Research Article

Applications Offarey Edge Graceful Of Radio Analytic Mean Labeling Diameter 2 Of Path Related Graphs

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Abstract

Let G be a simple, Connected and undirected FEGG.If every edge E_i is assigned a unique label from Farey sequence $\frac{x_1}{x_2} \in F_k$ objectively and each vertex having distinct label as the sum of all adjacent edge labels x_2-x_1 .then Such Labelling is called as FEGL. The Highest edge labelling x_2-x_1 among all edges is provided to Farey edge strength of G .Also Farey Edge graceful Graph in all the vertex Pair satisfied Radio Analytic mean condition d(x,y)+$\left\lceil\frac{|f(u)^2)-f(v)^2)|}{2}\right\rceil$ $\geq$ 1+diam G . Which vertex having highest Integer it is called FEGRAM.

Keywords Farey Sequence, Farey Edge Graceful numbers, RAMC, Diameter,Path graphs.

Introduction

Now a days Graph Labelling is an important topic in graph theory that involves allocated positive integers to the vertices and edges of a labelling graph below some certain inequalities. The intriguing model graph label is radio mean labelling, which has profit attention due to its applications in Communication network and frequency assignments. We are refer ‘’ A Dynamic large Survey of graph labelling ‘’ by A.Gallian. This Covers an recent development of Graph labelling models like graceful, Magic graceful, Geomentric mean, Exponential mean, Odd vertex magic label and unresolved volumes. In this Concept Graph theory labelling every vertex of a Graph G is allocated unique +ve integer named as label, Such the word labels cover specific Conditions depends on the unique distance between the nodes (vertices).

Our aim is to reduce interference between radio center Stations by definitely that the labels are enough space apart, particularly for vertices that are near to one another in the graph G. Some Researchers and Academic mathematicians investigate this area of graph theory and widely unique recognized as short resources. First radio labelling was introduced by Chartand in 2001.. Later developed in this concept radio analytic man labelling function give a graph with vertex set and edges sets.d(x,y)+$\left\lceil\frac{|f(u)^2)-f(v)^2)|}{2}\right\rceil$ $\geq$ 1+diam G.byP.Poomalai in 2019.Where d(x,y) is the distance between any two vertices x and y and diam G is diameter of the G. Then the positive Natural numbers according to them for a connected graph a radio analytic mean labeling is a one to one map f from the vertex set V(G). The Highest integer that can be assigned to any vϵ V(G).Few years later First Farey Graceful labelling introduced by Ajay Kumar in 2023. They investigate Farey caterpillars, Farey cycles, and Farey paths. Again In 2024 Ajay Kumar introduced a new idea Farey edge graceful labelling , which satisfied to strongly for labelled in Integrated graphs with maximum degree of the vertex. He is proved that Farey edge helm, Farey edge T_k graph and investigate Farey edge strength. We are reading their articles, having new idea Farey Edge graceful Radio Analytic Mean number and determine Farey edge strength of the graph. A Non Increasing Sequence of the forms

$F_k = \frac{x_1}{x_2}$: $0 \leq x_1 \leq x_2 \leq x$. GCD (X_1, X_2)= 1 is namely Farey sequence of order.

In this following article we will explain radio analytic mean labeling, its properties and some of the aims enter in evaluate optimal labelling for different models of graph. Only one of the important direct real applications of radio analytic mean labeling is allocated to frequencies to radio Stations or Communication towers system. Every Station is Consider as a vertex in the Graph and the edges between two vertices significance potential interference. Most read by an article ‘’On the local metric dimension of generalized wheel graphs,’’ Asian Europian Journal of mathematics is given by S.Lal and V.K. Bhat ,’’.. The radio analytic mean is Individually well formed for reading and reducing interference in Networking since it maybe take to attention to higher values , Which often dominating network perform metrics. In this article covered by Farey Edge graceful radio analytic mean number of cycle related graphs. Before Going to this section we known the following permilary in the index definitions

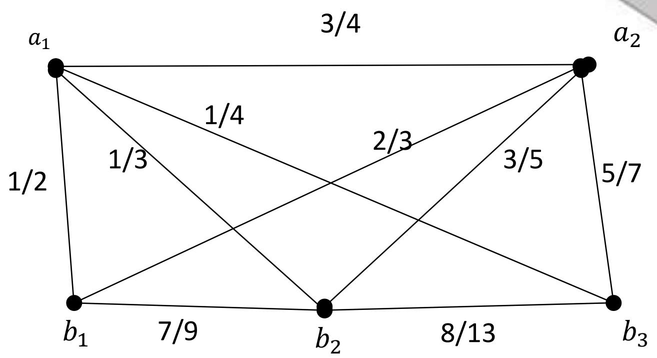
Definition 1:

Consider G(V,E) be a simple connected and undirected graph.If each edge e_i,i∈z of G is injectively labelled with Farey integer $\frac{x_1}{x_2} \in F_k$ and each vertex is injectively labeled with sum of all adjacent edges .ie) $W(x_i)= \sum_{x_i,y_j \in E(G)}(x_2 - x_1)$ is named Farey Edge graceful graph. The Maximum edge label vertex x_2-x_1 is called Farey edge strength of connected graph .

Definition 2:
The Radio Analytic mean condition is
$d(x,y)+\left\lceil\frac{|f(u)^2)-f(v)^2)|}{2}\right\rceil \geq$ 1+diam G.Here d(x,y)is distance between any two vertices of G

Definition 3 : Consider $P_2 + P_3$ The connected graph every vertex of P_2 is adjacent to every vertex of null graph N_n together with adjacency in both $P_2 + P_3$ have total number of vertices 5 and edges 9
Definition 4: Consider $P_3 + P_4$ The connected graph every vertex of P_3 is adjacent to every vertex of null graph N_n together with adjacency in both $P_3 + P_4$ have total number of vertices 7 and edges 17
Definition 5: Consider $P_3 + P_5$ The connected graph every vertex of P_3 is adjacent to every vertex of null graph N_n together with adjacency in both $P_3 + P_5$ have total number of vertices 8 and edges 21
Definition 6: Consider $P_3 + P_6$ The connected graph every vertex of P_3 is adjacent to every vertex of null graph N_n together with adjacency in both $P_3 + P_6$ have total number of vertices 9 and edges 25
Definition 7: Consider $P_6 + P_7$ The connected graph every vertex of P_2 is adjacent to every vertex of null graph N_n together with adjacency in both $P_6 + P_7$have total number of vertices 13 and edges 52
Result:
1. Let P_{2+3} , a+b ≡ 1 (mod 4) is Farey Edge graceful and Farey edge strength is $\{1,2,3 \ldots \ldots a+b\}$
2. Let P_{2+4} , a+b ≡ 2 (mod 4) is Farey Edge graceful and Farey edge strength is $\{1,2,3 \ldots \ldots a+b\}$
3. Let P_{3+4} , a+b ≡ 3 (mod 4) is Farey Edge graceful and Farey edge strength is $\{1,2,3 \ldots \ldots a+b\}$
4. Let P_{3+5} , a+b ≡ 0 (mod 4) is Farey Edge graceful and Farey edge strength is $\{1,2,3 \ldots \ldots a+b\}$

Theorem 1: Farey Edge graceful in Radio Analytic mean number of Diameter 2 Path graph P_{a+b}= 10
Proof: Let a_1, a_2, b_1, b_2, b_3 be the vertices of path graph.we define the edge setE= $\{a_i a_{i+1}, b_i b_{i+1}, a_i b_i 1 \leq i \leq 3\}$. The Connected graph P_{2+3} have total number of vertices 5 and edges 9. All the edges have distnicit farey fraction numbers. The diameter of the path graph is 2.. Here Vertex set Upper path V(G)= a_i , 1≤ i≤ 2 , Vertex set Bottam path V(G)= b_i , 1≤ i≤ 3. Here which vertex having maximum integer it is Called FEGRAMN.
We Define a function f : E(P $_{a+b}$) → F (G)
f(a_1, b_i)= $\frac{1}{i+1}$, 1≤ i≤ b , f(a_1, a_2)= $\frac{2i-1}{2j}$, i=j=2
f(a_2, b_i)= $\frac{1+i}{2i+1}$, 1≤ i≤ a , f(b_i, b_{i+1})= $\frac{4+2i}{7+3i}$, i= 2
f(a_2, b_i)= $\frac{2i-1}{2i+1}$, i= 3
f(b_i, b_{i+1})= $\frac{5+2i}{7+2i}$, i= 1
The vertex weights are$f_w(v_i) = \sum_{v_i,v_{j \in E(G)}}(x_2 - x_1)$= f $_w(a_1)$= 7 ,
Similarly, f $_w(a_2)$= 6 , f $_w(b_1)$= 4,f $_w(b_2)$= 11, f $_w(b_3)$= 10
The above all the vertex weights are indicated distinict. Hence P_{a+b} is Farey edge graceful graph.Next we will find Farey Edge strength of the graph. we subtract label from numerator to denominator of every edge label.Frequently we have receive the label ofevery edge from 1,2,3 … … $a+b$. Finally Farey edge strength is $a+b$. Next we will going to prove Farey Edge graceful graph Path vertex set satisfied Radio Analytic mean condition.
d(u,v) $+\left\lceil\frac{|f(u)^2)-f(v)^2)|}{2}\right\rceil$ ≥ 1+diam G.Here d(u,v) is distance between any two vertices of G
Case (i) If the vertices distance one ie) d(a_1, a_2)=1. d(a_1, b_i)=1, 1≤ i≤ b , d(a_2, b_i)=1, 1≤ i≤ b
Example :1



