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n- ZAGBERG DEGREE INDICES EQUATION FOR r-REGULAR n-EDGE HYPER GRAPH.

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Abstract:

In this paper we define r-regular n-edge hyper graph and introduce n- zagberg degree indices equation for r-regular n-edge hyper graph.

Keywords:

r- regular graph, Hyper graph, r-regular n-edge hyper graph, zagberg degree indices, n- zagberg degree indices.

I INTRODUCTION

Graph theory was introduced by Leonard Euler in 1735.Bang.The Regular graphs are viewed as the classes of graph. Many authors defined various types of regular graphs and hyper graphs. Distance regular graph, Strong regular graph were defined and its properties also discussed. Whereas the hyper graph play a vital role in the study of various network Design and analysis. In this article we derived an equation to analyse regular hypergraph[1],[2],[4],[5].

II - preliminaries

Definition 2.1:

Hypergraphs are simple graph in which edges connect any number of vertices.

Definition 2.2:

A graph is called regular graph if degree of each vertex is equal.

Definition 2.3:

A graph is called k-regular for some integer k if every vertex is of degree k.

Definition 2.4:

Zagberg indices for a graph G is

$$\alpha M_1(G) = \sum_{u \in v(G)} d_u^{2\alpha}$$

III- Main Result

Definition3.1:

r- regular n-Edge Hyper graph $G_r(V, E_n)$ is defined as

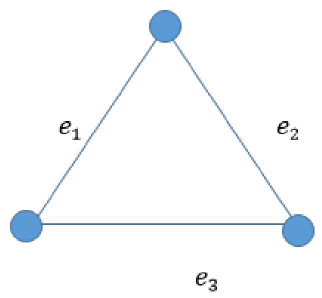
$G_r(V) = G(V)$ and $G_r(E_1) = G(E) \cup G(E)$

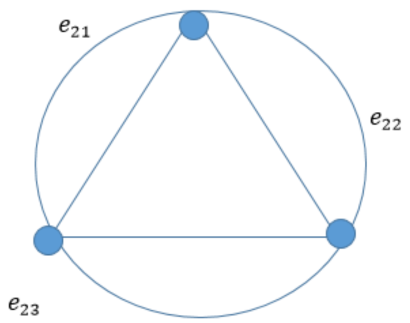
The resulting graph is First Edge Hyper graph.

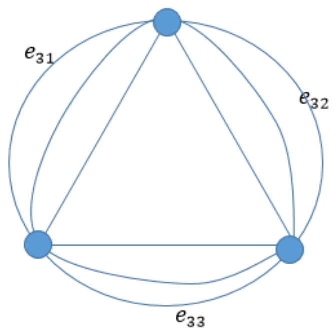
$G_r(E_2) = G(V)$, $G_r(E_2) = G_r(E_1) \cup G_r(E_1)$ is the edge set of second edge hyper graph. By continuing this way we get n- Edge hyper graph.

Example:

r- regular n- edge Hyper graph (First and second stage)







Theorem 3.2:

r- Regular Edge Hyper graph satisfies the n-Zagberg degree indices Equation

$$\mathcal{H}_n(G_r) = 2^2\big(\mathcal{H}_{n-1}(G_r)\big)$$

Where $\mathcal{H}_n(G_r) = \sum_{u \in V(G_r)} d_u^{2\alpha}$

Proof:

When $\alpha = 0$ First Stage

$$\mathcal{H}_1(G_r) = d_{u_1}^{2\alpha} + d_{u_2}^{2\alpha}$$

$= 2^0 + 2^0$

$= 2$ (Number of vertices in a graph)

When $\alpha = 1$ Second Stage

$$\mathcal{H}_2(G_r) = \sum_{u \in V(G_r)} d_u^{2\alpha}$$

$= d_{u_1}^{2\alpha} + d_{u_2}^{2\alpha}$

$= 2^2 + 2^2$

$= 8$ (Twice the sum of the degree)

$= 2^2\,(\mathcal{H}_1(G_r))$

When $\alpha = 2$ Third Stage

$$\mathcal{H}_3(G_r) = \sum_{u \in V((G_r))} d_u^{2\alpha}$$

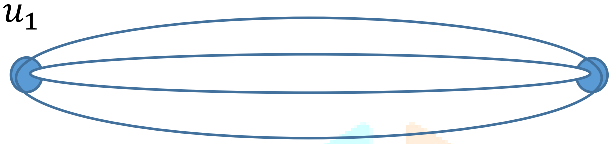
$$= d_{u_1}^{2\alpha} + d_{u_2}^{2\alpha}$$

$$= 2^4 + 2^4$$

$$= 32$$

$$= 2^2\ (\mathcal{H}_2(G_r))$$

u_1 u_2



When $\alpha = 3$ Fourth Stage

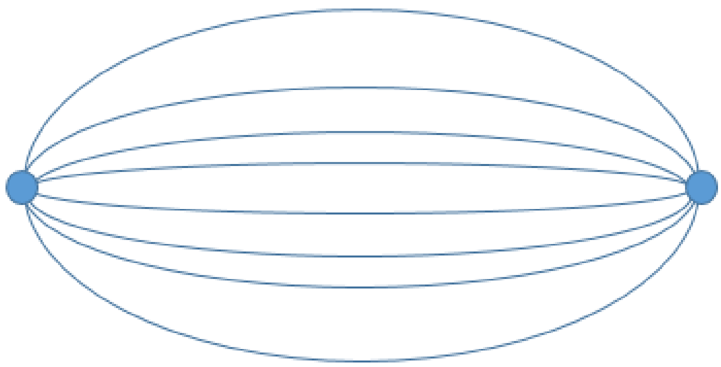
$$\mathcal{H}_4(G_r) = \sum_{u \in V(G_r)} d_u^{2\alpha}$$

$$= 2^6 + 2^6$$

$$= 128$$

$$= 2^2\ (\mathcal{H}_3(G_r))$$

u_1



u_2

When $\alpha = 4$ Fourth Stage

$$\mathcal{H}_5(G_r) = \sum_{u\in V(G_r)} d_u^{2\alpha}$$

$$=2^8 + 2^8$$

$$= 512$$

$$= 2^2\,(\mathcal{H}_4(G_r))$$

Hence, we get

$$\mathcal{H}_n(G_r) = 2^2\left(\mathcal{H}_{n-1}(G_r)\right).$$

Result 3.3:

By using the above Equation we get the result

$$\mathcal{H}_n(G_r) = 2^{2(n-1)}\left(\mathcal{H}_1(G_r)\right)$$

IV Conclusion

The derived equation is used to analyse Graphs at various level. In further research it can be converted into computational program and it results various communicational networks, movements of atoms under various stages, and also in biological Networks.

V References

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