illustrations, one may refer [1- 12].

II. DEFINITION

Trimorphic Number: If n is a number such that n^3 ends with n then n is called trimorphic number.

III. METHOD OF ANALYSIS

Let $R_1(x,y)$ and $R_2(z,w)$ be two distinct rectangles whose corresponding areas are A_1, A_2.
Consider

$$A_1 + A_2 = 24 \text{, a Trimorphic number}$$

That is,

$$xy + zw = 24 \qquad (1)$$

Let q, r, s be three non-zero distinct positive integers and $r > s$.
Introduction of the linear transformations

On the System of Equations $x+y=z+w,\ y+z=(x+w)^3$

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Abstract—This paper concerns with the problem of obtaining non-zero distinct integer solutions to the system of equations $x+y=z+w,\ y+z=(x+w)^3$.

Keywords— System of double equations, integer solutions, diophantine 3-tuples, dio 3-tuples.

I. INTRODUCTION

Number Theory has occupied a significant position in the world of Mathematics. One of the enjoyable areas of Number Theory that has not only attracted but also motivated many Mathematicians since antiquity is the subject of patterns in numbers. Mans love for numbers is perhaps older than Number Theory. Nearly, ever century has witnessed new and fascinating discoveries about the properties of numbers [1-5]. They form sequences, they form patterns and so on. Numerous discoveries arise from these peculiar number patterns.

Now, consider the positive integers 2, 4, 107, 109. Note that, $4+107=2+109$ and $107+109=(2+4)^3$. This illustration motivated us for searching non-zero distinct integer quadruples (x,y,z,w) such that, $x+y=z+w,\ y+z=(x+w)^3$. A few interesting properties among the solutions are presented. Sequences of diophantine 3-tuples with suitable properties are exhibited.

II. DEFINITIONS

Diophantine 3-tuple: A triple (a,b,c) is said to be a Diophantine 3-tuple, if the product of any two members of the set added with non-zero integer or a polynomial is a perfect square.

Dio 3-tuple: A triple (a,b,c) is said to be a Dio 3-tuple, if the product of any two members of the set added with the same members and increased by non-zero integer or a polynomial is a perfect square.

III. METHOD OF ANALYSIS

This paper illustrates the process for obtaining non-zero distinct integer solutions to the pair of equations

$$x+y=z+w \tag{1}$$

$$y+z=(x+w)^3 \tag{2}$$

Consider the linear transformations

$$x=u+v,\ w=u-v,\ u\neq v\neq 0 \tag{3}$$

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On ternary biquadratic Diophantine equation $11(x^2 - y^2) + 3(x + y) = 10z^4$

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Abstract: We obtain infinitely many non-zero integer triples (x, y, z) satisfying the non-homogeneous bi-quadratic equation with three unknowns $11(x^2 - y^2) + 3(x + y) = 10z^4$. Various interesting properties among the values of x, y, z are presented. Some relations between the solutions and special numbers are exhibited.

Keywords: Ternary bi-quadratic, Integer solutions, Pell equations.
2010 Mathematics Subject Classification: 11D25, 11D09.

1 Introduction

The theory of Diophantine equations offers a rich variety of fascinating problems. Since antiquity, mathematicians exhibit great interest in homogeneous and non-homogeneous bi-quadratic Diophantine equations. In this context, one may refer our references for a variety of problems on the bi-quadratic Diophantine equations with three variables and also for bi-quadratic equations with four unknowns studied on their integral solutions. This communication concerns a yet another interesting ternary bi-quadratic equation given by

On sets of 2n -tuples in Arithmetic Progression

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Abstract

This paper deals with the construction of sets of integers in Arithmetic Progression (A.P), where, the members in each set satisfy certain conditions.

Keywords: : *Arithmetic Progression, set with even number of integers*

1. Introduction

The theory of numbers has occupied a significant position in the world of mathematics as it has not only truth but also supreme beauty. Every century has witnessed new and fascinating discoveries about the properties of numbers. In this context, one may refer [1-7].Yet, many mathematical problems both major and minor, still remain unsolved.
This paper concerns formulating sets of 2n integers in arithmetic progression, where, the members in each set satisfy certain conditions.

2. Method of Analysis

Set 1:

Let $s=(a\ ,a_2,.........,a_{2n}), n\geq$ represents n integers in arithmetic progression such that a_1+a_{2n} is a perfect square and $\sum_{i=1}^{2n} a_i$ is a cubical integer.

Formulation

For simplicity and clarity, the members of the set s are considered as follows.

$$a_1=c-(2n-1)d,\ a_2=c-(2n-3)d,\ a_3=c-(2n-5)d,.........$$
$$a_{2n-2}=c+(2n-5)d,\ a_{2n-1}=c+(2n-3)d,\ a_{2n}=c+(2n-1)d \qquad (A)$$

Special sets of $(2n+1)$ - tuples in Arithmetic Progression

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Abstract— **This paper is concerned with the formulation of sets of $(2n+1)$ integers in Arithmetic Progression, where, the members in each set satisfy certain conditions.**

Keywords— **Arithmetic Progression, Set with odd number of integers.**

I. Introduction

The theory of numbers has occupied a signifieant position in the world of mathematics as it has not only truth but also supreme beauty. Every century has witnessed new and fascinating discoveries about the properties of numbers. Yet, many mathematical problems both major and minor, still remain unsolved. In this context, one may refer [1-6].

This paper concerns formulating sets of $(2n+1)$ integers in arithmetic progression, where, the members in each set satisfy certain conditions.

II. METHOD OF ANALYSIS

Set 1:

Let $S=(a_1,a_2,..........a_{2n+1})$ represents $(2n+1)$ integers in arithmetic progression such that $\sum_{i=n}^{n+2} a_i$ is a perfect square and $\sum_{i=1}^{2n+1} a_i$ is a cubical integer.

Solution:

To start with, note that the set S has an odd number of terms and therefore, the middle term is a_{n+1} .For simplicity and clarity, denote a_{n+1} by c and the set S is represented by

$$S=(c-nd, c-(n-1)d, ..., c-d, c, c+d, ... c+nd) \qquad (A)$$

where d is any given non-zero integer and c is a non-zero integer to be determined

The conditions to be satisfied by the members of S are

$$3c = \text{a square integer} \qquad (1)$$

and

$$(2n+1)c = \text{ a cubical integer} \qquad (2)$$

respectively. Now,

$$(1) \Rightarrow c = 3 * \text{ a square integer} = 3r^2, \text{ say} \qquad (3)$$

$$(2) \Rightarrow c = (2n+1)^2 * \text{ a cubical integer} = (2n+1)^2 s^3, \text{ say} \qquad (4)$$

ON THE TERNARY BIQUADRATIC EQUATION

$$x^4 + x^3 y + x^2 y^2 + xy^3 + y^4 = (x+y)^2 + 1 + z^2.$$

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ABSTRACT:

This paper deals with the problem of obtaining non-zero distinct integer solutions to the ternary bi-quadratic equation $x^4 + x^3 y + x^2 y^2 + xy^3 + y^4 = (x+y)^2 + 1 + z^2$. A few interesting relations among the solution are presented. Given an integer solution of the equation under consideration, integer solutions for various choices of hyperbola and parabolas are exhibited.

KEYWORDS:

Ternary bi- quadratic, integer solutions, parabolas, hyperbolas.

INTRODUCTION:

In number theory, Diophantine equations play a significant role and have a marvellous effects on credulous people. They occupy a remarkable position due to unquestioned historical importance .The subject of Diophantine equation is quite difficult. Every century has seen the solution of more mathematical problem than the century before and yet many mathematical problem, both major and minor still remains unsolved. It is hard to tell whether a given equation has solution or not and when it does, there may be no method to find all of them. It is difficult to tell which are early solvable and which require advanced techniques. There is no well unified body of knowledge concerning general methods. A Diophantine problem is considered as solved if a method is available to decide whether the problem is solvable or not and in case of its solvability, to exhibit all integers satisfying the requirements set forth in the problem. Many researchers in the subject of Diophantine equation exhibit great interest in homogeneous and non-homogeneous bi-quadratic Diophantine equations. In this context, are may refer [1-9].This communication concerns yet another interesting ternary bi-quadratic equation given by $x^4 + x^3 y + x^2 y^2 + xy^3 + y^4 = (x+y)^2 + 1 + z^2$ and is studied for its non-zero distinct integer solution. A

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Observations on Non-homogeneous Bi-quadratic with Four unknowns $10xy + 7z^2 = 7w^4$

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Abstract- This paper concerns with the problem of determining non-trivial integral solutions of the non-homogeneous bi-quadratic equation with four unknowns given by $10xy+7z^2=7w^4$. We obtain infinitely many non-zero integer solutions of the equation by introducing the linear transformations.

Keywords – Bi-quadratic equation with four unknowns, integral solutions, Non homogeneous bi-quadratic, Linear Transformations.

I. INTRODUCTION

The theory of Diophantine equations offers a rich variety of fascinating problems. In particular, bi-quadratic diophantine equations, homogeneous and non-homogeneous have aroused the interest of numerous mathematicians since antiquity[1-5]. In this context, one may refer [6-19] for various problems on the bi-quadratic diophantine equations with four variables. However, often we come across non-homogeneous bi-quadratic equations and as such one may require its integral solution in its most general form. It is towards this end, this paper concerns with the problem of determining non-trivial integral solutions of the non-homogeneous equation with four unknowns given by $10xy + 7z^2 = 7w^4$.

II. METHOD OF ANALYSIS

The non-homogeneous bi-quadratic diophantine equation with four unknowns under consideration is

$$10xy + 7z^2 = 7w^4 \tag{1}$$

Choice 1:

Introduction of the linear transformations

OBSERVATIONS ON THE HOMOGENEOUS TERNARYQUADRATIC DIOPHANTINE EQUATION WITH THREE UNKNOWNS $y^2+5x^2=21z^2$

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Abstract

The homogeneous ternary quadratic Diophantine equation representing the cone $y^2+5x^2=21z^2$ is analyzed for its patterns of non-zero distinct integral solutions. A few interesting properties between the solutions and special polygonal numbers are exhibited.

Keywords: *Ternary quadratic, Homogeneous quadratic, Cone, Integral solutions.*

Notations:

$t_{m,n}=n\left[1+\frac{(n-1)(m-2)}{2}\right]$ = polygonal number of rank n with sides m.

1. Introduction

The Diophantine equation offers an unlimited field for research due to their variety [1-3]. In particular, one may refer [4-15] for quadratic equations with three unknowns. This communication concerns with yet another interesting equation $y^2+5x^2=21z^2$ representing homogeneous quadratic with three unknowns for determining its infinitely many non-zero integral points. Also, a few interesting relations among the solutions are presented.

CHALLENGES OF ORGANISATIONAL DOMAIN IN BUSINESS PERCEPTION

Dr. K. Meena[1]

Dr. V. Praba[2]

Abstract

As the world is moving towards a borderless society driven by increased globalization, and further characterized by rapid pace of technological advancement, there has been a paradigm shift in the strategy organization adopt to stay relevant amidst competitive conditions. Business has not changed much, though the way in which it is being conducted has changed immensely impacted by the turbulence of the business and the operating environment. Organizations which are either proactive or quick enough to assess the disruptions caused by the rapid changes, reinvent themselves and exhibit dynamism successfully to wither the challenges and remain competitive. In this paper, we discuss the purposes of the organization, structure, strategy and organizational design to adapt themselves to the demands of the turbulent environment. The challenges are multidimensional and uncertain environment often require more flexible and responsive structure, and design capabilities to withstand the shocks/turbulence. Organizations which are proactive show more resilience to rapid changes, exhibit solid structure driven by strong fundamentals to stay ahead of their competitors. The environment business firms are exposed to increased organizational complexities, market dynamism, technological changes that impact the organizations which are discussed firstly. Secondly, organization responses through increased innovation and reorientation and in the process to remain competitive, have been using various tools and techniques that include but not restricted to environmental scanning, upscale technological capabilities, build business models with innovation in design and product capabilities in order to cope with challenges posed by the turbulence of global business environment. Lastly we have focused the need for effective communication across the organization and the impact it creates to arrive at a pragmatic conclusion for the issue.

Keywords: *Strategy, dynamic strategy, turbulent business environment,dynamic capabilities, dynamic competencies.*

Introduction

Organizations come into existence in order to achieve their objective. Profit maximization through cost optimization, inventory control, effective use of available resource, enhancing the enterprise or stakeholder value are all measures adopted to increase organization effectiveness. A turbulent external environment is widely believed to have damaging effects on organizational performance. Structure follows strategy as Heisenberg observed. It is believed that a robust organizational structure with strong fundamentals would be able to wither the turbulence and exogenous shock. Much less consensus has been reached on whether the best response to turbulence is to retain or alter existing organizational structures.

The great depression of the early 1900's, civil wars, the successive world war, oil shock of 1970s, foreign currency crisis in many of Asian nations in 1990s, financial crisis (2008-2012), Eurozone economy and sovereign debt crisis. Countries in the periphery of the Eurozone drifted into a severe sovereign debt crisis. Starting with Greece in 2009, the crisis quickly spilled over to Ireland, Italy, Portugal, and Spain (the so-called [1]GIIPS countries). These countries faced severe economic downturns which resulted in lower tax revenues, high fiscal deficits, and ultimately an increase in the sovereign credit risk which impacted business firm's ability to borrow. Arab spring and the oil driven middle east economy, civil war in Syria and refugee exodus to Europe, the US sanctions on Russia, Syria, and Iran, uncertainty surrounding the recent Brexit (Britain exit of the European Union), and the recent trade wars with proposed increased tariffs by the US on the Chinese export, and counter tariff on certain US exports by China have added dimension to heightened global uncertainty beside regional issues and other socio, economic and political factors.

