Advances in Mathematics: Scientific Journal 8 (2019), no.3, 781–786
(Special issue on ICRAPAM)
ISSN 1857-8365 printed version
ISSN 1857-8438 electronic version

Further results on super exponential mean graphs

R. Rathajeyalakshmi[1], A. Rajesh Kannan[2]

[1&2]*Department of Mathematics*

Mepco Schlenk Engineering College, Sivakasi- 626 005, Tamil Nadu, INDIA

Email: **rratha@mepcoeng.ac.in, rajmaths@gmail.com,**

Abstract Let G be a graph and $f: V(G) \to \{1,2,3,\dots,p+q\}$ be an injection. For each uv, the induced edge labeling f^* is defined as

$$\chi^*(uv) = \left\lceil \frac{1}{e} \left(\frac{\chi(v)^{\chi(v)}}{\chi(u)^{\chi(u)}}\right)^{\frac{1}{\chi(v)-\chi(u)}} \right\rceil.$$

Then f is called a super exponential mean labeling if $f\big(V(G)\big) \cup \{f^*(uv): uv \in E(G)\} = \{1,2,3,\dots,p+q\}$. A graph that admits a super exponential mean labeling is called a super exponential mean graph. In this paper, we have discussed the super exponential meanness of some standard graphs.

AMS 2010 Mathematics Subject Classification. 05C78.

Keywords Exponential mean graph, super exponential mean labeling, super exponential mean graph.

1. Introduction

In this paper, only finite, simple and undirected graphs are considered. For terminology, definitions we follow [7] and for survey [6].

A path on n vertices is denoted by P_n. The graph $\hat{G}(p_1, m_1, p_2, m_2, \dots, m_{n-1}, p_n)$ is obtained from n cycles of length $p_1, p_2, \dots, p_n$ and $(n-1)$ paths on $m_1, m_2, \dots, m_{n-1}$ vertices respectively by identifying a cycle and a path at a vertex alternatively as follows: If the j^{th} cycles is of odd length, then its $\left(\frac{p_j+3}{2}\right)^{th}$ vertex is identified with a pendant vertex of j^{th} path and if the j^{th} cycle is of even length, then its $\left(\frac{p_j+2}{2}\right)^{th}$ vertex is identified with a pendant vertex of j^{th} path while the other pendant vertex of the j^{th} path is identified with the first vertex of the $(j+1)^{th}$ cycle. The graph $G^*(p_1, p_2, \dots, p_n)$ is obtained from n cycles of length $p_1, p_2, \dots, p_n$ by identifying consecutive cycles at a vertex as follows. If the j^{th} cycle is of odd length, then its $\left(\frac{p_j+3}{2}\right)^{th}$ vertex is identified with the first vertex of $(j+1)^{th}$ cycle and if the j^{th} cycle is of even length, then its $\left(\frac{p_j+2}{2}\right)^{th}$ vertex is identified with the first vertex of $(j+1)^{th}$ cycle. The graph Tadpoles $T(n,k)$ is obtained by identifying a vertex of the cycle C_n to an end vertex of the path P_k. The triangular ladder $TL_n, n \geq 2$ is a graph obtained by completing the ladder L_n by the edges $u_i v_{i+1}$ for $1 \leq i \leq n-1$, where L_n is the graph $P_2 \times P_n$.

The middle graph $M(G)$ of a graph G is the graph whose vertex set is $\{v: v \in V(G)\} \cup \{e: e \in E(G)\}$ and the edge set is $\{e_1 e_2: e_1, e_2 \in E(G)$ and e_1 and e_2 are adjacent edges of $G\} \cup \{ve: v \in V(G), e \in E(G)$ and e is incident with $v\}$. The total graph $T(G)$ of a graph G is the graph whose vertex set is $V(G) \cup E(G)$ and two vertices are adjacent if and only if either they are adjacent vertices of G or adjacent edges of G or one is a vertex of G and the other one is an edge incident on it. A twig $TW(P_n), n \geq 3$ is a graph obtained from a path by attaching exactly two pendant vertices to each internal vertices to each internal vertices of the path.

The concept of exponential mean labeling was introduced [1] and developed the exponential mean labeling of some standard graphs [2] by by Rajesh Kannan et al.. The concept of super geometric labeling was first introduced by Durai Baskar et al. [3]. Arockiaraj et al. introduced the super F-root square mean labeling of graphs [4]. Rajesh Kannan et al. introduced super exponential mean labeling of graphs [5]. Motivated by the works on graph labeling, we discussed the further results on super exponential mean labeling of some standard graphs.

