Edge anti magic hyper graphs

S Vimala
Assistant Professor, Department of Mathematics, Mother Teresa Women's University, Kodaikanal, Tamil Nadu, India

* Corresponding Author: **S Vimala**

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Abstract
Claude Berge introduced hypergraphs in 1967 and 1973 as a means to generalize the graph approach. For a graph G = (V, E), a bijection g from V (G) ∪ E(G) into {1, 2,..., |V (G)|+|E(G)|} is called (a, d)-edge-antimagic labeling of G if the edge-weights w(xy) = g(x) + g(y), xy ∈ E(G), form an arithmetic progression starting from a and having common difference d. In this paper the concept of Edge Anti – magic labelling in Hyper Graphs are introduced. Some interesting properties of hyper graphs are studied. Investigation of this topic on Crossed prism graph, Cocktail party graph, Complete Tripartite graph are Edge Anti –magic Hyper Graphs has been done.

Keywords: Edge Anti – magic labelling, Hyper Graph, Crossed prism graph, Cocktail party graph, Complete Tripartite graph

1. Introduction

Hartsfield and Ringel [2] introduced anti-magic graphs in 1990. A graph with q edges is called anti-magic if its edges can be labelled with 1,2,…,q such that the sums of the labels of the edges incident to each vertices are distinct. Among the graphs they prove are anti-magic are: $K_n(n \geq 3)$, cycles, wheels, and $P_n(n \geq 3)$. T. Wang [4] has shown that the toroidal grids $C_{n1}\times C_{n2} \times \ldots C_{nk}$ are anti-magic and, more generally, graphs of the form $G \times C_n$ are anti-magic. If G is an r- regular anti-magic graph with r >1.

Here consider graph G = (V, E) is finite, straight forward and un-directed. G denotes graph then G includes a vertex and edges sets. Vertex set denoted by V = V (G) and edge set E = E (G). We followed the standard notions m = |E| and n = |V|. Labelled graphs are getting associate more and more helpful family of Mathematical Models for a broad vary of applications.

Graph labelling is a method of mapping that maps several set of elements of graph to a collection of numbers. Sedlacek [3] introduce labelling that simplifies the thought of magic labelling. The magic labelling is outlined as a bijection of graph component to set of successive integers ranging from one, satisfying some reasonably "constant sum" property. If this Bijection involves vertices or edges or both as graph elements to a collection of integers yielding a constant sum known as magic constant, it will be known as Vertex or Edge or Total Magic Labelling.

Bertault and eades [1] show how to create subset- based hyper graph drawings. An edge-based hyper graph drawing resembles standard drawings of graphs more closely. A hyper graph is planar if only if it has as edge-based drawing without hyper edge crossings. The edge anti-magic labeling admits hyper graph are called edge anti magic hyper graphs**.** In this paper proved edge anti magic hyper graph for Crossed Prism Graph, cocktail party graph, complete tripartite graph.

2. Preliminaries

Definition 2.1 [5]

A Crossed Prism Graph for positive even,is a graph obtained by taking two disjoint cycle graphs C_n and adding edges (V_k,V_{2k+1}) and (V_{k+1},V_{2k}) for k =1,3,…(n-1).

Then - crossed prism graph is isomorphic to the Haar graph H $(2^{n+1} + 2^{n/2} +1)$.

Definition 2.2 [5]

The cocktail party graph of order n isomorphic to the circulant graph (i=1,2,…(n-1)(2n)).

The n cocktail party graph is also the (2n,n) Turan graph.

Definition 2.3 [5]

A complete tripartite graph is the k =3 case of complete k-partite graph. In other words, it is a tripartite graph (i.e., a set of graph vertices decomposed into three disjoint sets such that no two graph vertices within the same set are adjacent) such that every vertex of each set graph vertices is adjacent to everry vertex in the other two sets.

If there are p,q and r graph vertices in the three sets, the complete tripartite graph (sometimes also called a complete trigraph) is denotes $k_{p,q,r}$.

Definition 2.4 [5]

An edge sum is the sum of labels of all vertices incident with the edge. A graph is called an edge anti magic if it has an edge anti magic labelling.

Definition 2.5 [5]

A hypergraph H is a pair H = (X, E), where X is a set of elements called nodes or vertices, and E is a set of non – empty subsets of X called hyperedges or edges.

3. Edge anti magic hyper graphs

Example 3.3

Crossed prism graph, is a edge anti – magic graph.