The various issues faced by the organization in uncertain global environment by testing the links between turbulence, structural stability, and performance of large organizations showed that turbulence has a negative effect on performance, and that this is compounded by internal organizational change. Organizations can mitigate the harmful effects of volatility in the external environment by maintaining structural stability.

Disruption often has an unpredictable temperament and the pace at which it arrives often leave organizational leaders devoid of control, let alone equipped to make strategic decisions. Organizational strategy needs to be in place and well prepared to take advantage when opportunities knock. As disruption plays out in real time,

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Three Connected Domination in a Graph

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laude Berge [1] introduced the concept of strong stable set S in a graph. These sets are independent and any vertex an have at most one neighbour in S. This concept was generalized by E. Sampathkumar and L. Pushpalatha [5]. A dependent set is a minimal dominating set. What type of domination will result from maximal semi-strong sets? This domination which we call us -Three-connected domination is initiated and studied in this paper.
Strong stable set, Semi-strong set, Three-connected domination.
69.
ematics subject Classification (2010):11D09

I. INTRODUCTION

, E) be a simple, finite, undirected graph. A subset S of $V(G)$ is called a strong stable set of G if $|N[v] \cap S| \leq 1$ for v in n be easily seen that such a sets is independent and the distance between any two vertices of S greater than equal to three. strong stable sets is a 2-packing. Generalising this concept, E. Sampathkumar and L. Pushpa Latha [5] introduced the semi-strong sets. A subset S of $V(G)$ is called semi-strong stable if $|N(v) \cap S| \leq 1$ for every v in $V(G)$. A strong stable set ng stable but the converse is not true. For example, in C_5, any two consecutive vertices is a semi- strong stable set. If S is ng stable set, then any component of S is either K_1 or K_2 and the distance between any two points of S is not equal to two. semi-strong stable set gives rise to a new type of domination and this is studied in this paper.

II. THREE-CONNECTED DOMINATING SET

ion 2.1: Let S be a subset of $V(G)$. For any $u \in V-S$, if there exists $v \in V(G)$, $v \neq u$ such that v is adjacent with u and v is nt with a vertex of S, (that is, for any $u \in V(G)$ and $w \in S$ such that uvw is a path P_3), then S is called a 3-connected ating set of G.

k 2.2: Any 3-connected dominating set S of G which is semi-strong is a maximal semi- strong set of G.

m 2.3: Let S be a subset of $V(G)$ such that for any $u \in V-S$, there exists v and a vertex w in S such that uvw is a path. operty is super hereditary.

subset of $V(G)$ satisfying the hypothesis. Let T be a proper super set of S. Let $u \in V-T$. Then $u \in V-S$. By hypothesis, a vertex v and a vertex w in S such that uvw is a path.

: $v \in V-T$. In this case, $u, v \in V-T$ and $w \in T$ (since $w \in S \subset T$). Moreover uvw is a path.

: $v \in T-S$ and $u \in V-T$. There exist w in S such that uvw is a path. That is, $u \in V-T$, $v \in T$, $w \in T$ and uvw is a path.

: $v \in S$ and $u \in V-T$. There exist $w \in S$ such that uvw is a path. That is, $v \in T$ and $w \in T$ and uvw is a path. In all the cases, for any $u \in V-T$, there exist $v \in V(G)$, $v \neq u$ and $w \in T$ such that uvw is a path. Therefore the property for ality of a semi-strong set S is super hereditary.

k 2.4: The above property is called a 3-connected dominating property.

m 2.5: Any minimal 3-connected dominating set is a maximal semi-strong set.

ninimal 3-connected dominating set of G.

: Let $u \in V-S$

e 1: There exists $v \in V-S$ and $w \in S$ such that uvw is a path. Suppose u has at least two neighbours in S. Let $x, y \in S$ at u is adjacent with x and y.

ler $S-\{x\}$. For any u_1 in $V-(S-\{x\})$, $u_1 \neq x$, $u_1 \in V-S$. There exists v in $V(G)$, $v \neq u_1$ and w in S such that uvw is if $w = x$. Then u_1vw is a triangle and not a path, contradiction. Therefore $w \neq x$. Therefore $w \in S-\{x\}$. Therefore there $w \in (S-\{x\})$ such that u_1vw is a path.

se $u_1 = x$. Then $u \in V-S$ such that u is adjacent with x and adjacent with $y \in (S-\{x\})$. That is, u_1 is adjacent with u and jacent with $y \in (S-\{x\})$. Therefore $S-\{x\}$ is a 3-connected dominating set of G, a contradiction (since S is minimal).

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SEMI-STRONG COLOR PARTITION OF A GRAPH

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ABSTRACT

Claude Berge introduced the concept of strong stable sets in a graph. A subset S of a graph $G = (V, E)$ is a strong stable set if $|N[v] \cap S| \leq 1$ for every $v \in V(G)$. Relaxing this condition Prof.E. Sampath kumar introduced semi-strong sets in graphs as those sets for which $|N(v) \cap S| \leq 1$ for every $v \in V(G)$.Resolvability is a well-studied concept. Combining these two, resolving semi-strong color partition is defined and studied in this paper.

Classification: 05C15, 05C70

Keywords: Resolving semi-strong color partition.

I. INTRODUCTION

A subset S of a graph G = (V, E) is called a semi-strong set if $|N[v] \cap S| \leq 1$ for every $v \in V(G)$.

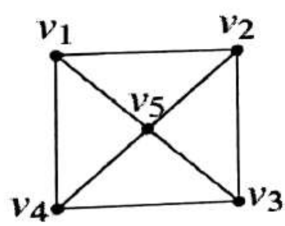
A subset S = $\{x_1, x_2, x_3, \ldots\ldots, x_k\}$ of a connected graph G is called a resolving set if the code C(u : S)=$(d(u, x_1), d(u, x_1), \ldots\ldots, d(u, x_1))$ is different for different u. A partition of V(G) into subsets where each subset considered is a resolving semi-strong set. The Minimum cardinality of such a partition denoted by $\chi_{spd}(G)$ is found out for some well-known graphs. Further, graphs with $\chi_{spd}(G)$=2,$\chi_{spd}(G)$= n are determined.

II. RESOLVING SEMI- STRONG COLOR PARTITION

Definition 1.1. Let G be a finite, simple, connected, undirected graph. A partition $\Pi = \{V_1, V_2, \ldots, V_k\}$ is called a resolving semi strong color partition if Π is a semi-strong color partition and the k-vector $(v|\Pi)=(d(v,v_1),d(v,v_2),\ldots,d(v,v_k))$ is distinct for different v in V (G). The minimum cardinality of a resolving semi-strong color partition of G is called semi-strong color class partition dimension of G and is denoted by$\chi_{spd}(G)$. The trivial partition namely$\{\{v_1\},\{v_2\} \ldots,\{v_k\}\}$ where $V(G)=\{v_1,v_2,.v_k\}$ is a resolving semi-strong color class partition of G.

Remark 1.2. (i)$\chi_s(G) \leq \chi_{spd}(G)$.
(ii) $pd(G) \leq \chi_{spd}(G)$

Example 1.3. Let G be the graph given in Fig.1.1:$\chi_s(G) = 5$.Therefore $\chi_{spd}(G)$=5.



G

Figure 1.1

On the Double Equations $x-yz=3w^3, xy=T^3$

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Abstract- The system of double equations given by $x-yz=3w^3, xy=T^3$ is studied for obtaining its non-zero distinct solutions in integers.

Keywords – Double equations, Integer solutions, Pair of equations with 5 unknowns.

I. Introduction

Systems of indeterminate quadratic equations of the form $ax+c=u^2$, $bx+d=v^2$ where a, b, c, d are non-zero distinct constants, have been investigated for solutions by several authors [1, 2] and with a few possible exceptions, most of the them were primarily concerned with rational solutions. Even those existing works wherein integral solutions have been attempted, deal essentially with specific cases only and do not exhibit methods of finding integral solutions is a general form. In [3], a general form of the integral solutions to the system of equations $ax+c=u^2$, $bx+d=v^2$ where a, b, c, d are non-zero distinct constants is presented when the product ab is a square free integer whereas the product cd may or may not a square integer. For other forms of system of double diophantine equations, one may refer [4-26].

This communication concerns with yet another interesting system of double Diophantine equations namely $x-yz=3w^3, xy=T^3$ for its infinitely many non-zero distinct integer solutions.

II. Method of Analysis

Consider the system of double equations

Observations on Homogeneous Bi-quadratic Equationwith Five unknowns

$$x^4 - y^4 = 26(z^2 - w^2)\,T^2$$

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bstract

nis paper concerns with the problem of determining non-trivial integral solutions of the homogeneous -quadratic equation with five unknowns given by $x^4 - y^4 = 26(z^2 - w^2)T^2$ .We obtain infinitely ny non-zero integer solutions of the equation by introducing the linear transformations. A few eresting properties among the values x, y, z, w, T and special numbers are also presented.

eywords: Bi-quadratic equation with five unknowns, integral solutions, homogeneous bi-quadratic, near Transformations.

troduction

e theory of Diophantine equations offers a rich variety of fascinating problems. In particular, bi-adratic diophantine equations, homogeneous and non-homogeneous have aroused the interest of merous mathematicians since antiquity[1-5]. In this context, one may refer [6-12] for various blems on the bi-quadratic diophantine equations with five variables. However, often we come oss homogeneous bi-quadratic equations and as such one may require its integral solution in its st general form. It is towards this end, this paper concerns with the problem of determining non-ial integral solutions of the homogeneous equation with five unknowns given by $- y^4 = 26(z^2 - w^2)T^2$.

On the non-homogeneous ternary quadratic Diophantine equation

$5x^2 + 2y^2 = 55z$

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The ternary quadratic equation given by $5x^2+2y^2=55z$ is considered and searched for its many different integer ... Five different choices of integer solutions of the above equations are presented. A few interesting relations between the ... and special polygonal numbers are presented.

...— Ternary quadratic, integer solution.

... classification :11D09.

I. INTRODUCTION

...Diophantine equations offer an unlimited field for research due to their variety [1-3]. In particular, ... may refer [4-18] for quadratic equations with three unknowns. This communication concerns with yet ... interesting equation $5x^2+2y^2=55z$ representing non homogeneous quadratic equation with three ...owns for determining its infinitely many non-zero integral points. Also, few interesting relations ...g the solution are presented.

II. NOTATIONS

$t_{m,n} = n^{th}$ term of regular polygon with m sides $= n\left[1+\frac{(n-1)(m-2)}{2}\right]$

PR_n = Pronic number of rank n $= n(n+1)$

III. METHOD OF ANALYSIS

...he Quadratic Diophantine equation with three unknowns to be solved is by

$$5x^2+2y^2=55z \qquad (1)$$

...he substituting

$$y=5Y \qquad (2)$$

$$x^2+10Y^2=11z \qquad (3)$$

...) is solved through different approaches and the different patterns of solution (1) obtained are ...esented below.

...ATTERN: 1

...ssume

$$Z=(a^2+10b^2)^2$$

Write '11' as

$$11=(1+i\sqrt{10})(1-i\sqrt{10})$$

(3) can also be written as

$$(x+i\sqrt{10}Y)(x-i\sqrt{10}Y)=(1+i\sqrt{10})(1-i\sqrt{10})(a+i\sqrt{10}b)^2(a-i\sqrt{10}b)^2$$

Consider the positive factor

OBSERVATION ON THE TERNARY QUADRATIC DIOPHANTINE EQUATION

$7x^2 + 2y^2 = 105z$

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bstract— The ternary quadratic equation given by $7x^2+2y^2=105z$ is considered and searched for its many ifferent integer solutions. Eleven different choices of integer solutions of the above equations are presented. A few nteresting relations between the solutions and special polygonal numbers are presented.

eywords— ternary quadratic, integer solutions.

MSC subject classification: 11D09

I .INTRODUCTION

he Diophantine equations offer an unlimited field for research due to their variety [1-3].in particular, one may efer

4-16] for quadratic equations with three unknowns. This communication concerns with yet another interesting quation $7x^2 + 2y^2 = 105z$ representing homogeneous quadratic equation with three unknowns for determining its nfinitely many non-zero integral points. Also , few interesting relations among the solutions are presented.

II. NOTATIONS

$_{m,n} = n^{th}$ term of a regular polygon with in sides $= n\left(1+\frac{(n-1)(m-2)}{2}\right)$

riangular number of rank n, $T_{3,n} = \frac{n(n+1)}{2}$

$pr_n = n(n+1)$

= Pronic number of rank n

III. METHOD OF ANALYSIS

he ternary quadratic diophantine equation to be solved for its non-zero distinct integral solutions is

$$7x^2 + 2y^2 = 105z \quad (1)$$

ubstituting

$$y = 7Y \quad (2)$$

n (1) we get, $x^2 + 2Y^2 = 15z$ (3)

3) is solved through different approaches and the different patterns of solutions to (1) obtained are presented elow.