FEGRAMN P_{2+3}= $f_w(b_3)$= 10

S.No	If any two vertices distance 1 &2 d(u,v)	$\left\lceil\frac{\lvert f(u)^2) - f(v)^2)\rvert}{2}\right\rceil$	diam (G)+1
1	**d(a_1, a_2) =1**	$\left\lceil\frac{\lvert f(7)^2)-f(6)^2)\rvert}{2}\right\rceil$ **=7**	3
2	**d(a_1, b_1) =1**	$\left\lceil\frac{\lvert f(7)^2)-f(4)^2)\rvert}{2}\right\rceil$ **=17**	3
3	**d(a_1, b_2) =1**	$\left\lceil\frac{\lvert f(7)^2)-f(11)^2)\rvert}{2}\right\rceil$**=36**	3
4	**d(a_1, b_3) =1**	$\left\lceil\frac{\lvert f(7)^2)-f(10)^2)\rvert}{2}\right\rceil$**=26**	3
5	**d(b_1, b_2) =1**	$\left\lceil\frac{\lvert f(4)^2)-f(11)^2)\rvert}{2}\right\rceil$**=53**	3
6	**d(b_2, b_3) =1**	$\left\lceil\frac{\lvert f(11)^2)-f(10)^2)\rvert}{2}\right\rceil$**=11**	3
7	d(a_2, b_3) =1	$\left\lceil\frac{\lvert f(6)^2)-f(10)^2)\rvert}{2}\right\rceil$**=32**	3
8	d(b_1, b_3) = 2	$\left\lceil\frac{\lvert f(4)^2)-f(10)^2)\rvert}{2}\right\rceil$=42	3

In all pairs of Farey edge graceful graphs satisfied Ramc. Therfore FEGRAMN P_{2+3}= $f_w(b_3)$= 10

Theorem 2: Farey Edge graceful in Radio Analytic mean number of diameter 2 Path graphs P_{a+b}= 20

Proof:

Let $a_1, a_2, a_3, b_1, b_2, b_3, b_4$ be the vertices of path graph.we define the edge set E= $\{a_i a_{i+1}, b_i b_{i+1,}\ a_i b_i 1 \le i \le 4\}$.The diameter of the path graph is 2. Here Total number of vertices 7 and edges 17 .The diameter of the path graph is 2.. Here Vertex set Upper path V(G)= a_i , 1≤ i≤ 3 , Vertex set Bottam path V(G)= b_i , 1≤ i≤ 4. Here which vertex having maximum integer it is Called FEGRAMN.

We Define a function f : E(P_{a+b}) → F (G)

f(a_i , b_i)= $\frac{1}{i+1}$, 1≤ i≤ b , f(a_3, b_i)= $\frac{4b+2i+1}{4b+2i+3}$, 1≤ i≤ b-1 , f(a_3, b_4)= $\frac{a^2}{a^2+b}$

f(a_2, b_i)= $\frac{4i-1}{4i+1}$, 1≤ i≤ b , f(b_3 , b_4)= $\frac{ab+3}{5b+a-1}$,

f(b_i, b_{I+1})= $\frac{a^2+2i}{ab+2j-1}$, 1≤ $i \le a-1$,j=1,4 , f(a_2,a_3)= $\frac{ab+1}{b^2}$, f(a_i, a_{I+1})= $\frac{1+i}{2+i}$,i=1

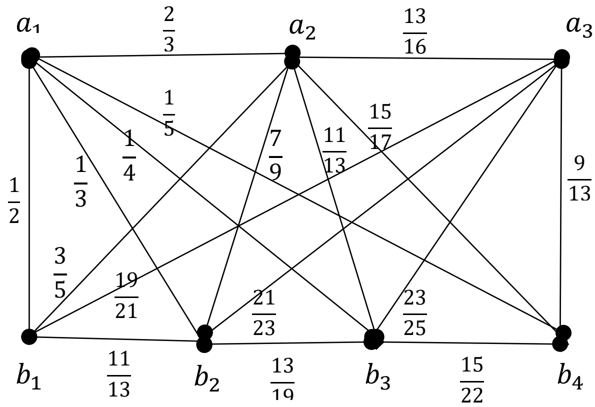
The vertex weights are $f_w(v_i) = \sum_{v_i, v_{j\, \epsilon\, E(G)}} (x_2 - x_1)$= $f_w(a_1)$= 11 ,

Similarly, $f_w(a_2)$=12 , $f_w(a_3)$=13 , $f_w(b_1)$= 7 , $f_w(b_2)$= 14, $f_w(b_3)$=20 , $f_w(b_4)$=17 , The above all the vertex weights are indicated distinict. Hence P_{a+b} is Farey edge graceful graph.Next we will find Farey Edge strength of the graph. we subtract label from numerator to denominator of every edge label.Frequently we have receive the label of every edge from 1,2,3 … … $a+b$. Finally Farey edge strength is $a+b$. Next we will going to prove Farey Edge graceful graph Path vertex set satisfied Radio Analytic mean condition.

S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil\frac{\lvert f(u)^2)-f(v)^2)\rvert}{2}\right\rceil$	diam (G) +1	S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil\frac{\lvert f(u)^2)-f(v)^2)\rvert}{2}\right\rceil$	diam (G)+1
1	d(a_1,a_2) =1	$\left\lceil\frac{\lvert f((11)^2)-f((12)^2)\rvert}{2}\right\rceil$ =12	3	12	d(a_3,b_3) =1	$\left\lceil\frac{\lvert f((13)^2)-f((20)^2)\rvert}{2}\right\rceil$=116	3
2	d(a_1,b_1) =1	$\left\lceil\frac{\lvert f((11)^2)-f((7)^2)\rvert}{2}\right\rceil$ =36	3	13	d(a_3,b_4) =1	$\left\lceil\frac{\lvert f((13)^2)-f((18)^2)\rvert}{2}\right\rceil$=78	3
3	d(a_1,b_2) =1	$\left\lceil\frac{\lvert f((11)^2)-f((14)^2)\rvert}{2}\right\rceil$=38	3	14	d(b_1,b_2) = 2	$\left\lceil\frac{\lvert f((7)^2)-f((14)^2)\rvert}{2}\right\rceil$=74	3
4	d(a_1,b_3) =1	$\left\lceil\frac{\lvert f((11)^2)-f((20)^2)\rvert}{2}\right\rceil$=140	3	15	d(b_1,b_3) = 2	$\left\lceil\frac{\lvert f((7)^2)-f((20)^2)\rvert}{2}\right\rceil$=176	3
5	d(a_1,b_4) =1	$\left\lceil\frac{\lvert f((11)^2)-f((18)^2)\rvert}{2}\right\rceil$=102	3	16	d(b_1,b_4) = 2	$\left\lceil\frac{\lvert f((7)^2)-f((17)^2)\rvert}{2}\right\rceil$=120	3
6	d(a_2,b_1) =1	$\left\lceil\frac{\lvert f(12)^2)-f(7)^2)\rvert}{2}\right\rceil$=48	3	17	d(b_2,b_3) = 2	$\left\lceil\frac{\lvert f((14)^2)-f((20)^2)\rvert}{2}\right\rceil$=102	3
7	d(a_2,b_2) =1	$\left\lceil\frac{\lvert f((12)^2)-f((14)^2)\rvert}{2}\right\rceil$=26	3	18	d(b_2,b_4) = 2	$\left\lceil\frac{\lvert f((14)^2)-f((17)\rvert}{2}\right\rceil$ =47	3
8	d(a_2,b_3) =1	$\left\lceil\frac{\lvert f((12)^2)-f((20)^2)\rvert}{2}\right\rceil$=128	3	19	d(b_3,b_4) = 2	$\left\lceil\frac{\lvert f((21)^2)-f((17)^2)\rvert}{2}\right\rceil$ =76	3
9	d(a_2,b_4) =1	$\left\lceil\frac{\lvert f(12)^2)-f(17)\rvert}{2}\right\rceil$=73	3	20	d(a_1,a_3) = 2	$\left\lceil\frac{\lvert f((11)^2)-f((13)^2)\rvert}{2}\right\rceil$ =24	3
10	d(a_3,b_1) =1	$\left\lceil\frac{\lvert f((13)^2)-f((7)^2)\rvert}{2}\right\rceil$=60	3	21	d(a_2,a_3) = 2	$\left\lceil\frac{\lvert f((21)^2)-f((18)^2)\rvert}{2}\right\rceil$ =59	3
11	d(a_3,b_2) =1	$\left\lceil\frac{\lvert f((13)^2)-f((14)^2)\rvert}{2}\right\rceil$=14	3		-	-	-

This forms all the bijective function f satisfies the RAMC.