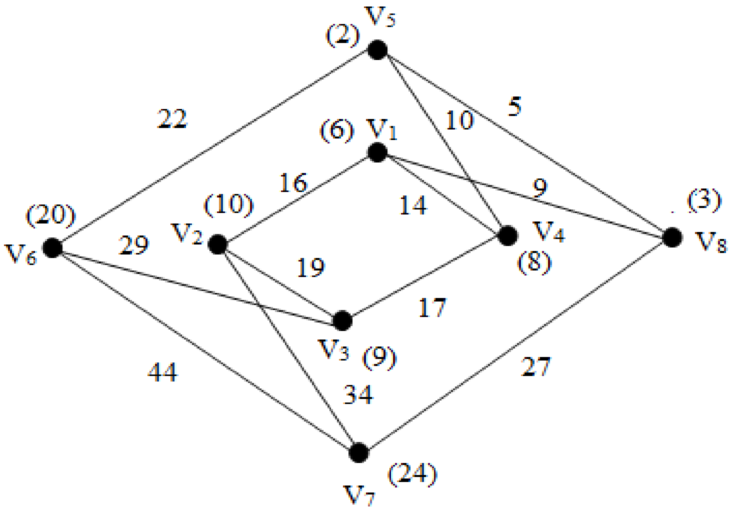

Fig 1: Edge anti magic hyper graphs

Definition 3.1

A Edge Anti- Magic Graph is a Edge Anti-Magic Hyper Graph in which every pair of distinct vertices H = (V, E) is in at most one Anti - Magic hyper edge of H.

Theorem 3.2

Every edge-anti magic crossed prism graph (P(G)) is E(0,k) a hyper graph with $\delta \leq k \leq n$.

Proof

First, we have Show that crossed prism graph is a edge-anti magic.

An edge sum is the sum of labels of all vertices incident with the edge.

Edge-anti magic labeling for crossed prism graph: From, these we obtained the crossed prism graph is edge-anti magic.

Then, to prove that an edge anti magic crossed prism graph is a hyper graph.

A hyper graph G can also be drawn as a bipartite graph where one set of vertices corresponds to the vertices of G and the other set corresponds to the hyper edges.

The edges of the bipartite graph represent vertex hyper edge incidents.

Then Neutrosophic edge anti- magic crossed prism graph is a hyper graph.

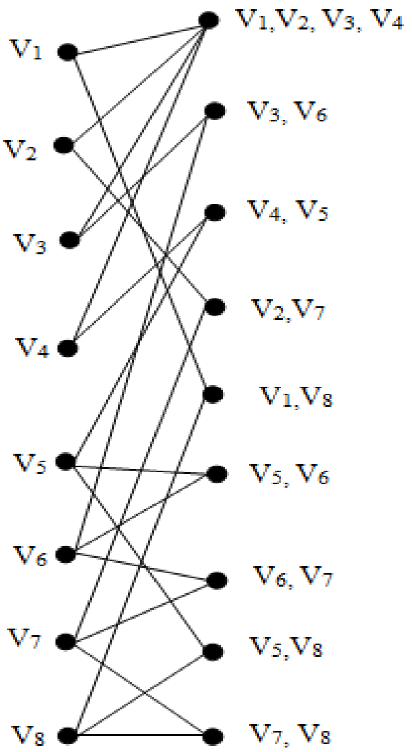

Fig 2

From, the figure, 3.3(b)
Vertices = $\{v_1, v_2, v_3, v_4, v_5, v_6, v_7, v_8\}$
Vertex hyper- edges = $\{(v_1,v_2,v_3), (v_1, v_5), (v_2, v_6), (v_3,v_4), (v_4,v_5), (v_5, v_6)\}$.
Hence, every edge anti-magic crossed prism graph is a hyper graph.

Example: 3.4
Cocktail party graph is a edge anti – magic graph.