ATTERN: 1

OBSERVATION ON THE HOMOGENEOUS TERNARY QUADRATIC DIOPHATINE EQUATION $25x^2 - 20xy + 10y^2 = 7z^2$

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tract : The ternary quadratic equation given by $25x^2 - 20xy + 10y^2 = 7z^2$ is considered and searched for its many different ger solution. Four different choices of integer solution of the above equations are presented. A few interesting relations ween the solutions and special polygonal numbers are presented.

words: ternary quadratic, integer solutions
C **subject classification: 11D09**

1. INTRODUCTION:

The Diophantine equation offer an unlimited field for research due to their variety [1-3]. In particular, one may refer [4-17] for dratic equations with three unknowns. This communication concerns with yet another interesting equation $^2 - 20xy + 10y^2 = 7z^2$ representing homogeneous equation with three for determining its infinitely many non-zero integral its. Also, few interesting relations among the solutions are presented.

2. NOTATIONS:

- $t_{m,n} = n^{th}$ term of a regular polygon with m sides.
  $= n\left(1 + \frac{(n-1)(m-2)}{2}\right)$
- PR_n = Pronic number of rank n
  $= n(n+1)$

3. METHOD OF ANALYSIS:

quadratic Diophantine equation with three unknowns to be solved is given by

$$25x^2 - 20xy + 10y^2 = 7z^2 \quad (1)$$

tituting

$$U = 5x - 2y \quad (2)$$

) we get

$$U^2 + 6y^2 = 7z^2 \quad (3)$$

s solved through different approaches and the different patterns of solutions (1) obtained are presented below.

TERN:1

me

$$z = a^2 + b^2 \quad (4)$$

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PREDICTING THE EFFECT OF RANDOMIZED CLINICAL TRIAL OF A DRUG (LG- 03812) FOR MILD COGNITIVE IMPAIRMENT USING MACHINE LEARNING

Dr.K.Meena[1]

Dr.V.Praba[2]

Abstract

Machine learningis a branch of AI which is the driving force for conducting exploratory data analytics for a variety of problems. One of the main aspects is to derive knowledge from a huge bunch of data using data mining classification algorithms. Prediction accuracy and Model explaining ability are the two most important objectives when developing machine learning algorithms to solve real-world problem. Data mining in Healthcare is useful to perform exploratory data analysis tasks and helps to interpret Treatment effectiveness , Healthcare management, Fraud & abuse , Hospital Infection Control and Smarter Treatment Techniques from the results of randomized clinical trials. This paper discusses about varieties of data mining classification algorithms and aims to analyze the variability in performance and effect of treatment of a phase 2pb randomized clinical trial (RCT) of a new drug (LG- 03812) for a period of one year. The primary objective of the study is to evaluate the efficacy of LG-03812 on slowing cognitive and functional impairment on the basis of completion of treatment. Decision Tree algorithm is an useful technique in predicting the completion of treatment and effects causing impairment. The numerical data are taken and fed to the DT algorithm to make calculation for the prediction of the same. The data sets are classified using the Waikato Environment for Knowledge Analysis(WEKA) platform by gathering and grouping the patients on the basis of attributes like age, sex, period of treatment, etc.

Keywords : Data Mining, Knowledge Discovery, Mild Cognitive Impairment, Randomized Clinical Trial, Classification of Algorithms, WEKA.

Introduction

Data mining extracts meaningful information from complexity of data which are in a raw form . Data Mining is the set of methodologies used in analyzing data from various dimensions and perspectives, finding previously unknown hidden patterns, classifying and grouping the data and summarizing the identified relationships. Data mining in general is a part of Knowledge Discovery process. Numerous benefits are provided by the use of data mining in healthcare such as detection of fraud, detection of abuse of drugs, proper diagnosing of patients, efficacy in treatments, early detection of diseases, survivability of patients etc. Data mining techniques have been applied by various researchers. It comprises of techniques like preprocessing , classification, association, clustering, outlier detection etc. The techniques play a vital role in the healthcare industry to support decision making, proper diagnosis, selection of treatments and prediction. Data mining techniques such as Neural Networks, decision trees, Support Vector machine, Naïve Bayes and Genetic algorithm have been used by academicians to write and

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N TWO INTERESTING SYSTEMS OF TRIPLE DIOPHANTINE EQUATIONS WITH FIVE UNKNOWNS

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A search is made for obtaining non-zero distinct integer quintuple (x, y, a, b, c) such that, ... $a^2, 2x+y=b^2, x+2y=3c^2$ and (ii). $x+y=a^2, 2x+y=b^2, x+2y=2c^2$. Different sets of solutions to the considered system ...ations are presented. A few interesting properties among the solutions are given.

...s: *System of triple equations, triple equations with five unknowns, integer solutions.*

...UCTION

...ory is one of the most fascinating and enlivening subjects occupying a vital place in the history of mathematics. In particular, ...of Diophantine equations has occupied a significant position in the subject of number theory as it invigorates the interest towards ... The beauty of diophantine equations and system is that the number of unknowns is bigger than the number of equations. They ...ely many real and integral solutions. One can easily understand that diophantine equations offer an unlimited field for research ...of their variety. The theory of diophantine equations has been a topic of constant interest to many researchers worldwide for ...turies because of its historical interest and applications of the principles especially in the field of pattern classification. In this ...e may refer[1- 7].

...his paper concerns with the problem of obtaining non-zero distinct integer quintuple (x, y, a, b, c) such that, (i) ...$, 2x+y=b^2, x+2y=3c^2$ and (ii) $x+y=a^2, 2x+y=b^2, x+2y=2c^2$ Different sets of solutions to the considered system of ...tions are presented. A few interesting properties among the solutions are given.

...ATIONS

$t_{m,n} = n\left[1+\frac{(n-1)(m-2)}{2}\right]$ = Polygonal number of rank n with sides m

$P_n = n(n+1)$ = Pronic number of rank n

$GNO_n = 2n+1$ = Gnomonic number

$P_n^3 = \frac{1}{6}(n^3+3n^2+2n)$ = Triangular pyramidal number of rank n

$P_n^5 = \frac{n^2(n+1)}{2}$ = Pentagonal pyramidal number of rank n

$Ct_{m,n} = \frac{mn(n+1)}{2}+1$ = Centered polygonal number of rank n with sides m

...HOD OF ANALYSIS

...m (i):

...et x, y be two non-zero distinct integers satisfying the system of equations

$$x+y=a^2 \tag{1}$$

$$2x+y=b^2 \tag{2}$$

$$x+2y=3c^2 \tag{3}$$

INTEGRAL POINTS ON THE TERNARY QUADRATIC DIOPHANTINE EQUATION $5x^2 + 11y^2 = 16z^2$

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ABSTRACT

The ternary quadratic homogeneous equation representing homogeneous cone given by $5x^2 + 11y^2 = 16z^2$ is analyzed for its non-zero distinct integer points on it. Five different patterns of integer points satisfying the cone under consideration are obtained. A few interesting relations between the solutions and special number patterns namely polygonal number, Pronic number , Star number, and nasty number are presented. Also knowing an integer solution satisfying the given cone, formulas for generating sequence of solutions based on the given solution are presented.

Keywords: Ternary homogeneous quadratic, integral solutions

INTRODUCTION

The ternary quadratic Diophantine equations offer an unlimited field for research due to their variety [1,20]. For an extensive review of various problems, one may refer [2-19]. This communication concerns with yet another interesting ternary quadratic equation $5x^2 + 11y^2 = 16z^2$ representing a cone for determining its infinitely many non-zero integral points. A few interesting relations among the solutions are presented. Also knowing an integer solution satisfying the given cone, formulas for generating sequence of solutions based on the given solution are presented.

NOTATIONS:

- Polygonal number of rank n with size m

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

- Pronic number of rank n

$$PR_n = n(n+1)$$

- Star number of rank n

$$S_n = 6n(n-1) + 1$$

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ON THE HOMOGENEOUS CONE $36x^2 - 24xy + 9y^2 = 6z^2$

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Abstract : The ternary quadratic equation given by $36x^2 - 24xy + 9y^2 = 6z^2$ is considered and searched for its different integer solutions. Three different choices of integer solution of the above equation are presented.

Key words: ternary quadratic, homogeneous cone, integer solutions

INTRODUCTION:

The Diophantine equations offer an unlimited field for research due to their variety [1-3]. In particular, one may refer [4-16] for quadratic equations with three unknowns. This communication concerns with yet another interesting equation $36x^2 - 24xy + 9y^2 = 6z^2$ representing homogeneous cone for determining its infinitely many non-zero integral points.

METHOD OF ANALYSIS:

The quadratic Diophantine equation with three unknowns to be solved is given by

$$36x^2 - 24xy + 9y^2 = 6z^2 \quad (1)$$

On completing the squares , (1) is written as

$$U^2 + 5y^2 = 6z^2 \quad (2)$$

where

$$U = 6x - 2y \quad (3)$$

(2) is solved through different approaches and the different patterns of solutions to (1) obtained are presented below:

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ON THE NEGATIVE PELLIAN EQUATION $y^2 = 13x^2 - 12$

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ABSTRACT

The hyperbola $y^2 = 13x^2 - 12$ is studied for its different solutions in integers. Some remarkable relations among the solutions are given. Also, integer solutions for other choices of hyperbolas and parabolas based on a given solution of the hyperbola under consideration are exhibited.

Keywords: Second degree with two unknowns, hyperbola, parabola, pell equation, solutions in integers.

1. INTRODUCTION

Many mathematicians analysed the binary quadratic diophantine equation of the form $y^2 = Dx^2 - N \left(N > 0\right)$, where D is a non-square positive integer [1-3]. The above equation is called the Negative form of the pell equation or related pell equation. It is worth to remind that the above equation is solvable only for certain values of D. In particular, one may refer [4-12].

This paper concerns with the equation $y^2 = 13x^2 - 12$ for determining different sets of solutions in integers and exhibits some remarkable relations between the solutions.

2. METHOD OF ANALYSIS

The binary quadratic equation to be solved is

$$y^2 = 13x^2 - 12 \qquad (1)$$

whose initial solution is $x_0 = 1$, $y_0 = 1$

Now consider the fundamental positive pell equation

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A Study On The Triple Equations $x+y=z^2$, $2x+y=2z^2+w^2$, $x+2y=10p^3$

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Abstract— The system of triple equations with five unknowns represented by $x+y=z^2$, $2x+y=2z^2+w^2$, $x+2y=10p^3$ is analyzed for its non-zero distinct integral solutions. Different sets of solutions are presented.

Keywords— System of triple equations , triple equations with five unknowns, integer solutions.

I. Introduction

In [1], an attempt has been made to obtain pairs of non-zero distinct integers x,y such that, in each pair

i. $x+y=a^2, 2x+y=b^2, x+2y=a^3$
ii. $x+y=a^2, 2x+y=b^2, x+2y=c^3$

[2] illustrates the analysis of obtaining different sets of distinct integer solutions to two systems of triple equations with five unknowns given by

i. $x+y=a^2, 2x+y=b^2, x+2y=3c^2$
ii. $x+y=a^2, 2x+y=b^2, x+2y=2c^2$ respectively.

In [3], the system of three equations $x+y=a^2, 2x+y=b^2, x+2y=a^2-c^2$ has been studied for its non-zero distinct integer solutions.

In [4-7], the following fours systems of Triple Equations are studied :

i. $x+y=a^2, 2x+y=a^2+3b^2, x+2y=a^2+c^2$
ii. $x+y=a^2, 2x+y=a^2+b^2, x+2y=a^2+5c^2$
iii. $x+y=2a^2, 2x+y=5a^2+b^2, x+2y=c^3$
iv. $x+y=2a^2, 2x+y=5a^2-b^2, x+2y=5c^3$

This communication exhibits different sets of non-zero distinct integer solutions for the system of triple equations with five unknowns given by $x+y=z^2$, $2x+y=2z^2+w^2$, $x+2y=10p^3$.

II. METHOD OF ANALYSIS

The system of triple equation with five unknowns x , y , z , w and p to be solved is

$$x+y=z^2 \tag{1}$$

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ON THE NON HOMOGENEOUS BINARY QUADRATIC EQUATION $4x^2 - 3y^2 = 37$

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Abstract:
This paper deals with the problem of obtaining non-zero distinct integer solutions to the non homogeneous binary quadratic equation represented by the Pell-like equation $4x^2 - 3y^2 = 37$. Different sets of integer solutions are presented. Employing the solutions of the above equation, integer solutions for other choices of hyperbolas and parabolas are obtained. A special Pythagorean triangle is also determined.

Keywords: Non homogeneous, binary quadratic, Pell-like equation, hyperbola, parabola, integral solutions, Special numbers.

2010 Mathematics Subject Classification: 11D09.

1. INTRODUCTION

The binary quadratic Diophantine equations (both homogeneous and non homogeneous) are rich in variety [1-6]. In [7-17] the binary quadratic non-homogeneous equations representing hyperbolas respectively are studied for their non-zero integral solutions. These results have motivated us to search for infinitely many non-zero integral solutions of still another interesting binary quadratic equation given by $4x^2 - 3y^2 = 37$. The recurrence relations satisfied by the solutions x and y are given. Also a few interesting properties among the solutions are exhibited.

2. METHOD OF ANALYSIS

Consider the non homogeneous binary quadratic equation

$$4x^2 - 3y^2 = 37 \qquad (1)$$

Introducing the linear transformations

$$x = X \pm 3T,\ y = X \pm 4T \qquad (2)$$

ON THE INTEGRAL SOLUTIONS OF HYPERBOLA $8x^2 - 3y^2 = 45$

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bstract

The hyperbola represented by the binary quadratic equation $8x^2 - 3y^2 = 45$ is alyzed for finding its non-zero distinct integer solutions. A few interesting relations ong its solutions are presented. Also, knowing an integral solution of the given perbola, integer solutions for other choices of hyperbolas and parabolas are sented. The formulation of second order Ramanujan Numbers with base numbers as l integers and Gaussian integers is illustrated.

ywords: Binary quadratic, Hyperbola, Parabola, Integral solutions, Pell equation, ond order Ramanujan Numbers.