Example :2



FEGRAMN P_{3+4} = $f_w(b_3)$= 20

Theorem 3: Farey Edge graceful in Radio Analytic mean number diameter 2 of Path graphs P_{a+b}= 5b

Proof:

Let $a_1, a_2, a_3, b_1, b_2, b_3, b_4, b_5$ be the vertices of path graph.we define the edge set E= $\{a_i a_{i+1}, b_i b_{i+1}, \ a_i b_i 1 \leq i \leq 5\}$. Here Total number of vertices 8 and edges 21.The diameter of the path graph is 2.. Here Vertex set Upper path V(G)= a_i , 1≤ i≤ 3 , Vertex set Bottam path V(G)= b_i , 1≤ i≤ 5. Here which vertex having maximum integer it is Called FEGRAMN. We Define a function f : E(P $_{a+b}$) → F (G)

f(a_1 , b_i)= $\frac{1}{i+1}$, 1≤ i≤ b , f(a_1 , a_j)= $\frac{2}{i+j}$, 1≤ i≤ $j \leq 3$

f(a_2 , b_i)= $\frac{4i-1}{4i+1}$, 1≤ i≤ b , f(a_3 , b_i)= $\frac{3i+1}{3j}$, 1≤ i≤ b-1 , a≤ j≤ b+1, f(a_3 , b_5)= $\frac{3b+1}{4ib+1}$

f(b_i , b_{i+1})= $\frac{4b+2i+1}{5b+2j}$, 1≤ i≤ b , 1 ≤ j≤ 5(odd only) , f(b_4 , b_5)= $\frac{7b+2}{8b+3}$,

The vertex weights are .$f_w(v_i) = \sum_{v_i v_{j} \in E(G)} (x_2 - x_1)$= f $_w(a_1)$= 16 ,

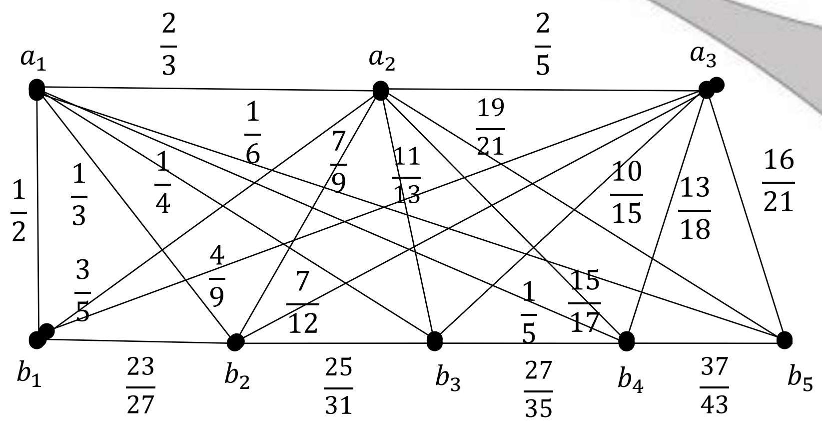
Similarly, f $_w(a_2)$= 14 ,f $_w(a_3)$= 28 ,f $_w(b_1)$= 12 , f $_w(b_2)$= 19, f $_w(b_3)$= 24, f $_w(b_4)$= 25, f $_w(b_5)$= 18

The above all the vertex weights are indicated distinict. Hence P$_{a+b}$ is Farey edge graceful graph.Next we will find Farey Edge strength of the graph. we subtract label from numerator to denominator of every edge label.Frequently we have receive the label

S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil\frac{\lvert f(u)^2) - f(v)^2)\rvert}{2}\right\rceil$	diam (G)+1	S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil\frac{\lvert f(u)^2) - f(v)^2)\rvert}{2}\right\rceil$	diam (G)+1
1	d(a_1, a_2) =1	$\left\lceil\frac{\lvert f(16)^2) - f(14)^2)\rvert}{2}\right\rceil$ =30	3	12	d(a_2, a_3) =1	$\left\lceil\frac{\lvert f(14)^2) - f(28)^2)\rvert}{2}\right\rceil$= 294	3
2	d(a_1, b_1) =1	$\left\lceil\frac{\lvert f(16)^2) - f(12)^2)\rvert}{2}\right\rceil$ =56	3	13	d(a_3, b_1) =1	$\left\lceil\frac{\lvert f(28)^2) - f(12)^2)\rvert}{2}\right\rceil$=320	3
3	d(a_1, b_2) =1	$\left\lceil\frac{\lvert f(16)^2) - f(19)^2)\rvert}{2}\right\rceil$=53	3	14	d(a_3, b_2) =1	$\left\lceil\frac{\lvert f(28)^2) - f(19)^2)\rvert}{2}\right\rceil$=212	3
4	d(a_1, b_3) =1	$\left\lceil\frac{\lvert f(16)^2) - f(24)^2)\rvert}{2}\right\rceil$=160	3	15	d(a_3, b_3) =1	$\left\lceil\frac{\lvert f(28)^2) - f(24)^2)\rvert}{2}\right\rceil$=104	3
5	d(a_1, b_4) =1	$\left\lceil\frac{\lvert f(16)^2) - f(23)^2)\rvert}{2}\right\rceil$=137	3	16	d(a_3, b_4) =1	$\left\lceil\frac{\lvert f(28)^2) - f(25)^2)\rvert}{2}\right\rceil$=80	3
6	d(a_1, b_5) =1	$\left\lceil\frac{\lvert f(16)^2) - f(18)^2)\rvert}{2}\right\rceil$=34	3	17	d(a_3, b_5) =1	$\left\lceil\frac{\lvert f(28)^2) - f(18)^2)\rvert}{2}\right\rceil$=230	3
7	d(a_2, b_1) =1	$\left\lceil\frac{\lvert f(14)^2) - f(12)^2)\rvert}{2}\right\rceil$=26	3	18	d(b_1, b_3) = 2	$\left\lceil\frac{\lvert f(12)^2) - f(24)^2)\rvert}{2}\right\rceil$=216	3
8	d(a_2, b_2) =1	$\left\lceil\frac{\lvert f(14)^2) - f(19)^2)\rvert}{2}\right\rceil$=83	3	19	d(b_2, b_4) = 2	$\left\lceil\frac{\lvert f(19)^2) - f(25)^2)\rvert}{2}\right\rceil$=84	3
9	d(a_2, b_3) =1	$\left\lceil\frac{\lvert f(14)^2) - f(24)^2)\rvert}{2}\right\rceil$=190	3	20	d(b_3, b_5) = 2	$\left\lceil\frac{\lvert f(24)^2) - f(18)^2)\rvert}{2}\right\rceil$=126	3
10	d(a_2, b_4) =1	$\left\lceil\frac{\lvert f(14)^2) - f(25)^2)\rvert}{2}\right\rceil$=215	3	21	d(a_1, a_3) = 2	$\left\lceil\frac{\lvert f(16)^2) - f(28)^2)\rvert}{2}\right\rceil$= 264	3
11	d(a_2, b_5) =1	$\left\lceil\frac{\lvert f(14)^2) - f(18)^2)\rvert}{2}\right\rceil$=64	3		-	-	-

of every edge from 1,2,3 … … $a + b$ .Finally Farey edge strength is $a + b$. Next we will going to prove Farey Edge graceful graph Path vertex set satisfied Radio Analytic mean condition. Therefore d(u,v) + $\left\lceil\frac{\lvert f(u)^2) - f(v)^2)\rvert}{2}\right\rceil$ ≥ 1+diam G.Here d(u,v) is distance between any two vertices of G

Example :3



FEGRAMN P_{3+5}= f $_w(b_4)$= 25

Theorem 4 : Farey Edge graceful in Radio Analytic mean number of Path graphs P_{a+b}= 28
Proof:
Let $a_1, a_2, a_3, b_1, b_2, b_3, b_4, b_5, b_6$ be the vertices of path graph.we define the edge set E= $\{a_i a_{i+1}, b_i b_{i+1,}\ a_i b_i 1 \le i \le 6\}$.The diameter of the path graph is 2. Here Total number of vertices 9 and edges 25 .The diameter of the path graph is 2.. Here Vertex set Upper path V(G)= a_i , 1≤ i≤ 3 , Vertex set Bottam path V(G)= b_i , 1≤ i≤ 6. Here which vertex having maximum integer it is Called FEGRAMN. We Define a function f : E(P $_{a+b}$) → F (G)

f(a_1, b_i)= $\frac{1}{1+i}$, $1 \le i \le b$, f(a_1, a_2)= $\frac{1}{b+a-1}$, f(a_2, b_i)= $\frac{b-1+2i}{b+1+2i}$, $1 \le i \le b$,

f(a_3, b_i)= $\frac{a^2+1+bi}{a^2+2+bi}$, $1 \le i \le a$, f(b_5,b_6)=$\frac{63}{68}$