Let G be a graph and $f: V(G) \rightarrow \{1,2,3,\dots,p+q\}$ be an injection. For each uv, the induced edge labeling f^* is defined as

$$\chi^*(uv) = \left\lfloor \frac{1}{e}\left(\frac{\chi(v)^{\chi(v)}}{\chi(u)^{\chi(u)}}\right)^{\frac{1}{\chi(v)-\chi(u)}} \right\rfloor.$$

Then f is called a super exponential mean labeling if $f(V(G)) \cup \{f^*(uv): uv \in E(G)\} = \{1,2,3,\dots,p+q\}$. A graph that admits a super exponential mean labeling is called a super exponential mean graph.

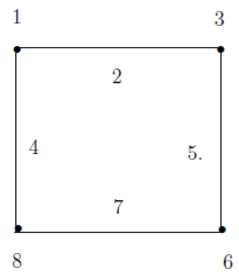

Figure 1. A super exponential mean labeling of C_4

2. Main Results

Theorem 2.1 $\widehat{G}(p_1, k_1, p_2, k_2, \dots, k_{n-1}, p_n)$ is a super exponential mean graph with $p_\alpha \neq 4$ for $2 \leq \alpha \leq n$ and for any k_α.

Proof. Let $\{v_\beta^{(\alpha)}: 1 \leq \alpha \leq n$ and $1 \leq \beta \leq p_\alpha\}$ be the vertices of the n number of cycles in $\widehat{G}$ with $p_\alpha \neq 4$ for $2 \leq \alpha \leq n$.

Let $\{u_\beta^{(\alpha)}: 1 \leq \alpha \leq n-1$ and $1 \leq \beta \leq k_\alpha\}$ be the vertices of the $(n-1)$ number of paths in $\widehat{G}$. For $1 \leq \alpha \leq n-1$, the α^{th} cycle and α^{th} path are identified by a vertex $v_{\left(\frac{p_\alpha+3}{2}\right)}^{(\alpha)}$ and $u_1^{(\alpha)}$ while p_α is odd and $v_{\left(\frac{p_\alpha+2}{2}\right)}^{(\alpha)}$ and $u_1^{(\alpha)}$ while p_α is even and the α^{th} path and the $(\alpha+1)^{th}$ cycle are identified by a vertex $u_{k_\alpha}^{(\alpha)}$ and $v_1^{(\alpha+1)}$ in $\widehat{G}$.

Define $f: V(\hat{G}) \to \{1,2,3, \dots, \sum_{\alpha=1}^{n-1} (2p_\alpha + 2k_\alpha) + 2p_n - 3n + 3\}$ as follows:
When p_1 is odd,

$$f\left(u_\beta^{(1)}\right) = f\left(v_{\lfloor \frac{p_1}{2} \rfloor + 2}^{(1)}\right) + 2\beta - 2, \text{ for } 2 \le \beta \le k_1 \text{ and}$$

$$f\left(v_\beta^{(1)}\right) = \begin{cases} 1 & \beta = 1 \\ 4\beta - 4 & 2 \le \beta \le \left\lfloor \frac{p_1}{2} \right\rfloor \\ 4\beta - 5 & \beta = \left\lfloor \frac{p_1}{2} \right\rfloor + 1 \\ 4\beta - 6 & \beta = \left\lfloor \frac{p_1}{2} \right\rfloor + 2 \\ 4p_1 + 5 - 4\beta & \left\lfloor \frac{p_1}{2} \right\rfloor + 3 \le j \le p_1. \end{cases}$$

The induced edge labeling is as follows:

$$f^*\left(v_\beta^{(1)} v_{\beta+1}^{(1)}\right) = \begin{cases} 4\beta - 2 & 1 \le \beta \le \left\lfloor \frac{p_1}{2} \right\rfloor \\ 4\beta - 3 & \beta = \left\lfloor \frac{p_1}{2} \right\rfloor + 1 \\ 4\beta - 8 & \beta = \left\lfloor \frac{p_1}{2} \right\rfloor + 2 \\ 4p_1 + 3 - 4\beta & \left\lfloor \frac{p_1}{2} \right\rfloor + 3 \le \beta \le p_1 - 1, \end{cases}$$

$$f^*\left(v_1^{(1)} v_{p_1}^{(1)}\right) = 3 \text{ and}$$

$$f^*\left(u_\beta^{(1)} u_{\beta+1}^{(1)}\right) = f\left(v_{\lfloor \frac{p_1}{2} \rfloor + 2}^{(1)}\right) + 2\beta - 1, \text{ for } 1 \le \beta \le k_1 - 1.$$