1. Introduction

The binary quadratic Diophantine equations of the form $- by^2 = N, (a, b, N \neq 0)$ are rich in variety and have been analyzed by many ematicians for their respective integer solutions for particular values of a, b and N. is context, one may refer [1-14].

This communication concerns with the problem of obtaining non-zero distinct ger solutions to the binary quadratic equation given by $8x^2 - 3y^2 = 45$ representing rbola. A few interesting relations among its solutions are presented. Knowing an gral solution of the given hyperbola, integer solutions for other choices of hyperbolas parabolas are presented. The formulation of second order Ramanujan Numbers with numbers as real integers and Gaussian integers is illustrated.

On special sequences of dio-quadruples with property $D(-1)$

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Abstract

This paper concerns with the problem of constructing dio-quadruple (a,b,c_{s-1},c_{s-2}) such that the product of any two members of the set subtracted by their sum and added with (-1) is a perfect square.

Keywords: *Dio-Quadruples, Pell equation, Integer solutions.*

1. Introduction

A set of m positive integers $\{a_1, a_2, a_3, ... a_m\}$ with $a_i a_j \pm (a_i + a_j) + n$ as a perfect square for all $1 \le i < j \le m$ is called a Special Dio m-tuple with property $D(n)$. In [1-6], problems on special dio-quadruples with suitable properties are analysed. This motivated us to construct sequences of special dio-quadruples with property $D(-1)$

2. Method of Analysis

2.1 Dio-Quadruple: 1

Let $a = 3$ and $b = 10$ be two integers such that $ab - (a+b) - 1$ is a perfect square. Therefore (a, b) is the special dio-2-tuple with property $D(-1)$

Let c_{s+1} be any non-zero integer.

Consider

$$(a-1)c_{s+1} - a - 1 = 2c_{s+1} - 4 = p^2 \tag{1}$$

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On Sequences of Diophantine 3-Tuples Generated through Euler Polynomials

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Abstract

This paper deals with the study of constructing sequences of diophantine triples (a,b,c) *such that the product of any two elements of the set added by a polynomial with integer coefficient is a perfect square*

2010 Mathematics Subject Classification: 11D99

Introduction:

The problem of constructing the sets with property that product of any two of its distinct elements is one less than a square has a very long history and such sets have been studied by Diophantus. A set of m positive integers $\{a_1, a_2, a_3, \ldots, a_m\}$ is said to have the property $D(n), n \in Z - \{0\}$ if $a_i a_j + n$ is a perfect square for all $1 \le i \le j \le m$ and such a set is called a Diophantine m-tuple with property $D(n)$.

Many Mathematicians considered the construction of different formulations of diophantine triples with the property $D(n)$ for any arbitrary integer n [1] and also, for any linear polynomials in n. In this context, one may refer [2-12] for an extensive review of various problems on diophantine triples.

This paper aims at constructing sequences of diophantine triples where the product of any two members of the triple with the polynomial with integer coefficients satisfies the required property.

Method of Analysis:

Sequence: 1

Consider the Euler polynomials $E_1(x)$ and $E_2(x)$ given by

$$E_1(x) = x - \frac{1}{2}, \quad E_2(x) = x^2 - x$$

Let $a = 4(E_1(x))^2$, $b = E_2(x)$

It is observed that

$$ab + 3x^2 - 3x + 1 = (2x^2 - 2x + 1)^2$$

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OBSERVATIONS ON THE HOMOGENEOUS TERNARY QUADRATIC DIOPHANTINE EQUATION $x^2 + 4xy + 9y^2 = 21z^2$

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Abstract: The homogeneous cone represented by the ternary quadratic Diophantine equation $x^2+4xy+9y^2=21z^2$ is studied for finding its non – zero distinct integer solutions. A few interesting properties among the solutions are also exhibited.

Keywords: Homogeneous, Ternary quadratic equation, Integral solutions

INTRODUCTION

Ternary quadratic equations are rich in variety [1- 7].For an extensive review of sizable literature and various problems, one may refer [8-20]. In this communication, we consider yet another interesting homogeneous ternary quadratic equation $x^2+4xy+9y^2=21z^2$ and obtain infinitely many non-trivial integral solutions. A few interesting properties among the solutions are also exhibited.

NOTATIONS

Polygonal number of rank n with size m - $t_{m,n} = n\left[1+\frac{(n-1)(m-2)}{2}\right]$

Pronic number of rank n - $PR_n = n(n+1)$

METHOD OF ANALYSIS

The Quadratic Diophantine equation with three unknowns to be solved in given by

$$x^2+4xy+9y^2=21z^2$$

Substituting

$$x+2y=U$$

in (1), we get

$$U^2+5y^2=21z^2$$

(3) is solved through different approaches and the different patterns of solution of (1) are presented below.

PATTERN: 1

Assume

$$z=a^2+5b^2 \quad (4)$$

Write "21" as

$$21=(1+i2\sqrt{5})(1-i2\sqrt{5}) \quad (5)$$

Substituting (5), (4) in (3) and applying the method of factorization, define

$$(U+i\sqrt{5}y)=(1+i2\sqrt{5})(a+i\sqrt{5}b)^2$$

Equating real and imaginary parts in the above equation and using (2),we have

$$\left.\begin{aligned} x(a,b) &= -3a^2+15b^2-24ab \\ y(a,b) &= 2a^2-10b^2+2ab \end{aligned}\right\} \quad (6)$$

Note that (4) and (6) give the integer solutions to (1).

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A Classification of Rectangles in Connection with Fascinating Number Patterns

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An Official Publication of Human Journals

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Keywords: Rectangles, Woodall Numbers, Cullen Numbers, Motzkin Numbers, Primitive rectangles, Non-Primitive rectangles

ABSTRACT

There are two sections I and II. **Section I** exhibits rectangles, where, in each rectangle, the area added with its semi-perimeter is represented by a special number. **Section II** presents rectangles, where, in each rectangle, the area minus its semi-perimeter is represented by a special number.

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EQUALITY OF THREE SPECIAL M-GONAL NUMBERS

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Abstract:

Explicit formulas for the ranks of Triangular numbers, Pentagonal numbers, Hexagonal numbers, Heptagonal numbers and Octagonal numbers satisfying the relations $t_{3,N}=t_{5,p}=t_{6,h}$, $t_{3,N}=t_{6,h}=t_{7,H}$, $t_{3,N}=t_{6,h}=t_{8,M}$ *are obtained.*

Keywords: *Equality of polygonal numbers, Heptagonal numbers, Hexagonal numbers, Octagonal numbers, Pentagonal numbers, Triangular numbers*

1. Introduction:

The theory of numbers has occupied a remarkable position in the world of mathematics and it is unique among the mathematical sciences in its appeal to natural human curiosity. Nearly every century has witnessed new and fascinating discoveries about the properties of numbers. They form sequences, they form patterns and so on. An enjoyable topic in number theory with little need for prerequisite knowledge is polygonal numbers which is one of the very best and interesting subjects. A polygonal number is a number representing dots that are arranged into a geometric figure. As the size of the figure increases, the number of dots used to construct it grows in a common pattern. Polygonal numbers have been meticulously studied since their very beginnings in ancient Greece. Numerous discoveries arise from these peculiar polygonal numbers and have become a popular field of research for mathematicians. In [1-5], one polygonal number simultaneously equal to an another polygonal number has been studied.

This paper concerns with the study of a polygonal number equal to two other polygonal numbers. The main thrust of this paper is to obtain ranks of three special polygonal numbers with the same value.

2. Notations:

- Triangular Number $t_{3,N}=\dfrac{N(N+1)}{2}$
- Pentagonal Number $t_{5,p}=\dfrac{1}{2}(3p^2-p)$
- Hexagonal Number $t_{6,h}=2h^2-h$
- Heptagonal Number $t_{7,H}=\dfrac{1}{2}(5H^2-3H)$
- Octagonal $t_{8,M}=3M^2-2M$

3. Method of Analysis:

3.1 Equality of $t_{3,N}=t_{5,p}=t_{6,h}$

Let N, p, h be the ranks of Triangular, Pentagonal and Hexagonal numbers respectively. The relation

$$t_{3,N}=t_{6,h}$$

leads to

$$N=2h-1 \tag{1}$$

NATING DIOPHANTINE 3-TUPLES FROM THE PAIR OF INTEGERS $\{u,v\}$

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ABSTRACT

h the construction of sequences of diophantine 3-tuples (a,b,c) *from the pair of integers*
a the product of any two elements of the set added by
$w)+s^2-2sw-uv+w^2)$ *is a perfect square.*

phantine 3-tuples, sequences of triples

N

f constructing the sets with property that product of any two of its distinct elements is as a very long history and such sets have been studied by Diophantus. A set of m distinct $a_2, a_3, \ldots\ldots, a_m\}$ is said to have the property $D(n), n \in Z-\{0\}$ if $a_i a_j + n$ is a $1 \le i < j \le m$ or $1 \le j < i \le m$ and such a set is called a Diophantine m-tuple with

aticians considered the construction of different formulations of diophantine triples with any arbitrary integer n [1] and also, for any linear polynomials in n. In this context, one extensive review of various problems on diophantine triples.

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Research Article

On The Non-Homogeneous Quintic Equation with Five Unknowns $X^4 - Y^4 = 13p^3\left(Z^2 - W^2\right)$

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Abstract: The quintic non-homogeneous equation with five unknowns represented by the Diophantine equation is analyzed for its patterns of non-zero distinct integral solutions. Various interesting relations between the solutions and special numbers, namely polygonal numbers, pyramidal numbers are exhibited.

Keywords: Non-homogenous quintic equation, quintic with five unknowns, integral solutions, 2010 Mathematics Subject Classifications: 11D41.

INTRODUCTION

The theory of Diophantine equations offers a rich variety of fascinating problems (Dickson, L.E. 1952; Mordell, L.J. 1969; & Telang, S.G. 1996). Particularly, in (Carmichael, R.D. 1959; Gopalan, M.A., & Vijayasankar, A. (2010 a) and Gopalan, M.A & Sangeetha, G (2010); Gopalan, M. A. *et al.*, 2013a; & Gopalan, M.A. *et al.*, 2013b) quintic equations with three unknowns are studied for their integral solutions. In (Gopalan, M.A. *et al.*, 2013c) quintic equations with four unknowns for their non-zero integer solutions are analyzed (Gopalan, M.A. *et al.*, 2013d; Gopalan, M.A. *et al.*, 2016; Gopalan, M.A. *et al.*, 2013e; & Gopalan, M.A.et al., 2013f) analyze quintic equations with five unknowns for their non-zero integer solutions. This communication concerns with yet another interesting non-homogeneous quintic equation with five unknowns given by $\left(x^4 - y^4\right) = 13\left(z^2 - w^2\right)P^3$ for finding its infinitely many non-zero distinct integer solutions. Various interesting properties among the values of x, y, z, w, P are presented.

NOTATIONS:

$t_{m,n}$: polygonal number of rank n with size m.

P_m^n : Pyramidal number of rank n with size m.

METHOD OF ANALYSIS

The non-homogeneous quintic equation with five unknowns to be solved for its distinct non-zero integral solutions is

$$\left(x^4 - y^4\right) = 13\left(z^2 - w^2\right)P^3 \tag{1}$$

METHOD 1:

Introduction of the linear transformations

$$x = u + v, y = u - v, z = 2u + v, w = 2u - v \tag{2}$$

in (1) leads to

$$u^2 + v^2 = 13P^3 \tag{3}$$

Different methods of obtaining the patterns of integer solutions to (1) are illustrated below:

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A search on the integer solutions of pell-like equation $ax^2-(a-1)y^2=a, a>1$

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Abstract

This paper deals with the problem of obtaining non-zero distinct integer solutions to the non-homogeneous binary quadratic equation represented by the Pell-like equation $ax^2-(a-1)y^2=a, a>1$. Different sets of integer solutions are presented. For illustration, the integer solutions to the above equation when a=11 are presented. The construction of second order Ramanujan Numbers is illustrated. Employing the solutions, a few relations among special polygonal numbers are obtained.

Keywords: non homogeneous binary quadratic, pell-like equation, hyperbola, integral solutions, special numbers

Introduction

The binary quadratic Diophantine equations of the form $ax^2-by^2=N,(a,b,N\neq 0)$ are rich in variety and have been analyzed by many mathematicians for their respective integer solutions for particular values of a, b and N. In this context, one may refer [1, 17]. This paper deals with the problem of obtaining non-zero distinct integer solutions to the non-homogeneous binary quadratic equation represented by the Pell-like equation $ax^2-(a-1)y^2=a, a>1$. Different sets of integer solutions are presented. For illustration, the integer solutions to the above equation when a=11 are presented. In this example, the construction of second order Ramanujan Numbers with base numbers as real integers and Gaussian integers is illustrated and employing the solutions, a few relations among special polygonal numbers are obtained. A special Pythagorean triangle is also determined.