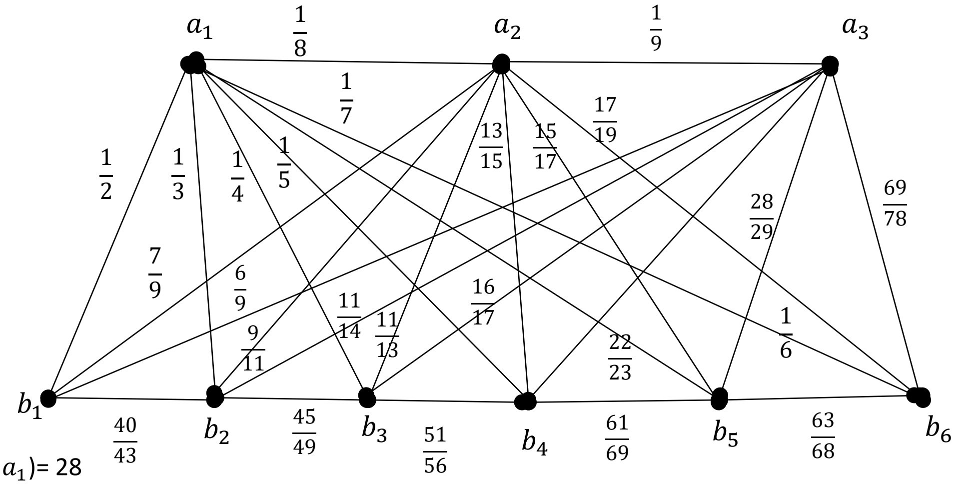
, f(a_3, b_i)= $\frac{bi}{9i}$,i=1 , f(a_3, b_2)= $\frac{a+b+2}{a^2+b-1}$, f(b_1,b_2)=$\frac{40}{43}$, f(b_2,b_3)=$\frac{45}{49}$, f(b_3,b_4)=$\frac{51}{56}$, f(b_4,b_5)=$\frac{61}{69}$

The vertex weights are $f_w(v_i) = \sum_{v_i, v_{j\,\epsilon\,E(G)}} (\boldsymbol{x_2 - x_1})$= f $_w(a_1)$= 28 ,

Similarly, f $_w(a_2)$= 27 , f $_w(a_3)$= 26 , f $_w(b_1)$= 9, f $_w(b_2)$= 14, f $_w(b_3)$= 15, f $_w(b_4)$= 20 ,
f $_w(b_5)$= 21, f $_w(b_6)$=22

The above all the vertex weights are indicated distinict. Hence P_{a+b} is Farey edge graceful graph.Next we will find Farey Edge strength of the graph. we subtract label from numerator to denominator of every edge label.Frequently we have receive the label of every edge from 1,2,3 ... ... $a + b$. Finally Farey edge strength is $a + b$. Next we will going to prove Farey Edge graceful graph Path vertex set satisfied Radio Analytic mean condition.

Example 4:



FEGRAMN P_{3+6} = f $_w(a_1)$= 28

S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil \frac{\lvert f(u)^2) - f(v)^2) \rvert}{2} \right\rceil$	diam (G)+ 1	S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil \frac{\lvert f(u)^2) - f(v)^2) \rvert}{2} \right\rceil$	diam (G)+ 1

1	d(a_1, a_2) =1	$\left\lceil\frac{\lvert f(28)^2)-f(27)^2)\rvert}{2}\right\rceil$ =28	3	19	d(a_3, b_6) =1	$\left\lceil\frac{\lvert f(26)^2)-f(22)^2)\rvert}{2}\right\rceil$=96	3
2	d(a_1, b_1) =1	$\left\lceil\frac{\lvert f(28)^2)-f(9)^2)\rvert}{2}\right\rceil$ =352	3	20	d(b_1, b_2) =1	$\left\lceil\frac{\lvert f(9)^2)-f(14)^2)\rvert}{2}\right\rceil$=58	3
3	d(a_1, b_2) =1	$\left\lceil\frac{\lvert f(16)^2)-f(19)^2)\rvert}{2}\right\rceil$=53	3	21	d(b_1, b_3) =2	$\left\lceil\frac{\lvert f(9)^2)-f(15)^2)\rvert}{2}\right\rceil$=72	3
4	d(a_1, b_3) =1	$\left\lceil\frac{\lvert f(16)^2)-f(24)^2)\rvert}{2}\right\rceil$=160	3	22	d(b_1, b_4) =1	$\left\lceil\frac{\lvert f(9)^2)-f(20)^2)\rvert}{2}\right\rceil$=160	3
5	d(a_1, b_4) =1	$\left\lceil\frac{\lvert f(16)^2)-f(23)^2)\rvert}{2}\right\rceil$=137	3	23	d(b_1, b_5) =1	$\left\lceil\frac{\lvert f(9)^2)-f(21)^2)\rvert}{2}\right\rceil$=180	3
6	d(a_1, b_5) =1	$\left\lceil\frac{\lvert f(16)^2)-f(21)^2)\rvert}{2}\right\rceil$=93	3	24	d(b_1, b_6) =2	$\left\lceil\frac{\lvert f(9)^2)-f(22)^2)\rvert}{2}\right\rceil$=202	3
7	d(a_1, b_6) =1	$\left\lceil\frac{\lvert f(28)^2)-f(22)^2)\rvert}{2}\right\rceil$=150	3	25	d(b_2, b_3) =2	$\left\lceil\frac{\lvert f(14)^2)-f(15)^2)\rvert}{2}\right\rceil$=15	3
8	d(a_2, b_1) =1	$\left\lceil\frac{\lvert f(27)^2)-f(9)^2)\rvert}{2}\right\rceil$=324	3	26	d(b_2, b_4) = 2	$\left\lceil\frac{\lvert f(14)^2)-f(20)^2)\rvert}{2}\right\rceil$=102	3
9	d(a_2, b_2) =1	$\left\lceil\frac{\lvert f(27)^2)-f(14)^2)\rvert}{2}\right\rceil$=267	3	27	d(b_2, b_5) = 2	$\left\lceil\frac{\lvert f(14)^2)-f(21)^2)\rvert}{2}\right\rceil$=123	3
10	d(a_2, b_3) =1	$\left\lceil\frac{\lvert f(27)^2)-f(15)^2)\rvert}{2}\right\rceil$=252	3	28	d(b_2, b_6) = 2	$\left\lceil\frac{\lvert f(14)^2)-f(22)^2)\rvert}{2}\right\rceil$ =144	3
11	d(a_2, b_4) =1	$\left\lceil\frac{\lvert f(27)^2)-f(20)^2)\rvert}{2}\right\rceil$=165	3	29	d(b_3, b_4) = 1	$\left\lceil\frac{\lvert f(15)^2)-f(20)^2)\rvert}{2}\right\rceil$ =88	3
12	d(a_2, b_5) =1	$\left\lceil\frac{\lvert f(27)^2)-f(21)^2)\rvert}{2}\right\rceil$=343	3	30	d(b_3, b_5) = 2	$\left\lceil\frac{\lvert f(15)^2)-f(21)^2)\rvert}{2}\right\rceil$ =108	3
13	d(a_2, b_6) =1	$\left\lceil\frac{\lvert f(27)^2)-f(22)^2)\rvert}{2}\right\rceil$=323	3	31	d(b_3, b_6) = 2	$\left\lceil\frac{\lvert f(15)^2)-f(22)^2)\rvert}{2}\right\rceil$ =130	3
14	d(a_3, b_1) =1	$\left\lceil\frac{\lvert f(26)^2)-f(9)^2)\rvert}{2}\right\rceil$=298	3	32	d(b_3, b_6) = 2	$\left\lceil\frac{\lvert f(15)^2)-f(22)^2)\rvert}{2}\right\rceil$ =130	3
15	d(a_3, b_2) =1	$\left\lceil\frac{\lvert f(26)^2)-f(14)^2)\rvert}{2}\right\rceil$=240	3	33	d(b_4, b_5) = 2	$\left\lceil\frac{\lvert f(20)^2)-f(21)^2)\rvert}{2}\right\rceil$ =21	3
16	d(a_3, b_3) =1	$\left\lceil\frac{\lvert f(26)^2)-f(15)^2)\rvert}{2}\right\rceil$=226	3	34	d(b_4, b_6) = 2	$\left\lceil\frac{\lvert f(20)^2)-f(22)^2)\rvert}{2}\right\rceil$ =42	3
17	d(a_3, b_4) =1	$\left\lceil\frac{\lvert f(26)^2)-f(20)^2)\rvert}{2}\right\rceil$=138	3	35	d(b_5, b_6) = 1	$\left\lceil\frac{\lvert f(21)^2)-f(22)^2)\rvert}{2}\right\rceil$ =22	3
18	d(a_3, b_5) =1	$\left\lceil\frac{\lvert f(26)^2)-f(21)^2)\rvert}{2}\right\rceil$=118	3	36	d(a_1, a_3) =2	$\left\lceil\frac{\lvert f(28)^2)-f(26)^2)\rvert}{2}\right\rceil$ =54	3

This forms all the pairs bijective function f satisfies the RAMC.Therefore FEGRAMN P_{3+6}= f $_w(a_1)$= 28

Theorem 5 : Farey Edge graceful in Radio Analytic mean number of Path graphs P_{a+b}= 44

Proof:

Let $a_1, a_2, a_3, a_4, a_5, a_6,$ *and* $b_1, b_2, b_3, b_4, b_5, b_6, b_7$ be the vertices of path graph.we define the edge set E= $\{a_i a_{i+1}, b_i b_{i+1,}\ a_i b_i, 1 \le i \le 6\}$.The diameter of the path graph is 2. Here Total number of vertices 13 and edges 52 .The diameter of the path graph is 2.. Here Vertex set Upper path V(G)= a_i , 1≤ i≤ 6 , Vertex set Bottam path V(G)= b_i , 1≤ i≤ 7. Here which vertex having maximum integer it is Called FEGRAMN. We Define a function f : E(P $_{a+b}$) → F (G)

f(a_i)=$\frac{1}{1+i}$, 1≤i≤ b ,

f(a_2, b_i)=$\frac{2i}{1+2i}$, 1≤i≤ a-2 , f(a_2, b_{i+4})=$\frac{b+2i}{b+2+2j}$, 1≤i≤ 3, 1≤j≤ 3 , f(a_{2+i}, a_{i+3})=$\frac{6+4i}{7+4i}$,i= 1,2,3

f(a_3, b_i)=$\frac{5+5i}{b+2+4i}$, 1≤i≤ 3 , f(a_3, b_i)=$\frac{5+5i}{3b+5j}$, 4≤i≤ a , 1≤j≤ $\frac{b}{2}$, f(a_4, b_i)=$\frac{7b-2+3j}{7b+4j}$, 1≤i≤ b , 1≤j≤ b ,

f(a_5, b_i)=$\frac{10b+a+4i}{1b+2+4i}$, 1≤i≤ 4 ,f(a_5, b_{i+4})=$\frac{13b+2+4i}{13b+4+4i}$, 1≤i≤ $\frac{a}{3}$, f(a_6, b_i)=$\frac{15b+4+2i}{15b+4+2j}$, 1≤i≤ 4 , 3≤j≤ 6 ,

f(a_6, b_{i+4})=$\frac{16b+5+2i}{17b+2+2j}$, 1≤i≤ 3 , 2≤j≤ 6, j≠5 , f(b_1, b_2)=$\frac{6a+4}{7a+1}$, f(b_2, b_3)=$\frac{7a+3}{7a}$, f(b_3, b_4)=$\frac{9a-1}{9a+2}$, f(b_4, b_5)=$\frac{10a+1}{11a+3}$

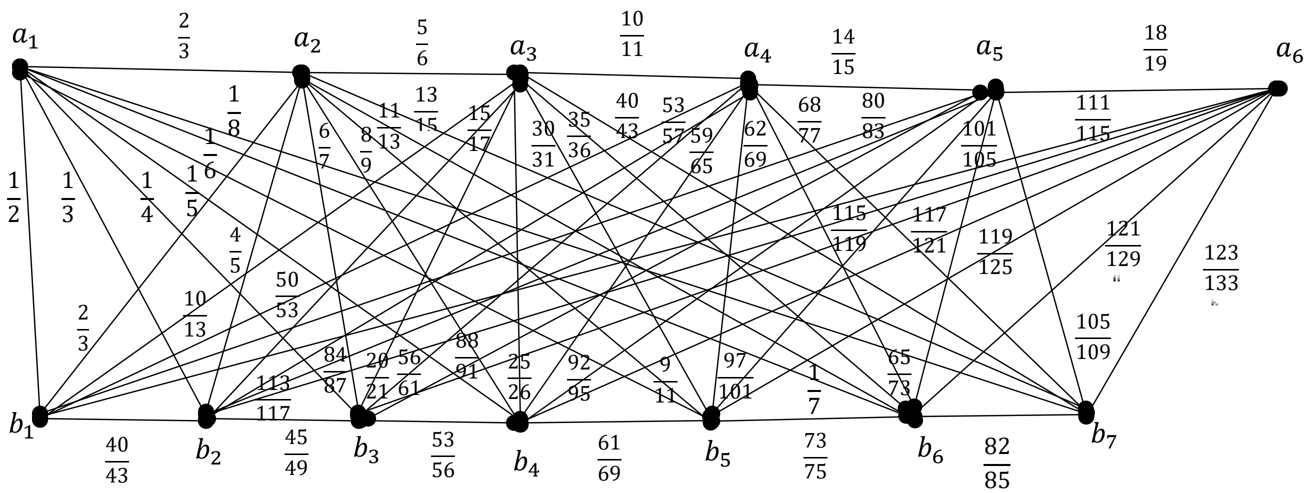
f(b_6, b_7)=$\frac{12b-2}{12b+1}$, f(b_5, b_6)=$\frac{10b+3}{11b-2}$

The vertex weights are $f_w(v_i) = \sum_{v_i v_{j \in E(G)}}(x_2 - x_1)$= f $_w(a_1)$= 28 ,

Similarly, f $_w(a_2)$= 12 , f $_w(a_3)$= 14 , f $_w(a_4)$= 44 , f $_w(a_5)$= 26, f $_w(a_6)$= 41, f $_w(b_1)$= 18, f $_w(b_2)$= 30, f $_w(b_3)$= 24, f $_w(b_4)$= 29 , f $_w(b_5)$= 35, f $_w(b_6)$=36, f $_w(b_7)$=38

The above all the vertex weights are indicated distinict. Hence P$_{a+b}$ is Farey edge graceful graph.Next we will find Farey Edge strength of the graph. we subtract label from numerator to denominator of every edge label.Frequently we have receive the label of every edge from 1,2,3 ... ... $a + b$. Finally Farey edge strength is $a + b$. Next we will going to prove Farey Edge graceful graph Path vertex set satisfied Radio Analytic mean condition.

Example 5:



FEGRAMN P$_{6+7}$ = f $_w(a_4)$= 44

Check the Farey Edge graceful graph satisfied Radio Analytic mean condition:

S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil\frac{\lvert f((u^2)-f(v)^2)\rvert}{2}\right\rceil$	diam (G)+1	S.No	If any two vertices distance 1 &2	Analytic mean Condition $\left\lceil\frac{\lvert f((u^2)-f(v)^2)\rvert}{2}\right\rceil$	diam (G)+1
1	d(a_1, a_2) =1	$\left\lceil\frac{\lvert f((28)^2)-f(12)^2)\rvert}{2}\right\rceil$ =320	3	19	d(a_6, b_2) =1	$\left\lceil\frac{\lvert f(41)^2)-f(30)\rvert}{2}\right\rceil$= 391	3
2	d(a_1, b_1) =1	$\left\lceil\frac{\lvert f((28)^2)-f(18)^2)\rvert}{2}\right\rceil$ =230	3	20	d(a_6, b_3) =1	$\left\lceil\frac{\lvert f(41)^2)-f(24)^2)\rvert}{2}\right\rceil$=553	3
3	d(a_1, b_2) =1	$\left\lceil\frac{\lvert f((28)^2)-f(30)^2)\rvert}{2}\right\rceil$=58	3	21	d(a_6, b_4) =2	$\left\lceil\frac{\lvert f(41)^2)-f(29)^2)\rvert}{2}\right\rceil$=420	3
4	d(a_1, b_3) =1	$\left\lceil\frac{\lvert f((28)^2)-f(24)^2)\rvert}{2}\right\rceil$=104	3	22	d(a_6, b_5) =1	$\left\lceil\frac{\lvert f(41)^2)-f(35)^2)\rvert}{2}\right\rceil$=228	3