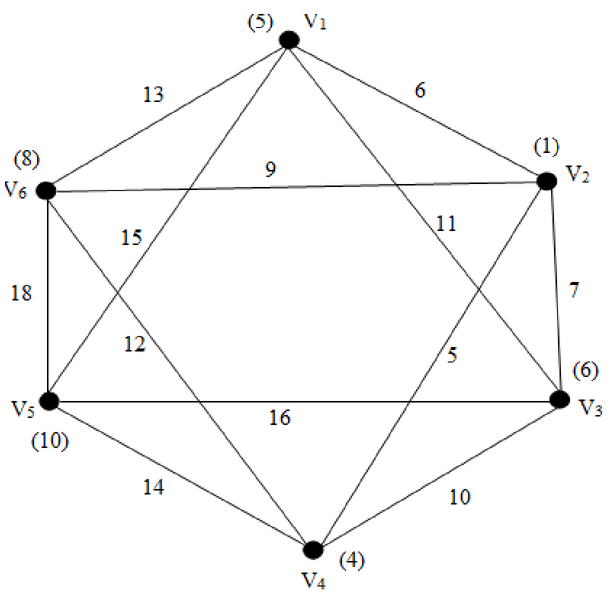

Fig 3

Edge anti magic hyper graph

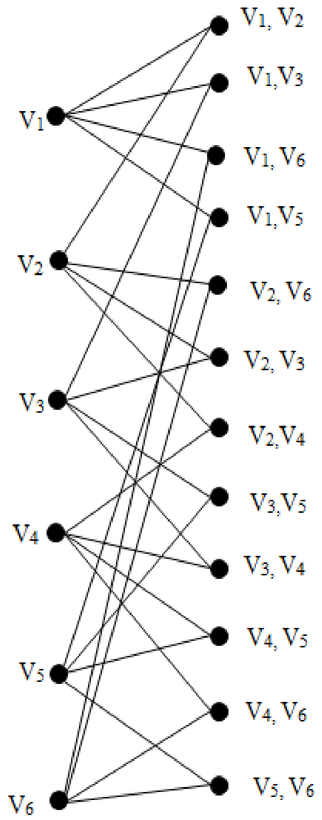

Fig 4

From, the figure,
Vertices = $\{v_1, v_2, v_3, v_4, v_5, v_6\}$
Vertex hyper edges = $\{(v_1,v_2), (v_1, v_3), (v_1, v_6), (v_1, v_5), (v_2, v_3), (v_2, v_4), (v_2, v_6), (v_3, v_4), (v_3, v_5), (v_4,v_5), (v_4, v_6), (v_5, v_6)\}$
Hence, every edge anti magic cocktail party graph is a hyper graph.

Example 3.5
Complete tripartite graph is a edge anti – magic graph.

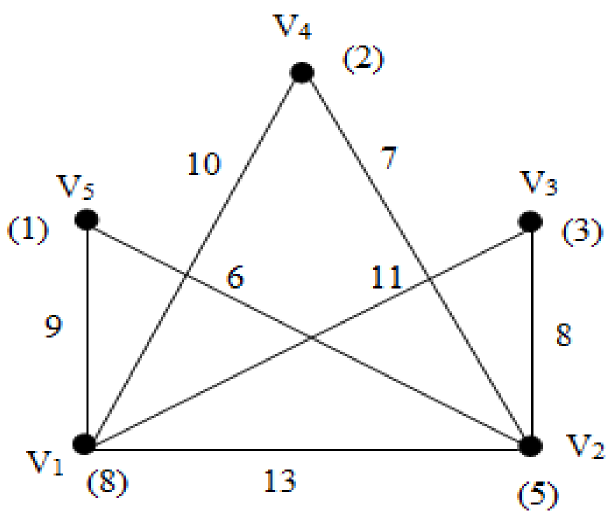

Fig 5

Edge anti magic hyper graph

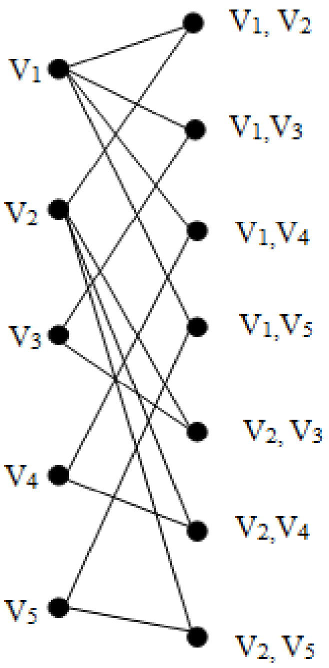

Fig 6

From the figure,
Vertices = {v_1,v_2, v_3, v_4,v_5}
Vertex hyper edges = {(v_1,v_2), (v_1, v_3), (v_1, v_5), (v_2, v_3), (v_2, v_4), (v_2, v_5), (v_1, v_5) }
Hence, every edge anti magic complete tripartite graph is a hyper graph.

4. Conclusion

In this paper, a new concept of "Edge Anti– Magic Hyper Graphs" were introduced and defined. And these concepts applied to Crossed prism graph, Cocktail party graph, and complete bipartite graph. Our future proposed work is to apply on different types of anti-magic hyper graphs and their applications are in and their applications are in technologies, communication networks, astronomy, Circuit design and database management will be developed on future purpose.

5. Reference

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