Method of Analysis

Let a (>1) be any positive integer. The Pell-like equation under consideration is

$$ax^2-(a-1)y^2=a, a>1 \tag{1}$$

The process of obtaining different choices of integer solutions to (1) is illustrated below:

Choice (1)

Taking

$$x=2k+1, y=2s \tag{2}$$

in (1), it is written as

$$a(k^2+k)=(a-1)s^2 \tag{3}$$

which is satisfied by

$$k=a-1, s=a \tag{4}$$

And

$$k=-a, s=a \tag{5}$$

In view of (2), the integer solutions to (1) are given by

A Study on The Hyperbola $y^2 = 11x^2 - 50$

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The binary quadratic equation represented by the negative Pellian $y^2 = 11x^2 - 50$ ... for its distinct integer solutions. A few interesting relations among the solutions are ... Further, employing the solutions of the above hyperbola, we have obtained solutions of ... choices of hyperbola, parabola.

...: Binary quadratic, hyperbola, parabola, Pell equation, integral solutions.

...uction:

A binary quadratic equation of the form $y^2 = Dx^2 + 1$, where D is non-square positive ... has been studied by various mathematicians for its non-trivial integral solutions when D ... different integral values [1-2]. For an extensive review of variousproblems, one may refer ... In this communication, yet another interesting hyperbola given by $y^2 = 11x^2 - 50$ ... and infinitely many integer solutions are obtained. A few interesting properties ... the solutions are obtained. Further, employing the solutions of the above hyperbola, we ... obtained solutions of other choices of hyperbola, parabola.

...HOD OF ANALYSIS:

...tive Pell equation representing hyperbola under consideration is

$$y^2 = 11x^2 - 50 \quad (1)$$

...allest positive integer solution is

A Peer Search on Integral Solutions to Non-Homogeneous Binary Quadratic Equation $15x^2 - 2y^2 = 78$

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...hyperbola represented by the binary quadratic equation $15x^2 - 2y^2 = 78$ is analyzed for finding its non-zero distinct ... A few interesting relations among its solutions are presented. Also, knowing an integral solution of the given ... solutions for other choices of hyperbolas and parabolas are presented. The formulation of second order ...numbers with base numbers as real integers and Gaussian integers is illustrated.

...binary quadratic, Hyperbola, Parabola, Integral solutions, Pell equation, Second order Ramanujan Numbers.

I. INTRODUCTION

...binary quadratic Diophantine equations of the form $ax^2 - by^2 = N, (a, b, N \neq 0)$ are rich in ... have been analyzed by many mathematicians for their respective integer solutions for ...values of a, b and N. In this context, one may refer [1-14].

...communication concerns with the problem of obtaining non-zero distinct integer solutions to ...quadratic equation given by $15x^2 - 2y^2 = 78$ representing hyperbola. A few interesting ...among its solutions are presented. Knowing an integral solution of the given hyperbola, integer ...for other choices of hyperbolas and parabolas are presented. The formulation of second order ...Numbers with base numbers as real integers and Gaussian integers is illustrated.

II. METHOD OF ANALYSIS

...Diophantine equation representing the binary quadratic to be solved for its non-zero distinct integer ...

$$15x^2 - 2y^2 = 78 \tag{1}$$

...the linear transformations

$$x = X + 2T, \; y = Y + 15T \tag{2}$$

...and (2), we have

$$X^2 = 30T^2 + 6 \tag{3}$$

...smallest positive integer solution is

$$X_0 = 6, \; T_0 = 1$$

...the other solutions of (3), consider the pell equation

$$X^2 = 30T^2 + 1 \tag{4}$$

...a Journal ISSN NO:2231-3990

...HOMOGENEOUSCUBIC DIOPHANTINE EQUATION WITH FOUR UNKNOWNS

$$3(x^3 + y^3) = 8zw^2$$

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...RACT

...ogeneous cubic Diophantine equation with four unknowns represented by $3(x^3 ... = 8zw^2$ is analyzed for its patterns of non – zero distinct integral solutions. A few ...ing relations between the solutions and special polygonal numbers are exhibited.

...WORDS

...Cubic equation, Integral solutions, Special polygonal numbers, Pyramidal numbers.

...RODUCTION

The theory of Diophantine equations offers a rich variety of fascinating problems. In ...ular, cubic equations, homogeneous and non-homogeneous have aroused the interest of ...ous mathematicians since antiquity [1-3]. For illustration, one may refer [4-12] for ...geneous and non-homogeneous cubic equations with three, four and five unknowns. ...paper concerns with the problem of determining non-trivial integral solution of the ...geneous cubic equation with four unknowns given by $3(x^3 + y^3) = 8zw^2$ .A few ...ons between the solutions and the special numbers are presented.

...ATIONS USED

Regular Polygonal Number of rank n with sides m : $t_{m,n} = n[1 + \frac{(n-1)(m-2)}{2}]$

Pyramidal Number of rank n with sides m : $p_n^m = \frac{1}{6}[n(n+1)][(m-2)n + (5-m)]$

Pronic Number of rank n : $pr_n = n(n+1)$

Gnomonic Number of rank n: $gn_n = 2n+1$

Stella Octangular Number of rank n: $SO_n = n(2n^2 - 1)$

Octahedral Number of rank n: $OH_n = \frac{1}{3}n(2n^2 + 1)$

Star Number of rank n : $S_n = 6n(n-1)+1$

...SERVATIONS ON THE QUADRATIC ...OPHANTINE EQUATION WITH THREE UNKNOWNS $3x^2+2y^2=21z$

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... quadratic diophantine equation given by $3x^2+2y^2=21z$ is considered and searched for its many different integer ... choices of integer solutions of the above equations are presented .A few interesting relations between the solutions ... numbers are presented.

... quadratic, integer solution

...ification: 11D09

... equations offer an unlimited field for research due to their variety [1-3]. In particular one many refer [4-15] for quadratic ... unknowns.

... concerns with yet another interesting equation $3x^2+2y^2=21z$ representing non-homogeneous quadratic equation ... for determining its infinitely many non-zero integral points. Also,few interesting, relations among the solutions are ...

... regular polygon with m sides

$$... n\left(1+\frac{(n-1)(m-2)}{2}\right)$$

... number of rank n,

$$\frac{n(n+1)}{2}$$

... of rank n.

$$... = 6n(n-1)+1$$

... number of rank n.

$$Pr_n = n(n+1)$$

... ANALYSIS

... quadratic Diophantine equation to be solved for its non-zero distinct integral solution is

$$...+2y^2=21z \quad (1)$$

...

$$... \quad (2)$$

...

$$...+6Y^2=7z \quad (3)$$

... different approaches and the different patterns of solutions of (1) obtained are presented below.

$$... z=(a^2+6b^2)^2 \quad (4)$$

... written as

$$...+6y^2=7z$$

$$...(1+i\sqrt{6})(1-i\sqrt{6})$$

$$(5)$$

$$(X+i\sqrt{6}Y)(X-i\sqrt{6}Y)=(a+i\sqrt{6}b)^2(a-i\sqrt{6}b)^2(1+i\sqrt{6})(1-i\sqrt{6})$$

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OBSERVATIONS ON THE TERNARY QUADRATIC DIOPHANTINE EQUATION $9x^2+2y^2=27z$

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…: The ternary quadratic equation given by $9x^2+2y^2=27z$ is considered and searched for its many different integer … Five different choices of integer solutions of the above equation are presented. A few interesting relations between the solutions … polygonal numbers are presented.
… ternary quadratic, integer solution
…ject classification: 11D09

…ODUCTION:

…Diophantine equation offer an unlimited field for research due to their variety [1-3] in particular one may refer[4-14] for … equations with three unknowns. This communication concerns with yet another interesting equations $9x^2+2y^2=27z$ for … many non-zero integral points. Also, a few interesting relations among the solutions are presented.

…TATIONS:

… = n^{th} term of a regular polygon with m sides

$$= n\left(1+\frac{(n-1)(m-2)}{2}\right)$$

… $= 6n(n-1)+1$ = Star number of rank n

… $= n(n+1)$ = Pronic number of rank n

…THOD OF ANALYSIS:

…ERNARY QUADRATIC DIOPHANTINE EQUATION TO BE SOLVED FOR ITS NON-ZERO DISTINCT INTEGRAL SOLUTION IS

$$9x^2+2y^2=27z \quad (1)$$

…ing

… $3Y$ (2)

… get

$$…+2Y^2=3z \quad (3)$$

…d through different approaches and the different patterns of solution (1) obtained are presented below

…N:1

$$…(a^2+2b^2)^2 \quad (4)$$

…

$$…(1+i\sqrt{2})(1-i\sqrt{2}) \quad (5)$$

… and (5) in (3) we get

$$…(x+i\sqrt{2}Y)(x-i\sqrt{2Y})=(1+i\sqrt{2})(1-i\sqrt{2})(a+i\sqrt{2}b)^2(a-i\sqrt{2}b)^2$$

…the positive factor,

$$…(x+i\sqrt{2}Y)=(1+i\sqrt{2})(a+i\sqrt{2}b)^2$$

$$…(x+i\sqrt{2}Y)=a^2-2b^2+i2\sqrt{2}ab+i\sqrt{2}a^2-i2\sqrt{2}b^2-4ab$$

$$(x+i\sqrt{2}Y)=(a^2-2b^2-4ab)+i\sqrt{2}(2ab+a^2-2b^2)$$

…real and imaginary parts,

$$…a^2-2b^2-4ab$$

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...SERVATIONS ON THE TERNARY QUADRATIC DIOPHANTINE EQUATION $5x^2+2y^2=5z$

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[3]PG Scholar, Department of Mathematics

...e ternary quadratic equation given by $5x^2+2y^2=5z$ is considered and searched for its many different integer solution. Five ...ces of integer solution of the above equations are presented. A few interesting relations between the solutions and special ...mbers are presented.

...ternary quadratic, integer solutions

...ct classification: 11D09

INTRODUCTION

...ntine equation offer an unlimited field for research due to their variety [1-3]. In particular, one may refer [4-14] for ...equations with three unknowns. This communication concerns with yet another interesting equation ...$6y^2=14z^2$ representing homogeneous equation with three for determining its infinitely many non-zero integral ...s, few interesting relations among the solutions are presented.

NOTATIONS

$t_{m,n}$ = n^{th} term of regular polygon with m sides

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

Pr_n = Pronic number of rank n

$=n(n+1)$

S_n = Star number of rank n

$=6n(n-1)+1$ (OR) $=6n^2-6n+1$

G_n = Gnomonic number of rank n

$=2n-1$

ISSN NO: 1021-9056

OBSERVATION ON THE HOMOGENEOUS TERNARY QUADRATIC DIOPHANTINE EQUATION $16x^2+8xy+3y^2=11z^2$

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...The ternary quadratic diophantine equation given by $16x^2+8xy+3y^2=11z^2$ is considered and searched for its many ... integer solutions. six different choices of integer solutions of the above equations are presented .A few interesting ... between the solutions and special polygonal numbers are presented.

...Ternary quadratic, integer solution

...classification: 11D09

1. INTRODUCTION:

...phantine equations offer an unlimited field for research due to their variety [1-3]. In particular one many refer [4-15] for ... equations with three unknowns. This communication concerns with yet another interesting equation ... $+3y^2=11z^2$ representing homogeneous quadratic equation with three unknowns for determining its infinitely many ... integral points. Also, few interesting, relations among the solutions are presented.

2. NOTATIONS

...term of a regular polygon with m sides

$$t_{m,n}=n\left(1+\frac{(n-1)(m-2)}{2}\right)$$

...angular number of rank n.

$$t_{3,n}=\frac{n(n+1)}{2}$$

...nic number of rank n.

$$PR_n=n(n+1)$$

3. Method of analysis:

...ratic Diophantine equation with three unknowns to be solved is given by

$$16x^2+8xy+3y^2=11z^2 \qquad (1)$$

...ing

$$4x+y=U \qquad (2)$$

...get

$$U^2+2y^2=11z^2 \qquad (3)$$

...through different approaches and the different patterns of solution of (1) obtained are presented below

...he homogeneous Ternary Quadratic Diophantine Equation $9x^2-6xy+6y^2=14z^2$

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...The ternary quadratic equation given by $9x^2-6xy+6y^2=14z^2$ is considered and searched for its many different integer ...different choices of integer solution of the above equations are presented. A few interesting relations between the solutions ...polygonal numbers are presented.

...ternary quadratic, integer solutions
...classification: 11D09

...CTION:

...antine equation offer an unlimited field for research due to their variety [1-3]. In particular, one may refer [4-15] for quadratic ...with three unknowns. This communication concerns with yet another interesting equation $9x^2-6xy+6y^2=14z^2$ representing ...equation with three for determining its infinitely many non-zero integral points. Also, few interesting relations among the ...presented.

...TIONS:

$t_{m,n}=n^{th}$ term of a regular polygon with m sides.

$=n\left(1+\frac{(n-1)(m-2)}{2}\right)$

PR_n = Pronic number of rank n

$=n(n+1)$

...HOD OF ANALYSIS:

...Diophantine equation with three unknowns to be solved is given by

$$...-6xy+6y^2=14z^2 \quad (1)$$

$$...-6xy+y^2)+5y^2=14z^2$$

$$...-y)^2+5y^2=14z^2 \quad (2)$$

...

$$...)=U$$

$$(3)$$

$$...+5y^2=14z^2 \quad (4)$$

...ough different approaches and the different patterns of ...obtained are presented below.

$$...+5y...$$

$$(5)$$

$$...+i\sqrt{5})(3-i\sqrt{5}) \quad (6)$$

...and (6) in (4), we get

On Finding Integer Solutions To The Homogeneous Cone $7x^2 + 5y^2 = 432z^2$

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Abstract: The homogeneous cone represented by the ternary quadratic Diophantine equation $7x^2 + 5y^2 = 432z^2$ is studied for finding its non – zero distinct integer solutions.