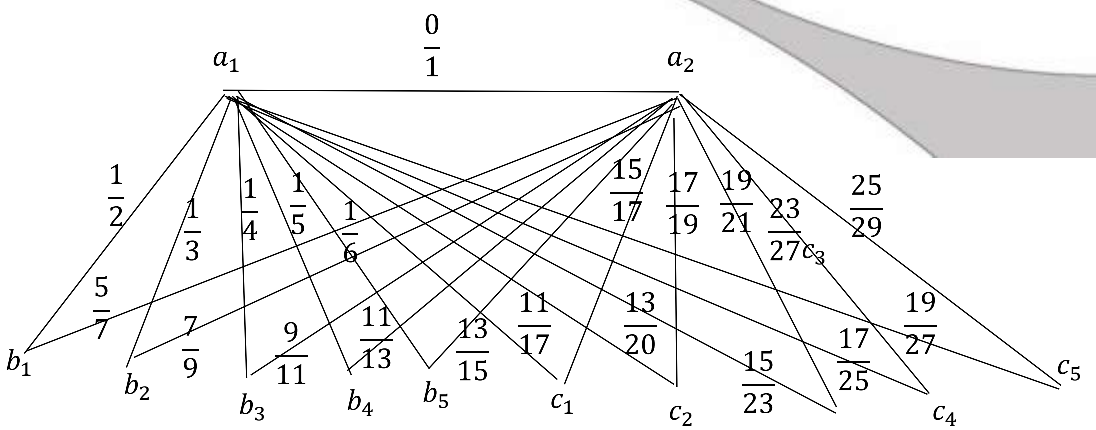
5	d(a_1, b_4) =1	$\left\lceil\frac{\lvert f((28)^2)-f(29)^2)\rvert}{2}\right\rceil$=12	3	23	d(a_6, b_6) =1	$\left\lceil\frac{\lvert f((41)^2)-f(36)^2)\rvert}{2}\right\rceil$=193	3
6	d(a_1, b_5) =1	$\left\lceil\frac{\lvert f((28)^2)-f(35)^2)\rvert}{2}\right\rceil$=221	3	24	d(a_6, b_7) =2	$\left\lceil\frac{\lvert f((41)^2)-f(38)^2)\rvert}{2}\right\rceil$=119	3
7	d(a_1, b_6) =1	$\left\lceil\frac{\lvert f((28)^2)-f(36)^2)\rvert}{2}\right\rceil$=256	3	25	d(a_1, a_3) =2	$\left\lceil\frac{\lvert f((28)^2)-f(14)^2)\rvert}{2}\right\rceil$=294	3
8	d(a_1, b_7) =1	$\left\lceil\frac{\lvert f((28)^2)-f(38)^2)\rvert}{2}\right\rceil$=330	3	26	d(a_1, a_4) =2	$\left\lceil\frac{\lvert f((28)^2)-f(44)^2)\rvert}{2}\right\rceil$ =576	3
9	d(a_2, b_1) =1	$\left\lceil\frac{\lvert f((12)^2)-f(18)^2)\rvert}{2}\right\rceil$=90	3	27	d(a_1, a_5) = 2	$\left\lceil\frac{\lvert f(28)^2)-f(26)\rvert}{2}\right\rceil = 54$	3
10	d(a_2, b_2) =1	$\left\lceil\frac{\lvert f((12)^2)-f(30)^2)\rvert}{2}\right\rceil$=378	3	28	d(a_1, a_6) = 2	$\left\lceil\frac{\lvert f((28)^2)-f(41)^2)\rvert}{2}\right\rceil$=449	3
11	d(a_2, b_3) =1	$\left\lceil\frac{\lvert f((12)^2)-f(24)^2)\rvert}{2}\right\rceil$=216	3	29	d(a_2, a_3) = 2	$\left\lceil\frac{\lvert f(12)^2)-f(14)^2)\rvert}{2}\right\rceil$ =26	3
12	d(a_2, b_4) =1	$\left\lceil\frac{\lvert f((12)^2)-f(29)^2)\rvert}{2}\right\rceil$=349	3	30	d(a_2, a_4) = 1	$\left\lceil\frac{\lvert f(12)^2)-f(44)^2)\rvert}{2}\right\rceil$ =896	3
13	d(a_2, b_5) =1	$\left\lceil\frac{\lvert f((12)^2)-f(35)^2)\rvert}{2}\right\rceil$=541	3	31	d(a_2, a_5) = 2	$\left\lceil\frac{\lvert f(12)^2)-f(26)^2)\rvert}{2}\right\rceil$ =266	3
14	d(a_2, b_6) =1	$\left\lceil\frac{\lvert f((12)^2)-f(36)^2)\rvert}{2}\right\rceil$=576	3	32	d(a_2, a_6) = 2	$\left\lceil\frac{\lvert f(12)^2)-f(41)^2)\rvert}{2}\right\rceil$ =769	3
15	d(a_2, b_7) =1	$\left\lceil\frac{\lvert f((12)^2) - f(38)^2)\rvert}{2}\right\rceil = 650$	3	33	d(a_3, a_4) = 1	$\left\lceil\frac{\lvert f(14)^2)-f(44)\rvert}{2}\right\rceil$ =870	3
16	d(a_3, b_1) =1	$\left\lceil\frac{\lvert f((14)^2)-f(18)^2)\rvert}{2}\right\rceil$=64	3	34	d(a_3, a_5) = 2	$\left\lceil\frac{\lvert f(14)^2)-f(26)^2)\rvert}{2}\right\rceil$ =240	3
17	d(a_3, b_2) =1	$\left\lceil\frac{\lvert f((14)^2)-f(30)^2)\rvert}{2}\right\rceil$=352	3	35	d(a_3, a_6) = 2	$\left\lceil\frac{\lvert f(14)^2)-f(41)^2)\rvert}{2}\right\rceil$ =743	3
18	d(a_3, b_3) =1	$\left\lceil\frac{\lvert f((14)^2)-f(24)^2)\rvert}{2}\right\rceil$=190	3	36	d(a_4, a_5) = 1	$\left\lceil\frac{\lvert f(44)^2)-f(26)\rvert}{2}\right\rceil$ =630	3
37	d(a_3, b_4) =1	$\left\lceil\frac{\lvert f((14)^2)-f(29)^2)\rvert}{2}\right\rceil$=323	3	56	d(a_4, a_6) = 2	$\left\lceil\frac{\lvert f(44)^2)-f(41)\rvert}{2}\right\rceil$ =128	3
38	d(a_3, b_5) =1	$\left\lceil\frac{\lvert f(14)^2)-f(35)^2)\rvert}{2}\right\rceil$=515	3	57	d(a_5, a_6) = 1	$\left\lceil\frac{\lvert f(21)^2)-f(22)^2)\rvert}{2}\right\rceil$ =22	3
39	d(a_3, b_6) =1	$\left\lceil\frac{\lvert f((14)^2)-f(36)^2)\rvert}{2}\right\rceil$=550	3	58	d(b_1, b_2) =1	$\left\lceil\frac{\lvert f(18)^2)-f(30)^2)\rvert}{2}\right\rceil$ =288	3
40	d(a_3, b_7) =1	$\left\lceil\frac{\lvert f((14)^2)-f(38)^2)\rvert}{2}\right\rceil$=624	3	59	d(b_1, b_3) =2	$\left\lceil\frac{\lvert f((18)^2)-f(24)^2)\rvert}{2}\right\rceil$=126	3
41	d(a_4, b_1) =1	$\left\lceil\frac{\lvert f((44)^2)-f(18)^2)\rvert}{2}\right\rceil$=806	3	60	d(b_1, b_4) =2	$\left\lceil\frac{\lvert f((18)^2)-f(29)^2)\rvert}{2}\right\rceil$= 259	3
42	d(a_4, b_2) =1	$\left\lceil\frac{\lvert f((44)^2)-f(30)^2)\rvert}{2}\right\rceil$=518	3	61	d(b_1, b_5) =1	$\left\lceil\frac{\lvert f((18)^2)-f(35)^2)\rvert}{2}\right\rceil$ =451	3
43	d(a_4, b_3) =1	$\left\lceil\frac{\lvert f((44)^2)-f(24)^2)\rvert}{2}\right\rceil$=680	3	62	d(b_1, b_6) =1	$\left\lceil\frac{\lvert f((18)^2)-f(36)^2)\rvert}{2}\right\rceil$ =486	3

44	d(a_4, b_4) =1	$\left\lceil\frac{\lvert f((44)^2)-f(29)^2)\rvert}{2}\right\rceil$=548	3	63	d(b_1, b_7) =1	$\left\lceil\frac{\lvert f((18)^2)-f(38)^2)\rvert}{2}\right\rceil$=560	3
45	d(a_4, b_5) =1	$\left\lceil\frac{\lvert f((44)^2)-f(35)^2)\rvert}{2}\right\rceil$=356	3	64	d(b_2, b_3) =1	$\left\lceil\frac{\lvert f((30)^2)-f(24)^2)\rvert}{2}\right\rceil$= 162	3
46	d(a_4, b_6) =1	$\left\lceil\frac{\lvert f((44)^2)-f(36)^2)\rvert}{2}\right\rceil$=320	3	65	d(b_2, b_4) =1	$\left\lceil\frac{\lvert f((30)^2)-f(29)^2)\rvert}{2}\right\rceil$=30	3
47	d(a_4, b_7) =1	$\left\lceil\frac{\lvert f((44)^2)-f(38)^2)\rvert}{2}\right\rceil$=246	3	66	d(b_2, b_5) =1	$\left\lceil\frac{\lvert f((30)^2)-f(35)^2)\rvert}{2}\right\rceil$=163	3
48	d(a_5, b_1) =1	$\left\lceil\frac{\lvert f((26)^2)-f(18)^2)\rvert}{2}\right\rceil$=176	3	67	d(b_2, b_6) =1	$\left\lceil\frac{\lvert f((30)^2)-f(36)^2)\rvert}{2}\right\rceil$=198	3
49	d(a_5, b_2) =1	$\left\lceil\frac{\lvert f((26)^2)-f(30)^2)\rvert}{2}\right\rceil$=112	3	68	d(b_2, b_7) =1	$\left\lceil\frac{\lvert f((30)^2)-f(38)^2)\rvert}{2}\right\rceil$=272	3
50	d(a_5, b_3) =1	$\left\lceil\frac{\lvert f((26)^2)-f(24)^2)\rvert}{2}\right\rceil$=50	3	69	d(b_3, b_4) =1	$\left\lceil\frac{\lvert f((24)^2)-f(29)\rvert}{2}\right\rceil$ =133	3
51	d(a_5, b_4) =1	$\left\lceil\frac{\lvert f((26)^2)-f(29)^2)\rvert}{2}\right\rceil$=83	3	70	d(b_3, b_5) =1	$\left\lceil\frac{\lvert f((24)^2)-f(35)^2)\rvert}{2}\right\rceil$=325	3
52	d(a_5, b_5) =1	$\left\lceil\frac{\lvert f((26)^2)-f(35)^2)\rvert}{2}\right\rceil$=275	3	71	d(b_3, b_6) =1	$\left\lceil\frac{\lvert f((24)^2)-f(36)^2)\rvert}{2}\right\rceil$=360	3
53	d(a_5, b_6) =1	$\left\lceil\frac{\lvert f((26)^2)-f(36)^2)\rvert}{2}\right\rceil$=310	3	72	d(b_3, b_7) =1	$\left\lceil\frac{\lvert f((24)^2)-f(38)^2)\rvert}{2}\right\rceil$=434	3
54	d(a_5, b_7) =1	$\left\lceil\frac{\lvert f((26)^2)-f(38)^2)\rvert}{2}\right\rceil$=384	3	73	d(b_4, b_5) =1	$\left\lceil\frac{\lvert f((29)^2)-f(35)\rvert}{2}\right\rceil$=192	3
55	d(a_6, b_1) =1	$\left\lceil\frac{\lvert f((41)^2)-f(18)^2)\rvert}{2}\right\rceil$=680	3	74	d(b_4, b_6) =1	$\left\lceil\frac{\lvert f((29)^2)-f(36)^2)\rvert}{2}\right\rceil$ =228	3