Keywords: Homogeneous Quadratic, Ternary quadratic equation, Integral solutions.

1. INTRODUCTION

Ternary quadratic equations are rich in variety [1- 4, 17-20].For an extensive review of sizable literature and various problems, one may refer [5-16]. In this communication, we consider yet another interesting homogeneous ternary quadratic equation $7x^2 + 5y^2 = 432z^2$ and obtain infinitely many non-trivial integral solutions.

NOTATIONS USED

- $t_{m,n} = n\left[1 + \frac{(n-1)(m-2)}{2}\right]$ - Polygonal number of rank n with size m.
- $PT_{k-1} = \frac{(k-1)k(k+1)(k+2)}{24}$ – Pentatope number of rank $k-1$

2. Method of Analysis

The ternary quadratic Diophantine equation to be solved is

$$7x^2 + 5y^2 = 432z^2 \tag{1}$$

Different sets of solutions in integers to (1) are illustrated below:

Set 1: Introduction of the linear transformations

$$x = X - 5T, \; y = X + 7T \tag{2}$$

in (1) leads to

$$X^2 + 35T^2 = 36z^2 \tag{3}$$

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A Classification of Rectangles in Connection with Two Fascinating Number Patterns

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Abstract:

*This paper has two sections I and II. **Section I** exhibits rectangles, where, in each rectangle, the area added with its semi-perimeter is represented either by a Gopa-Vidh number or by a Gopa-Shan number. **Section II** exhibits rectangles, where, in each rectangle, the area minus its semi-perimeter is represented either by a Gopa-Vidh number or by a Gopa- Shan number. The total number of primitive and non-primitive rectangles is also given.*

Keywords: *Rectangles, Gopa-Vidh number, Gopa- Shan number, Primitive rectangles, Non-Primitive rectangles.*

2010 Mathematics Subject Classification: 11D99

Introduction:

The diophantine problems connecting geometrical representations with special patterns of numbers are presented in [1-19]. In [20], Pythagorean triangles with $\frac{2*Area}{Perimeter}$ is represented by another number, namely Gopa – Vidh number. This paper concerns with the problem of finding rectangles such that, in each rectangle, the area added with its semi-perimeter as well as the area minus its semi-perimeter is represented either by a Gopa-Vidh number or by a Gopa- Shan number. The total number of primitive and non- primitive is also given.

It seems that the above problems have not been considered earlier.

Definitions:

Gopa-Vidh number:

Let N be a non-zero positive integer. Let 'a' represent the sum of the digits in N^2. If N^2 is a square multiple of a, then the integer N is referred as Gopa- Vidh number.

Gopa-Shan number:

Let N be a non-zero positive integer. Let 'a' represent the sum of the digits in N^3. If N^3 is a square multiple of a, then the integer N is referred as Gopa- Shan number.

Method of Analysis:

Let R be a rectangle with dimensions x and y. Let A and S represent the Area and Semi-perimeter of R.

Section-I : $A+S=$ Gopa - Vidh number

The problem under consideration is mathematically equivalent to solving the binary quadratic diophantine equation represented by

$$xy+(x+y)=\alpha \quad (I.1)$$

where α is a Gopa-Vidh number.

Rewrite (I. 1) as

$$x=\frac{\alpha-y}{y+1} \quad (I.2)$$

Given α, it is possible to find x in integers for suitable y in integers. The following Table I.1 exhibits the Gopa-Vidh number with their corresponding rectangles satisfying (I.1):

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சங்க இலக்கியங்களில் வீரச்சிறப்பு

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துறைத்தலைவர்
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சங்கச் சமூக மக்கள் மறப்பண்பையும் மானத்தையும் தம் உயிரெனக் கருதியவர்கள். ...ும் வேந்தன்முதல் வீடாளும் பெண் வரை வீர உணர்வுடன் மேம்பட்டுத் திகழ்ந்தனர். ...ல மக்கள் போர் நிறைந்த சமூகத்தை விரும்பிய போழ்திலும் போரிலும் சில ...மைகளைப் பின்பற்றி அறநெறிகளைக் காத்தனர். இதற்கு இலக்கியங்கள் நிறையச் ...றுகள் பகர்கின்றன்.

சங்கத் தமிழரின் வீர வாழ்வு ஒரு சமூகத்தின் வீரத்தை வெளிப்படுத்துகிறது. வாழ்வின் ...ந்தம் என்பது நான்கு வகைகளாகச் சுட்டப்படுகின்றன.அவையாவன கல்வி, வீரம், புகழ், ...ட என்பன. கல்வியை அடிப்படையாகக் கொண்ட வீரம், வீரத்தினால் விளைந்த புகழ், ...ட என்ற நான்கும் வாழ்க்கையைப் பெருமிதத்தோடு சிறப்படையச் செய்கிறது.

பகையை உணரும் ஒவ்வோர் உயிரினத்திற்கும் வீரம் என்பது மிகவும் அவசியமான ... வீரம் இருந்தால் மட்டுமே தன் சுற்றத்தையும் நாட்டையும் பாதுகாக்க முடியும் என்பதை இலக்கியங்களில் காணமுடிகிறது.

...களின் வீரத்திறம்

சங்கக்காலத்தில் வாழ்ந்த மன்னர்கள் போர் விருப்பம் உடையவராகவே விளங்கினர். ...ளில் ஏற்படும் ஒலியை போர்ப்பறையின் ஒலியென எண்ணி மகிழும் திறமுடையவர்களாகத் ...னர். வீரம் என்றால் தன்னைவிட இளைத்தவர்களை வீணாக இன்னலுக்கு ஆளாக்கி, தான் இன்புறுவதன்று: தன் மானத்திற்கு இழுக்கு வராமலும் அறத்திற்கு இடையூறு ஏற்படாமலும் ...து வெற்றியடைதலே சிறப்பானதாகும்.

பிள்ளைக் கண்ணனும் பிள்ளைத் தமிழும்

முனைவர் மு.திரிபுரசுந்தரி
உதவிப்பேராசிரியர்
தமிழாய்வுத்துறை
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி
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...ள கண்ணனும் திருவெள்ளறையும்:

திருவெள்ளறைப் பதிகம் கண்ணனை பிள்ளைக் கண்ணனை பற்றியதே இதைத் ...வெள்ளறைப் பாசுரத் திருமொழி வைணவர்கள் அன்றாடம் பாடிப்பரவும் " நித்தியானு ...ஸந்தில்" தொகுக்கப்பட்ட பெருமை உடையது, இதிலிருந்தே இதன் சிறப்பு நன்கு விளங்கும்.

...யிர திவ்விய பிரபந்தத்தில் திருவெள்ளறையின் சிறப்பு:

"திருவெள்ளறை" திருத்தலம் நாலாயிர திவ்விய பிரபந்தத்திலேயே முதலில் அமைந்த ...த்தலமாகும். பத்துப் பாடல்களிலும் ஒரே திருத்தலம் அமையுமாறு பாடிய முதற் பெருமை. ...ருவெள்ளறை" திருத்தலத்திற்கே உண்டு. அதாவது முதலில் அமையும் சிறப்புடைய ...ங்களைப் பாடிய முதல்வராகிய பெரியாழ்வார் திருமொழியிலேயே முதலில் பாடும் பெருமை ...ற திருத்தலம் " திருவெள்ளறை" யாகும். இதிலிருந்தே இந்தத் திருத்தலத்தின் ஏற்றம் ...ளங்கும்.

...சோதை நிலை:

பெரியாழ்வார் தன்னை யசோதையாக பாவித்துக் கொண்டு திருவெள்ளறை எம்பிரானை ...ந்தாமரைக் கண்ணனை – குழந்தை கண்ணனாக எண்ணிப் பாடுகின்றார். அவன் அழகிலும் ...யல்களிலும் மயங்கி " ஐயோ" பிறர் கண்ணேறு இப்பிள்ளைமேல் பட்டுவிடுமோ என்று மனம் ...தவித்துக் கண்ணனைக் " காப்பிடவாராய் என அழைக்கின்றார். இங்கு அவன் மேல் கொண்ட ...ரணையும், தாயுள்ளமும் புலனாகின்றன.

இந்திரன் முதலானோர்

தொகையும் வகையும்

முனைவர் சு.நாகரெத்தினம்
உதவிப்பேராசிரியர்
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தொகை என்றால் தொகுக்கப்படுதல்,தொக்கி விடுதல் அதாவது மறைந்து விடுதல் என்று இருபொருள் உண்டு. எட்டுத்தொகை என்பதற்குத் தொகுக்கப்பட்ட எட்டு நூல்கள் என்று பொருள்; உவமைத் தொகை என்று சொல்லும் போது உவம உருபு மறைந்து வருவது என்று பொருள். இங்ஙனம் தொகை என்ற சொல் இருபொருள் குறிக்கும் ஒரு சொல்லாகும். இதில் இலக்கணங்கள் கூறும் மறைந்து வரும் தொகையையும் அதன் வகையையும் இக்கட்டுரை விளக்க முயலுகின்றது.

தொகை விளக்கம்

தொடர் மொழிகளை நன்னூல் தொகைநிலைத் தொடர்மொழி, தொகாநிலைத் தொடர்மொழி என இருவகை படுத்திக் காட்டுகின்றது.

பெயரொடு பெயரும் வினையும் வேற்றுமை
முதலிய பொருளி னவற்றி னுருபிடை
ஓழிய விரண்டு முதலாத் தொடர்ந்தொடு
மொழிபோ னடப்பன தொகைநிலைத் தொடர்ச்சொல்
(நன்.சொல்-361)

பெயர்ச்சொல்லோடு பெயர்ச்சொல்லும் பெயர்ச்சொல்லோடு வினைச்சொல்லும் பின் சொல்லப்படும் வேற்றுமை முதலாகிய அறுவகைப் பொருட்புணர்ச்சிக்கண், அவற்றின் உருபுகள் நடுவிலே தொக்கு நிற்ப,இரண்டு சொற்கள் முதலாகப் பல சொற்கள் தொடர்ந்து ஒரு சொற் போல நடப்பவை தொகைநிலைத் தொடர்ச் சொற்களாம் என்று மேற்கூறிய நூற்பாவிற்குப்

தண்டலையார் சதகம் சுட்டும் பழமொழிகள்

கு. கவிதவள்ளி
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அறிவாலும், அனுபவத்தாலும் பழுத்துப்போன மொழிகளே பழமொழிகள் ஆகும். கிராமப்புற ...ள் தங்கள் அனுபவங்களை, பழமொழிகளாக உருவாக்கின்றனர். கிராமப் புற மக்கள் ...ள் பேச்சு வழக்கில் பழமொழிகளை சர்வ சாதரணமாக பயன் படுத்துகின்றனர். சொல்வடை, ...மொழி, பழஞ்சொல் என்பன பழமொழிகளின் வேறு பெயர்களாக வழங்கப்படுகின்றன.

பழமொழியானது பழங்காலந் தொட்டே வழக்கத்தில் இருந்து வந்ததற்கான சான்றுகள் ...க்கியங்களில் பல இடங்களில் காணப்படுகின்றன. பழமொழியை தொல்காப்பியர் முதுமொழி ... குறிப்பிடுகின்றார். பழமொழி என்பது நுட்பம், சுருக்கம், ஆழம், மென்மை முதலான ...க்கே உரித்தான பல சிறப்பு இயல்புகளைக் கொண்டிருக்கும். இதனை தொல்காப்பியர், ...மையும் சுருக்கமும் ஒளியுடைமையும், மென்மையும் என்று இவை விளங்கத்தோன்றி குறித்த ...ளை முடித்தற்கு வருடம் ஏது முதுமொழி என்ப (நூ : 1433) என்று குறித்துள்ளார்.

பழமொழி தொன்மையானது என்பதற்கும், சங்க காலத்திலேயே மக்கள் வழக்கில் அது ...து வந்ததற்கும் அகநானூற்றுப் பாடலில் சான்றுகள் உள்ளன.

அம்ம வாழி தோழி இம்மை என்னும்

நன்று சேய் மருங்கில் தீது இது என்னும்

தொன்றுபடு பழமொழி இன்று பொய்த்தன்று கொல்

என்ற அகநானூறு பாடல் வழி அறியலாம்.

சதகம் :-

நூறு பாடல்களைக் கொண்ட இலக்கிய வகை சதகம் ஆகும். உண்மைப் ...ருளாகிய இறைவனைப் பற்றிப் பாடப் பெறுவது சதகம். மாணிக்க வாசகரின் சதக நூலே ...தல் சதகம் நூல் ஆகும். சதக நூல்களில் ஒன்றான தண்டலையார் சதகத்தில் பயின்று வரும் ...மொழிகளைப் பற்றி காண்போம்

...லையார் சதகத்தில் பழமொழிகள் :-

தண்டலை எனும் சிவத்தலத்தில் உறைந்திருக்கும் பெருமானை, படிக்காசுப் புலவர் பாடிய ...கமே தண்டலையார் சதகம் ஆகும்.

பரிபாடலில் பண்பாட்டுக் கூறுகள்

கு.அன்னபூரணி,
உதவிப் பேராசிரியர்,
தமிழாய்வுத்துறை,
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி,
திருச்சிராப்பள்ளி-620002
தமிழ்நாடு,

சங்கத் தமிழர்கள் பண்பாட்டிலும் நாகரிகத்திலும் சிறந்து விளங்கினர் என்பதனை சங்க லக்கியங்கள் எடுத்துரைக்கின்றன. திணைநிலை வாழ்க்கை மேற்கொண்டிருந்த சங்கத்தமிழர்கள் த்தம் திணையின் சூழலியல் மரபுகளுக்கு ஏற்றவாறு பல்வேறு வாழ்வியல் நிலைகளில் ண்பாட்டு ஒற்றுமை நிலவியதைக் காணமுடிகின்றது. சங்க இலக்கியத்தில் பரிபாடலில் மைந்துள்ள பண்பாட்டுக் கூறுகள் குறித்து இக்கட்டுரையில் ஆராயப் பெறுகின்றது.

கமும் பண்பாடும்:

சமூகமும் பண்பாடும் ஒன்றிப்பிணைந்தது. சமுதாயக்கூறுகளில் ஒன்றான பண்பாடு மக்களின் வாழ்க்கை முறையினை உலகுக்கு எடுத்துக்காட்ட வல்லதாகும். மக்களின் நாகரீக, வு வளர்ச்சியை அவர்தம் பண்பாட்டுக் கூறுகளால் அறியலாம். பண்பாடு மானுட ர்ச்சிக்குத் துணை புரிகின்றது. மனிதனை விலங்கிலிருந்து வேறுபடுத்துவது பண்பாடாகும். பண்பாடு காலத்திற்கு காலம், நாட்டிற்கு நாடு, இனத்திற்கு இனம் வேறுபடும். ஒரு நாட்டின் ருமைக்கும் சிறப்புக்கும் காரணம் அங்கு வாழும் மக்களின் பண்பாடுதான் என்பதனை,

> "நாடா கொன்றோ காடா கொன்றோ
> அவலா கொன்றோ மிசையா கொன்றோ
> எவ்வழி நல்லவர் ராடவர்
> அவ்வழி நல்லை வாழிய நிலனோ" (புறம் : 187)

ஒவ்வையாரின் பாடல் எடுத்துரைக்கின்றது. சங்ககாலம் பண்பாட்டில் வளர்ச்சி பெற்றுச் ந்து விளங்கிய காலம். சங்ககால மக்களின் வாழ்வியல் முறைகளையும், வரலாற்றையும் சங்க க்கியங்களைக் கொண்டே நாம் அறிய முடிகின்றது. நம்பிக்கைகள், பழக்கவழக்கங்கள், வியல் விழுமியங்கள், சடங்குகள், தொழில்கள், மக்கள் குழுக்கள், உணவு, ஆடை, கலன்கள், வழிபாட்டுமுறைகள், தெய்வங்கள், விலங்குகள், பறவைகள், ஐம்பூதங்கள், த்தலைவர்கள், போர்முறை, புழங்கு பொருட்கள் போன்றவை குறித்த செய்திகளை சங்க

சீவக சிந்தாமணியில் உருவகங்கள்

மு. தேவகி,
உதவிப் பேராசிரியர்,
தமிழாய்வுத்துறை
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி,
திருச்சிராப்பள்ளி – 620002,
தமிழ்நாடு.

புலவர் தம் புலமைத்திறனை வெளிப்படுத்தும் பலவகை வாயில்களுள் உருவகமும் ஒன்று. சீவக சிந்தாமணியில் கற்போர் நினைவைவிட்டு அகலாத உருவகம் பல உண்டு. திருத்தக்கதேவரின் புலமைத் திறனை வெளிப்படுத்தும் அரிய உருவகம் பல பேசும் மாந்தரின் உள்ள பாங்கினை அறிந்து திருத்தக்கதேவர் அமைத்த உருவகம் தேடிப் புகுவார்க்குச் சீவகசிந்தாமணி சுடர் மணியாக காட்சி தரும்.

உவமையாக விரிந்து நிற்காது உருவகமாகச் செறியும் போது நயம் சிறக்கின்றது. ஒன்றனை இன்னொன்று ஒக்கின்றது என்ற இருநிலை இன்றி இரண்டும் ஒன்றாகவே இருக்கின்ற ஒருமை உருவகத்தில் அமைகின்றமையால் உறவும் நெருக்கமும் மிகுந்து மிளிர்கின்றது.

ஒன்று போல ஒன்று இருக்கிறது என்று கூறுவது உவமை. அது போல ஒன்று இருக்கிறது என்று கூறுவது உவமை. அது போல கூறாமல் அதுவே என்று கூறுவது உருவகம். முகமாகிய மதி என்று கூறுவது உருவகம் உருவகமாகக் கூறப்படும் பொருள் உவமிக்கப்படும் பொருளைவிட உயர்ந்ததாக இருக்க வேண்டும். இதனை

"உயர்ந்ததன் மேற்றே உள்ளுங் காலை"

என்று தொல்காப்பியர் கூறுகிறார்.

தேன் போலும் வாசகம் என்று உவமையில் தேனுக்கும் வாசகத்துக்கும் இடையே இனிமையாகிய ஒற்றுமையைக் காட்டும் 'போலும்' என்னும் உவம உருபு நிற்பதால் தேன் வாசகம் என்ற இரண்டைத் தனித்தனியே காணுகின்றோம். அந்த அளவிற்கு உபமானமும், உபமேயமும் வேறு வேறாக நிற்கின்றன. இவ்வேற்றுமையையும் ஒழித்து உபமாகும்" உபமேயமும் ஒன்றாகவே நாம் காணும்படியாக ஓர் ஒற்றுமைக்

இப்போது வாசகத்தேன் என உருவக நிலைக்கு வந்து வாசகமும் தேனும் ஒன்றென்றே உணரப்படுகின்றன இதனை தண்டியலங்காரம்,

வைரமுத்து கவிதைகளில்

தேசத் தலைவர்களும் கவிஞர்களும்

முனைவர்: மு.கவிதா,
உதவிப்பேராசிரியர்,
தமிழாய்வுத்துறை,
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி,
திருச்சி - 620002,
தமிழ்நாடு.

னுரை:

உள்ளத்தில் உள்ளதனை, இன்ப ஊற்றெடுப்பதனை, தெள்ளத் தெளிந்த தமிழால் ந்துரைப்பதற்குரிய ஆற்றல் கைவரப்பெற்றவர்களில் தனிச்சிறப்பு பெற்றவர் வைரமுத்து ஆவார். திய நாட்டின் மீதும் தேசத் தலைவர்கள் மீதும் கவிஞர்கள் மீதும் தீராத பற்றுக்கொண்டவர். திய நாட்டிற்குச் சுதந்திரம் வாங்கித் தந்த தலைவர்களைப் பற்றியும் தமிழகத்தை முன்னேற்றிய லைவர்களைப் பற்றியும் வைரமுத்து தமது கவிதைகளில் புனைந்துள்ளார். அவ்வகையில் ாத்மா காந்தி, ஜவஹர்லால் நேரு, தந்தை பெரியார், அறிஞர் அண்ணா போன்றவர்கள் ஆற்றிய களைக் குறித்தும் தமது கவிதைகளில் எடுத்துரைப்பதைக் காணலாம். இலக்கியத்தையும் திய தேசத்தையும் வாழ்வித்த கவிஞர்களான கம்பர், பாரதி, பாரதிதாசன் போன்றோர்களை முத்து சிறப்பித்துள்ளார். கவிஞர்களின் தமிழ்ப் பற்றும் இலக்கியப் பற்றும் வைரமுத்துவின் தில் வேரூன்றி விருட்சமாக வளர்ந்து கவிஞர்களைப் பெருமைபடுத்தும் விதமாக கவிதை றியுள்ளதைக் காணலாம்.

தியடிகள்

மக்கள் சேவையை மகேசன் சேவையாக கொண்டு வாழ்ந்தவர் காந்தியடிகள் **'மகாத்மா'** பெயரை மக்களிடம் பெற்றவர் இந்திய விடுதலைக்கு விடிவெள்ளியாக விளங்கியது தியம். அந்த காந்தியமே தேசியமாகவும் சமுதாயமாகவும் விளங்குகின்றது. அதுதான் நாட்டின் னேற்றத்துக்கு வழிவகுக்கும் என்று வைரமுத்து கருதுகின்றார்

சுதந்திரத்திற்காகப் பாடுபட்ட தியாகிகள் இல்லையெனில் இன்று நாம் நாட்டில் திரமாக உலாவர முடியாது என்பதை வைரமுத்து

ன்னையே

ங்கி

திர மோதிரம்

து கொடுத்தாம்

னலே"(கொடிமரத்தின் வேர்கள் ப:74)

ம் கவிதை வரிகளில் குறிப்பிட்டுள்ளதைக் காணமுடிகிறது.

தொல்காப்பிய உரையாசிரியர்கள்

முனைவர் அ.தெய்வவள்ளி
உதவிப் பேராசிரியர்,
தமிழாய்வுத்துறை,
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி,
திருச்சி-02.
தமிழ்நாடு.

ழுக்குக் கிடைத்துள்ள இலக்கண நூல்களுள் மிகவும் தொன்மையானது ால்காப்பியர் இயற்றிய தொல்காப்பியம் ஆகும். தமிழ் மொழியின் ான்மையையும், தமிழ் இலக்கியத்தின் பழமையையும் கூறுகின்றன.

தொல்காப்பியம் எழுத்ததிகாரம், சொல்லதிகாரம், பொருளதிகாரம் என்னும் ன்று அதிகாரங்களை உடையது. ஒவ்வொரு அதிகாரமும் ஒன்பது இயல்களைக் ாண்டது. 1610 நூற்பாக்களையும் உடையது.

உரையாசிரியர் தங்கள் காலங்களில் தோன்றிய பழைய நூல்களுக்கு உரை ுதாமல் இருந்திருப்பின் பல நூல்கள் விளக்கம் பெறாமலும், மக்களிடையே வாமலும் காலப்போக்கில் மறைந்திக்கும். நூல்கள் பல நுட்பமான ்த்துக்களையும், புதுமையான விளக்கங்களையும் காலந்தோறும் பெற்று நாடெங்கும் விப் புகழ் பெறாமல் போயிருக்கும். எனவேதான் உரையாசிரியர்களின் உரைகள். ை தோன்றிய நிலையையும் விளக்குகின்றன.

ால்காப்பியர்

தொல்காப்பியர் காப்பியக் குடியில் பிறந்தவர் ஆதனால் அடைமொழியுடன் ால்காப்பியர் எனப் பெயர் பெற்றார். தொல்காப்பியன் எனத் தன் பெயர் குலப்பெயரே பெராயகப் பெற்றார் தொன்மையானவற்றைக் காப்பதற்காகத் தொல் - காப்பு - இயம் ப் பொருள்படும் தொல்காப்பியத்தை இயற்றினார் என்றும், அதனால் தொல்காப்பியர்

புறநானூற்றில் செங்கோன்மை

ப.லெட்சுமி

உதவிப் பேராசிரியர்

தமிழாய்வுத்துறை

ஸ்ரீமதி இந்திராகாந்தி கல்லூரி

திருச்சிராப்பள்ளி - 620 002

தமிழ் நாடு.

முன்னுரை:

சங்க இலக்கியங்களில் புறநானூறு என்னும் நூல் சங்க கால மன்னர்களின் செங்கோல் ஆட்சி திறத்தினை மெய்ப்பிக்கும் காலக்கண்ணாடி எனலாம். இந்நூலில் பாடாண்திணை, இயன்மொழிவாழ்த்து, செவிஅறிவுறுத்தல் போன்ற துறைகளின் வாயிலாக மன்னர்களின் சிறந்த ஆட்சி முறையையும் ஈகை, வீரம், வெற்றி, நீதி வழங்குதல், புலவர்களை போற்றுதல் அறநெறியின் வாயிலாக செம்மையான முறையில் செங்கோல் ஆட்சி புரிந்திருக்கின்றனர். என்பதனை இக்கட்டுரையில் காண்போம்.

1) செங்கோல்

அரசர்களுக்கு உரிய அடையாளங்களாக கூறப்படுபவை முடி ,செங்கோல், முரசு, குடை, கொடி, படை போன்றவைகள் ஆகும். இதில் செங்கோல் என்பது ஒருபாற் கோடாது செவ்விய கோல் போலிருத்தல் செங்கோல் எனப்பட்டது. பண்டைக் காலத்தில் அரசர்கள் செல்லும்போது அவர்கள் முன்பாக ஒரு கோல் தாங்கிச் செல்லும் வழக்கம் இருந்தது. இதேபோல் இக்காலத்திலும் உயர் நீதிமன்றங்களில் நீதிபதிகள் தன் அறையிலிருந்து நீதி வழங்கும் இடத்திற்கு செல்லும்போது வெள்ளியால் ஆன தடித்த கோல் ஒன்றை தாங்கிய வண்ணம் ஓர் ஆள் அவர் முன்னே செல்வதை காணலாம். இது நீதி வழங்குவதற்கு உரிய அடையாளம். என்று கருதப்படுகிறது.

ஆலமர் நாயகனின் அருள்மொழிகள்

திருமதி **ச.கண்ணம்மாள்**

உதவிப் பேராசிரியர்

தமிழாய்வுத்துறை

ஸ்ரீமதி இந்திராகாந்தி கல்லூரி

திருச்சிராப்பள்ளி-620 002.