This forms all the pairs of Farey Edge graceful graphs satisfied RAMC.Therefore FEGRAMN P_{6+7} = f $_w(a_4)$= 44

Theorem 6: Farey Edge Graceful graph of Radio Analytic mena number in connected graph P_2+ N_{10} is 53.
Proof:
Let $a_1, a_2,$ *and* $b_1, b_2, b_3, b_4, b_5, c_1, c_{2,} c_{3,}, c_{4,}, c_{5,}$ be the path vertices and bottom vertices of**P_2 + N_{10}**graph.we define the edge set E= $\{a_i a_{i+1}, b_i b_{i+1,}\ a_1 b_i, a_1 c_i, a_2 b_i\ , a_2 c_i\ 1 \leq i \leq 6\}$.The diameter of the path graph is 2. Here Total number of vertices 12 and edges 21 . Here Vertex set Upper path V(G)= a_i , 1≤ i≤ 2 , Vertex set Bottom path V(G)= b_i , 1≤ i≤ 5, V(c)= c_i , 1≤ i≤ 5 . Here which vertex having maximum integer it is Called FEGRAMN. We Define a function f : E(P_{a+b}) → F (G)

f$(a_i a_{i+1})$= $\frac{0}{1}$, i=1 , f(a_1, b_i)= $\frac{1}{1+i}$, 1≤i≤ 5 , f(a_2, b_i)= $\frac{2i+3}{5+2j}$, 1≤i≤ 5 ,f(a_1, c_i)= $\frac{2i+3}{5+2j}$, 1≤i≤ 5
f(a_2, c_i)= $\frac{2i+3}{5+2j}$, 1≤i≤ 5.
Example 6 :



FEGRAMN : f(a_1)= 53
f(a_1)= 53 , f(a_2)= 25, f(b_1)= 3, f(b_2)= 4, f(b_3)= 5, f(b_4)= 6, f(b_5)=7, f(c_1)= 8, f(c_2)= 9, f(c_3)= 10,
f(c_4)= 11, f(c_5)= 12,

The above all the vertex weights are indicated distinict. Hence P_{a+b} is Farey edge graceful graph.Next we will find Farey Edge strength of the graph. we subtract label from numerator to denominator of every edge label.Frequently we have receive the label of every edge from 1,2,3 … … $a + b$. Finally Farey edge strength is $a + b$. Next we will going to prove Farey Edge graceful graph Path vertex set satisfied Radio Analytic mean condition.

S.no	If any two vertices distance 1 & 2	$\left\lceil\frac{\lvert f(u^2)-f(v^2)\rvert}{2}\right\rceil$	Diam +1	S.no	If any two vertices distance 1 & 2	$\left\lceil\frac{\lvert f(u^2)-f(v^2)\rvert}{2}\right\rceil$	Diam +1
1	d$(\boldsymbol{a_1}, \boldsymbol{a_2})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(25)^2)\rvert}{2}\right\rceil$ =1092	3	29	d$(\boldsymbol{b_1}, \boldsymbol{b_2})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(4)^2)\rvert}{2}\right\rceil$ =3	3
2	d$(\boldsymbol{a_1}, \boldsymbol{b_1})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(3)^2)\rvert}{2}\right\rceil$ =1400	3	30	d$(\boldsymbol{b_1}, \boldsymbol{b_3})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(5)^2)\rvert}{2}\right\rceil$ =8	3
3	d$(\boldsymbol{a_1}, \boldsymbol{b_2})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(4)^2)\rvert}{2}\right\rceil$ =1397	3	31	d$(\boldsymbol{b_1}, \boldsymbol{b_4})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(6)^2)\rvert}{2}\right\rceil$ =14	3
4	d$(\boldsymbol{a_1}, \boldsymbol{b_3})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(5)^2)\rvert}{2}\right\rceil = 1392$	3	32	d$(\boldsymbol{b_1}, \boldsymbol{b_5})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(7)^2\rvert}{2}\right\rceil$ =20	3
5	d$(\boldsymbol{a_1}, \boldsymbol{b_4})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(6)^2)\rvert}{2}\right\rceil$ =1387	3	33	d$(\boldsymbol{b_1}, \boldsymbol{c_1})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(8)^2)\rvert}{2}\right\rceil$ =28	3
6	d$(\boldsymbol{a_1}, \boldsymbol{b_5})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(7)^2)\rvert}{2}\right\rceil$ =1380	3	34	d$(\boldsymbol{b_1}, \boldsymbol{c_2})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(9)^2)\rvert}{2}\right\rceil$ =36	3
7	d$(\boldsymbol{a_1}, \boldsymbol{c_1})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(8)^2)\rvert}{2}\right\rceil$ =1373	3	35	d$(\boldsymbol{b_1}, \boldsymbol{c_3})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(10)^2)\rvert}{2}\right\rceil$ =46	3
8	d$(\boldsymbol{a_1}, \boldsymbol{c_2})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(9)^2)\rvert}{2}\right\rceil$ =1364	3	36	d$(\boldsymbol{b_1}, \boldsymbol{c_4})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(11)^2)\rvert}{2}\right\rceil$ =56	3
9	d$(\boldsymbol{a_1}, \boldsymbol{c_3})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(10)^2)\rvert}{2}\right\rceil$ =1355	3	37	d$(\boldsymbol{b_1}, \boldsymbol{c_5})$ **=2**	$\left\lceil\frac{\lvert f(3)^2)-f(12)^2)\rvert}{2}\right\rceil = 68$	3
10	d$(\boldsymbol{a_1}, \boldsymbol{c_4})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(11)^2)\rvert}{2}\right\rceil$ =1344	3	38	d$(\boldsymbol{b_2}, \boldsymbol{b_3})$ **=2**	$\left\lceil\frac{\lvert f(4)^2)-f(5)^2)\rvert}{2}\right\rceil$ =5	3
11	d$(\boldsymbol{a_1}, \boldsymbol{c_5})$ **=1**	$\left\lceil\frac{\lvert f(53)^2)-f(12)^2)\rvert}{2}\right\rceil$ =1333	3	39	d$(\boldsymbol{b_2}, \boldsymbol{b_4})$ **=2**	$\left\lceil\frac{\lvert f(4)^2)-f(6)^2)\rvert}{2}\right\rceil$ =10	3
12	d$(\boldsymbol{a_2}, \boldsymbol{b_1})$ **=1**	$\left\lceil\frac{\lvert f(25)^2)-f(3)^2)\rvert}{2}\right\rceil$ =308	3	40	d$(\boldsymbol{b_2}, \boldsymbol{b_5})$ **=2**	$\left\lceil\frac{\lvert f(4)^2)-f(7)^2)\rvert}{2}\right\rceil$ =17	3
13	d$(\boldsymbol{a_2}, \boldsymbol{b_2})$ **=1**	$\left\lceil\frac{\lvert f(25)^2)-f(4)^2)\rvert}{2}\right\rceil$ =305	3	41	d$(\boldsymbol{b_2}, \boldsymbol{c_1})$ **=2**	$\left\lceil\frac{\lvert f(4)^2)-f(8)^2)\rvert}{2}\right\rceil$ =24	3
14	d$(\boldsymbol{a_2}, \boldsymbol{b_3})$ **=1**	$\left\lceil\frac{\lvert f(25)^2)-f(4)^2)\rvert}{2}\right\rceil$ =305	3	42	d$(\boldsymbol{b_2}, \boldsymbol{c_2})$ **=2**	$\left\lceil\frac{\lvert f(4)^2)-f(9)^2)\rvert}{2}\right\rceil$ =33	3
15	d$(\boldsymbol{a_2}, \boldsymbol{b_4})$ **=1**		3	43	d$(\boldsymbol{b_2}, \boldsymbol{c_3})$ **=2**	$\left\lceil\frac{\lvert f(4)^2)-f(10)^2)\rvert}{2}\right\rceil$ =42	3