தமிழ்நாடு

உலகனைத்தும் படைத்து காக்கின்ற உலகத்து உயிர்களை உய்விக்கச் செய்பவன், …யன் மாலால் அறிய முடியா பேருருவானவன். அடியார்களுக்கு எளியனாய் அருள் வழங்குபவன் …ங்ஙனமாக ஒப்பற்ற பெருமைகளை உடைய சிவபெருமான் ஆலமர் நாயகனாகி இருந்து …காதி முனிவர்களுக்கு உபதேசம் செய்கிறார். இக்கட்டுரை அவ்வுபதேசத்தின் …ருண்மையைத் திருச்சாழல் வழி விளக்குவதாகி அமைகிறது.

…ழல் என்றொரு விளையாட்டு:

சாழல் என்பது பெண்கள் விளையாடும் ஒரு வகை விளையாட்டாகும். வினா விடை …மைப்பில், ஒரு பெண் வினாத்தொடுக்க, மற்றொரு பெண் அதற்கு விடை பகர்வாள். இந்த …னா விடை பெரும்பான்மையும் சமயம் சார்ந்ததாகி அமைகின்றது.

மகடூஉ முன்னிலைப்படுத்திக் கூறல் என்பது இலக்கிய பெருவழக்காகும். அவ்வழியே …ணிக்கவாசகர் தம்முடைய திருவாசகத்தில் சிவனின் தோற்றத்தை விவாதிப்பது போல வினா …ழுப்பு அதற்கு விடையும் தருகின்றார். சாழல் விளையாட்டில் பங்கேற்கும் இரு பெண்களில், …மையாயிருந்த ஒரு பௌத்த அரசகுமாரி விடை கூறுகிறாள் என்ற செவிவழிச் செய்தியும் …ல்லப்பட்டு வருகின்றது.

…றைவனின் குணங்கள்:

'நகரேஷு காஞ்சி, பூவேஷு ஜாதி, புருசேஷு மகாவிஷ்ணு' என்று வைணவ வாதிகள் …மாலைத் தலைவனாக்கி தம்மை மற்றும் தம் போன்ற மக்களை தலைவியாகி பாவனை …ய்து பக்தி செலுத்தினர்; பரம புருஷனை அடைய எண்ணினார்.

திருவள்ளுவர் காட்டும் வாழ்வியல் கூறுகள்

திருமதி.அ சங்கீதா
உதவிப்பேராசிரியர்
தமிழாய்த்துறை
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி
திருச்சிராப்பள்ளி-620002
தமிழ்நாடு

திருவள்ளுவர் மனித சமூகத்திற்குத் தந்த பண்பாட்டுக் கூறாக விளங்குவது திருக்குறள்.இதில் மனித வாழ்க்கை நெறிகள் பல சுட்டப்படுகிறது. பண்பாட்டு நெறிகள்,ஐம்புலன் காத்தல், இல்வாழ்க்கை, விருந்தோம்பல், கற்பு, இனிய சொற்கள், காதல், கல்வி,மக்கட்பேறு, சமுக பழக்க வழக்கம் என்று திருவள்ளுவர் ஒழுக்க நெறிகளை எடுத்துக்

கூறியுள்ளார். அனைவருக்கும் சமமானது ஒழுக்கம் இதனை வள்ளுவர் இல்லறம்,துறவறம் எனப் பிரித்து கூறுகிறார்.

பண்பாட்டு நெறிகள்

திருக்குறளின் மனித பண்பாட்டு நெறிகள் சமுக பண்பாட்டை அறம் வலியுறுத்தி மன்னிக்கும் பண்பை உண்டாக்குகிறது. செய்ந்நன்றி அறிதல் கள் உண்ணாமை, ஈகை, இரக்கம், தவம், புகழ், மானம், முயற்சி, பழிக்கு அஞ்சும் பண்பு,வீரம், அரசியல், நடு நிலைமை, அவா அறுத்தல் என ஆராய்ந்து மனிதன் வாழ்விற்கு நல்ல அறங்களை காட்டுகிறார்.

ஐம்புலன் காத்தல்;

வள்ளுவரின் வாழ்க்கை நெறிகளில் ஐம்புலன் காத்தலையே பண்பாடு சிதைவின்றி வாழ வழிகாட்டுகிறார்,

குறுந்தொகையில் கொண்டெடுத்து மொழிதல்

முனைவர். அ. சர்மிளா
உதவிப்பேராசிரியர்
தமிழாய்வுத்துறை
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி
திருச்சிராப்பள்ளி-620002
தமிழ்நாடு

காலந்தோறும் பல்வேறு வடிவத்திலும் பொருண்மையிலும் வளர்ச்சி பெற்று வரும் மிழிலக்கியங்கள் மனித வாழ்க்கையின் கருவூலமாகக் காலத்தைக் காட்டும் கண்ணாடியாகத் கழ்கின்றன. இச்சிறப்புப் பொருந்திய சங்க இலக்கியத்தில் நல்முத்தாய் அக மன உணர்வை ன்று கூட்டிய சிந்தையாய் விளங்குவது ‘குறுந்தொகை’ இலக்கியமாகும். இவ்விலக்கியத்தில் டக உறுப்பான ‘கூற்று” என்பதில் அமையும் “கொண்டெடுத்து மொழிதல்” எனும் உத்தியைப் ற்றி விளக்குவதாய் இக்கட்டுரை அமைகின்றது.

காண்டெடுத்து மொழிதல்

நறுக்குதெரித்தாற் போன்று இருக்கும் இக்குறுந்தொகை இலக்கியத்தின் யிரோட்டத்திற்குப் பாத்திரங்கள், சூழல்கள், கூற்றுகள் போன்ற பல உறுப்புகள் அமைந்து ணி சேர்க்கின்றன. இலக்கியங்களே மனித வாழ்விற்கே ஆனவைகள். இவ்வகையில் சங்க லக்கியத்தின் சிறப்பு என்பதே அவ்விலக்கியத்தைப் படிப்போர் தாங்களே அப்பாத்திரங்களாகி, ரையாடுவதும் உணர்வுக்கு உள்ளாவதுமான உணர்வை பெறுவதுமே ஆகும். இவ்வமைப்பே டகச் சூழலை உண்டாக்குகின்றது. நாடகத்திற்குப் பாத்திரங்கள் எவ்வளவு முக்கியத்துவமோ த்தளவு முக்கியத்துவம் பெறுவது ‘கூற்று’ என்ற ஒன்றும் ஆகும். இக்கூற்றானது உரையாடல், மொழி என்று அமையும். இவற்றில் மேலும் ஒரு சிறப்பு பொருந்திய உத்தி ‘கொண்டெடுத்து மொழிதல்’ எனும் ஒன்றாகும். கொண்டு+எடுத்து+மொழிதல் ஒருவர் தான் கூறும் கருத்தின்

இலக்கியங்களில் வாழ்வியல்

பெ.ஜோதி, எம்.ஏ.,எம்.பில்.,பி.எட்.,யு.ஜி.சி.நெட்.,
உதவிப்பேராசிரியர்,
தமிழாய்வுத்துறை,
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி.
திருச்சி 620 002.
தமிழ்நாடு.

முன்னுரை :

நம் முன்னோர்களின் வாழ்க்கையைக் கூறும் கருத்துப்பொருளால் அமைந்து முறைப்படி வாழக் கற்றுக் கொடுப்பதே இலக்கியம் என்னும் காலக் கண்ணாடியாகும்.

"எழுவது போல் பிறத்தலும் உறங்குவதுபோல் இறத்தலும்"

ன்று அமைந்ததுதான் வாழ்க்கை.

இவ்வாழ்க்கையில் கொடை, அறம், வீரம், நட்பு, விருந்தோம்பல் ஆகிய பண்புகளோடு அமைந்த இலக்கியங்களின் வாழ்வியலை உணர்த்துவதே இக்கட்டுரையின் நாக்கமாகும்.

செல்வத்தின் பயன் :

இவ்வுலகை ஆளும் அரசனாக இருந்தாலும், பொருளே இல்லாத ஆண்டியாக இருந்தாலும் அனைவருக்கும் **உண்ணும் உணவு நாழி அளவு தான்** உடுக்கும் ஆடைகளும் கீழாடை, மேலாடை என்னும் இரண்டு மட்டுமே. மற்றபடி உள்ளத்து ணர்வுகள் அனைத்தும் ஒன்றாகவே இருக்கும். அதனால்தான் பெற்ற செல்வத்தால் பறும்பயன் இல்லாதவர்களுக்குக் கொடுத்து இன்பம் காண வேண்டும். ப்பொதுமைப் பண்பை,

" தென்கடல் வளாகம் பொதுமை இன்றி
வெண்குடை நிழற்றிய ஒருமை யோர்க்கும்
நடுநாள் யாமத்தும் பகலும் துஞ்சான்
கடுமாப் பார்க்கும் கல்லா ஒருவர்கும்

உயிர் நோக்கம்

திருமதி க.பத்மாவதி
உதவிப் பேராசிரியர்
தமிழாய்வுத்துறை
ஸ்ரீமதி இந்திராகாந்தி கல்லூரி
திருச்சிராப்பள்ளி - 620 002
தமிழ் நாடு

உலகில் பிறந்த ஒவ்வோர் உயிரும் அதன் நோக்கம் என்ன? என்று கண்ணுற்று அதைப் பூர்த்தி செய்ய வேண்டியிருக்கிறது. அந்நோக்கம் நிறைவேற பல்வேறு தடைகளைத் தாண்டி பயணிக்க வேண்டியதாகிறது. இக்கட்டுரையானது, உயிர் நோக்கத்திற்கு அடிப்படையான தவம் என்னும் கருதுகோளை முன்னிறுத்தி தவத்திற்கு உருவாக கருதுவதையும் அத்தகைய தவமும் முற்பிறவியில் தவமுடையோர்க்கே கிட்டும் என்பதையும் தவ நிலையை அடைந்தோர் வேண்டிய அனைத்தையும் கிடைக்கப் பெறுவோராவர் என்பது குறித்தும் தவ நெறியாளர்களால் மன்னுயிர் அனைத்தும் உய்வு பெற்று அவர்களைத் தொழும் என்பதையும் திருவள்ளுவரின் தவம் என்னும் அதிகாரத்தின் வழி நின்று ஆராய முற்படுகிறது.

<u>தவத்திற்கு உரு</u>

உண்டி சுருக்கி, உண்ணா நோன்பியற்றி, காவியாடை உடுத்தி, துறவறம் பூண்டு மிளிர்வோர்களை தவத்திற்குறிய உருக்கொண்டோராய் சுட்டுவர் பெரியோர். இக்கருத்துக்களிலிருந்து பெரும்பாலும் வேறுபட்டு நிற்கிறார் திருவள்ளுவர்.

உற்றுநோய் நோன்றல் உயிர்க்குறுகண் செய்யாமை
அற்றே தவத்திற்கு உரு"

(கு 261)

என்ற குறட்பாவழி,

- தனக்கு வரும் துன்பங்களைப் பொறுத்துக் கொள்ளுதல்

சங்க அகப்பாடல்களில் அலரும் அம்பலும்

திருமதி பா. ராதிகா எம்.ஏ.,எம்.பில்.,
பி.எட்., யுஜிசி நெட,
உதவிப்பேராசிரியர்,
தமிழாய்வுத்துறை,
ஸ்ரீமதி இந்திரா காந்தி கல்லூரி,
திருச்சிராப்பள்ளி - 620 002.
தமிழ்நாடு.

இரண்டாயிரம் ஆண்டுகளுக்கு முற்பட்ட காலம் சங்க காலம் என குறிக்கப்பெறுகிறது. சங்க காலத்தில் தோன்றிய நூல்களை சங்க இலக்கியங்கள் என்பர். சங்க இலக்கியங்களை அகம், புறம் எனப் பிரித்துப் பார்ப்பதற்கும் தமிழ் மொழியின் முழுமையான இலக்கணத்தை அறிந்து கொள்வதற்கும் தொல்காப்பியம் துணை நிற்கிறது. சங்க இலக்கியம் என்பது தமிழில் எழுதப்பட்ட செவ்வியல் இலக்கியமாகும்.

சங்க இலக்கியம் ஓர் அறிமுகம்

சங்க இலக்கியங்களை பத்துப்பாட்டு, எட்டுத்தொகை என வகைப்படுத்தலாம். இவற்றை பதினென்மேற்கணக்கு நூல்கள் என வழங்குவர். எட்டுத்தொகையில் உள்ள நூல்கள் தொகைநூல்களாகும். இவற்றின் பெயர்களை பழம்பாடல் ஒன்று விளக்குகிறது.

நற்றிணை நல்ல குறுந்தொகை ஐங்குறுநூறு
ஒத்த பதிற்றுப்பத்து ஓங்கு பரிபாடல்
கற்றறிந்தார் ஏத்தும் கலியோடு அகம்புறம் என்(று)
இத்திறத்த எட்டுத் தொகை

சங்க இலக்கியப் பாடல்கள் 2381 எண்ணிக்கை உடையது. சங்க இலக்கியத்தில் அதிக பாடல்களைப் பாடியவர் கபிலர். சங்க இலக்கியப் பாடல்கள் 473 புலவர்களால் பாடப்பட்டது. 19 ஆம் நூற்றாண்டில் வாழ்ந்த தமிழ் அறிஞர்களால் உ.வே.சாமிநாதையர், சி.வை.தாமோதரம்பிள்ளை ஆகியோரது முயற்சியால் சங்க இலக்கியங்கள் அச்சுருப் பெற்றன.