		$\left\lceil\frac{\lvert f(25)^2)-f(6)^2)\rvert}{2}\right\rceil$ =295					
16	d$(\boldsymbol{a_2}, \boldsymbol{b_5})$ =1	$\left\lceil\frac{\lvert f(25)^2)-f(7)^2)\rvert}{2}\right\rceil$ =288	3	44	d$(\boldsymbol{b_2}, \boldsymbol{c_4})$ =2	$\left\lceil\frac{\lvert f(4)^2)-f(11)^2)\rvert}{2}\right\rceil$ =53	3
17	d$(\boldsymbol{a_2}, \boldsymbol{c_1})$ =1	$\left\lceil\frac{\lvert f(25)^2)-f(8)^2)\rvert}{2}\right\rceil$ =281	3	45	d$(\boldsymbol{b_2}, \boldsymbol{c_5})$ =2	$\left\lceil\frac{\lvert f(4)^2)-f(12)^2)\rvert}{2}\right\rceil$ =64	3
18	d$(\boldsymbol{a_2}, \boldsymbol{c_2})$ =1	$\left\lceil\frac{\lvert f(25)^2)-f(9)^2)\rvert}{2}\right\rceil$ =272	3	46	d$(\boldsymbol{b_3}, \boldsymbol{b_4})$ =2	$\left\lceil\frac{\lvert f(5)^2)-f(6)^2)\rvert}{2}\right\rceil$ =6	3
19	d$(\boldsymbol{a_2}, \boldsymbol{c_3})$ =1	$\left\lceil\frac{\lvert f(25)^2)-f(10)^2)\rvert}{2}\right\rceil$ =263	3	47	d$(\boldsymbol{b_3}, \boldsymbol{b_5})$ =2	$\left\lceil\frac{\lvert f(5)^2)-f(7)^2)\rvert}{2}\right\rceil$ =12	3
20	d$(\boldsymbol{a_2}, \boldsymbol{c_4})$ =1	$\left\lceil\frac{\lvert f(25)^2)-f(11)^2)\rvert}{2}\right\rceil$ =252	3	48	d$(\boldsymbol{b_3}, \boldsymbol{c_1})$ =2	$\left\lceil\frac{\lvert f(5)^2)-f(8)^2)\rvert}{2}\right\rceil$ =20	3
21	d$(\boldsymbol{a_2}, \boldsymbol{c_5})$ =1	$\left\lceil\frac{\lvert f(25)^2)-f(12)^2)\rvert}{2}\right\rceil = 241$	3	49	d$(\boldsymbol{b_3}, \boldsymbol{c_2})$ =2	$\left\lceil\frac{\lvert f(5)^2)-f(9)^2)\rvert}{2}\right\rceil$ =28	3
22	d$(\boldsymbol{b_3}, \boldsymbol{c_3})$ =2	$\left\lceil\frac{\lvert f(5)^2)-f(10)^2)\rvert}{2}\right\rceil$ =38	3	50	d$(\boldsymbol{b_4}, \boldsymbol{c_1})$ =2	$\left\lceil\frac{\lvert f(6)^2)-f(8)^2)\rvert}{2}\right\rceil$ =14	3
23	d$(\boldsymbol{b_3}, \boldsymbol{c_4})$ =2	$\left\lceil\frac{\lvert f(5)^2)-f(11)^2)\rvert}{2}\right\rceil$ =48	3	51	d$(\boldsymbol{b_4}, \boldsymbol{c_2})$ =2	$\left\lceil\frac{\lvert f(6)^2)-f(9)^2)\rvert}{2}\right\rceil$ =23	3
24	d$(\boldsymbol{b_3}, \boldsymbol{c_5})$ =2	$\left\lceil\frac{\lvert f(5)^2)-f(12)^2)\rvert}{2}\right\rceil$ =60	3	52	d$(\boldsymbol{b_4}, \boldsymbol{c_3})$ =2	$\left\lceil\frac{\lvert f(6)^2)-f(10)^2)\rvert}{2}\right\rceil$ =32	3
25	d$(\boldsymbol{b_4}, \boldsymbol{b_5})$ =2	$\left\lceil\frac{\lvert f(6)^2)-f(7)^2)\rvert}{2}\right\rceil$ =7	3	53	d$(\boldsymbol{b_4}, \boldsymbol{c_4})$ =2	$\left\lceil\frac{\lvert f(6)^2)-f(11)^2)\rvert}{2}\right\rceil$ =43	3
26	d$(\boldsymbol{b_5}, \boldsymbol{c_2})$ =2	$\left\lceil\frac{\lvert f(7)^2)-f(9)^2)\rvert}{2}\right\rceil$ =16	3	54	d$(\boldsymbol{b_4}, \boldsymbol{c_5})$ =2	$\left\lceil\frac{\lvert f(6)^2)-f(12)^2)\rvert}{2}\right\rceil$ =54	3
27	d$(\boldsymbol{b_5}, \boldsymbol{c_3})$ =2	$\left\lceil\frac{\lvert f(7)^2)-f(10)^2)\rvert}{2}\right\rceil$ =26	3	55	d$(\boldsymbol{b_5}, \boldsymbol{c_1})$ =2	$\left\lceil\frac{\lvert f(7)^2)-f(8)^2)\rvert}{2}\right\rceil$ =8	3
28	d$(\boldsymbol{b_5}, \boldsymbol{c_4})$ =2	$\left\lceil\frac{\lvert f(7)^2)-f(11)^2)\rvert}{2}\right\rceil$=36	3	56	d$(\boldsymbol{b_5}, \boldsymbol{c_5})$ =2	$\left\lceil\frac{\lvert f(7)^2)-f(12)^2)\rvert}{2}\right\rceil$ =48	3

This forms all the pairs of Farey Edge graceful graphs satisfied RAMC.Therefore FEGRAMN : f(a_1)= 53

Applications of Farey edge graceful graph in Bank sector in moneyTransaction Network:

Consider any Bank accounts as vertices, transactions as edges. Farey edge graceful labelling gives each transaction a unique fractional weight .This reduce duplicate transactions so because vertex sums stay unique.In a bank has 4 branches as consider 4 vertices and transsactions between them 4 edges.If we have 5 Transaction we label F5: $\left\{\frac{o}{1}, \frac{1}{5},\frac{1}{4}, \frac{1}{3}, \frac{2}{5}, \frac{1}{2},\frac{3}{5},\frac{2}{3}, \right\}$. Each branches is load equal to sum of incoming transaction weights mod 1.Because farey edge graceful property all 4 branches get different load values. Load Balancing in Payment systems: The Farey fractions a/b are evenly distributed in. If you assign transaction priority and fee as a Farey fraction you get uniform distributed of load across branches**.**

Applications of Farey edge graceful graph and Radio analytic mean number in Hospital :

Step 1:**Farey edge graceful graph :**

Consider a medium hospital has 4 units like ER,ICU,WARD, OT Converted in 4 vertices and patients transfer 5 edges .We apply farey edge graceful labeling consider F5:$\left\{\frac{0}{1},\frac{1}{5},\frac{1}{4},\frac{1}{3},\frac{2}{5},\frac{1}{2},,\ldots.\right\}$.Assign ER-ICU=1/5, ICU-WARD= 1/4 ,WARD-OT= 1/3 , OT-ER= 2/5 , ER-WARD=1/2 .

Therefore vertex load ER = 1/5 + 2/5 + 1/2 = 8 , Vertex load ICU= 1/5+ 1/4 =7 ,
vertex load WARD = 1/3 +1/4 + 1/2 =6 , vertex load OT= 2/5 + 1/3 = 5 . So all vertices has different nodes.Farey sequence ensure all patients get unique infusion profile and easy to audit for error.

Step 2:**Radio analytic mean number :**

In patients assign in time slots : ER=10 , ICU =15 , WARD= 20, OT=25. We will check ER and ICU at distance 1 and diameter 3. In Radio analytic mean condition is

d(x,y)+$\left\lceil\frac{\lvert f(u)^2)-f(v)^2)\rvert}{2}\right\rceil \geq$ 1+diam G

=> 1 + $\left\lceil\frac{\lvert(10)^2)-(15)^2)\rvert}{2}\right\rceil \geq$ 1+ 3

=> 1+ 63 $\geq$ 4. So remain patients gives to next slot. So avoid the interference between patients .

This method is fair applicable in 200 to 500 beds hospital, not for 5000 patients .Radio analytic mean labeling assign time slots to wards.Ensure 2 nearby wards don't get patients at same time and avoids crowding.

In Future work Farey edge graceful graphs :

Further research may explore practical applications of Farey edge graceful labelling in ,sensors network and communication signal systems. Radio Analytic mean labelling applied Frequency assignment problems, secure data

Transmission, Optimization problems. In Communication network efficient channel assignment is reduced interference between transmitters. In this type of problem can be effectively indicated by graph labelling.Another Extended area in Farey edge graceful Radio Analytic mean labelling to Directed graphs ,vertex weighted graphs , Fuzzy graphs. Signal image process.This type of extension could most significantly elaborate the applicable of Farey edge graceful Radio Analytic mean labelling in real world modelling. In future work can be developed under vertex switching and edge connect switching ,Graph Union, Corona grphs ,prism graphs. This transformation or Preservation of Farey Edge Radio analytic mean graphs lead to general labelling of another theorems.

Conclusions:

In this article provide new idea on Farey edge graceful in Radio Analytic mean number for path and finite path graphs. We have to prove that Farey Edge Graceful path graph admits a RAMN, through a systematic construction that ensure the different vertex labelling. This result establishes to applicable of cycle graph also.. Additionally, we prove assigning appropriate Farey fractions to their vertices satisfy the Radio Analytic mean condition. This demonstrates that Farey edge graceful labelling can be proved Cordial labelling of graphs with intricate fan graph and radial Configurations.The results received in this study broad the class of graphs well known to admit farey edge graceful and Contribute to the Radio analytic mean number of labelling and theoretical development Concept of graph labelling .These findings open avenues for further research on farey Edge graceful labelling under other graph product operations and fuzzy graph families.

Conflicts of Interest :

The author(s) declare(s) that there is no conflict of interest regarding the publication of this pap

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