When p_1 is even,

$$f\left(v_\beta^{(1)}\right) = \begin{cases} 1 & \beta = 1 \\ 4\beta - 4 & 2 \le \beta \le \left\lfloor \frac{p_1}{2} \right\rfloor + 1 \\ 4p_1 + 5 - 4\beta & \left\lfloor \frac{p_1}{2} \right\rfloor + 2 \le \beta \le p_1 \ and \end{cases}$$

$$f\left(u_\beta^{(1)}\right) = f\left(v_{\lfloor \frac{p_1}{2} \rfloor + 1}^{(1)}\right) + 2\beta - 2, \text{ for } 2 \le \beta \le k_1.$$

The induced edge labeling is as follows:

$$f^*\left(v_\beta^{(1)} v_{\beta+1}^{(1)}\right) = \begin{cases} 4\beta - 2 & 1 \le \beta \le \left\lfloor \frac{p_1}{2} \right\rfloor \\ 4p_1 + 3 - 4\beta & \left\lfloor \frac{p_1}{2} \right\rfloor + 1 \le \beta \le p_1 - 1, \end{cases}$$

$$f^*\left(v_1^{(1)} v_{p_1}^{(1)}\right) = 3 \text{ and}$$

$$f^*\left(u_\beta^{(1)} u_{\beta+1}^{(1)}\right) = f\left(v_{\lfloor \frac{p_1}{2} \rfloor + 1}^{(1)}\right) + 2\beta - 1, \text{ for } 1 \le \beta \le k_1 - 1.$$

For $2 \le i \le n - 1$,

$$f\left(u_\beta^{(\alpha)}\right) = \begin{cases} f\left(v_{\lfloor \frac{p_\alpha}{2} \rfloor + 2}^{(\alpha)}\right) + 2\beta - 2 & 2 \le \beta \le k_i \ and\ p_\alpha\ is\ odd\ 1mm \\ f\left(v_{\lfloor \frac{p_\alpha}{2} \rfloor + 1}^{(\alpha)}\right) + 2\beta - 2 & 2 \le \beta \le k_\alpha \ and\ p_\alpha\ is\ even. \end{cases}$$

For $2 \le i \le n$,

$$f\left(v_\beta^{(\alpha)}\right)=\begin{cases}\begin{cases}f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-6 & 2\le\beta\le\left\lfloor\frac{p_\alpha}{2}\right\rfloor+1 \text{ and } p_\alpha \text{ is odd } 1mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4p_\alpha+5-4\beta & \left\lfloor\frac{p_\alpha}{2}\right\rfloor+2\le\beta\le p_\alpha \text{ and } p_\alpha \text{ is odd}\end{cases} 1mm\\ \begin{cases}f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-6 & 2\le\beta\le\left\lfloor\frac{p_\alpha}{2}\right\rfloor \text{ and } p_\alpha \text{ is even } 1mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-5 & \beta=\left\lfloor\frac{p_\alpha}{2}\right\rfloor+1 \text{ and } p_\alpha \text{ is even } 1mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-12 & \beta=\left\lfloor\frac{p_\alpha}{2}\right\rfloor+2 \text{ and } p_\alpha \text{ is even } 1mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4p_\alpha+5-4\beta & \left\lfloor\frac{p_\alpha}{2}\right\rfloor+3\le\beta\le p_\alpha\\ & \text{and } p_\alpha \text{ is even.}\end{cases}\end{cases}$$

The induced edge labeling is as follows:
For $2 \le \alpha \le n$,

$$f^*\left(v_\beta^{(\alpha)}v_{\beta+1}^{(\alpha)}\right)=\begin{cases}\begin{cases}f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+1 & \beta=1 \text{ and } p_\alpha \text{ is odd } 2mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-4 & 2\le\beta\le\left\lfloor\frac{p_\alpha}{2}\right\rfloor+1\\ & \text{and } p_\alpha \text{ is odd } 2mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4p_\alpha+3-4\beta & \left\lfloor\frac{p_\alpha}{2}\right\rfloor+2\le\beta\le p_\alpha-1\\ & \text{and } p_\alpha \text{ is odd}\end{cases} 2mm\\ \begin{cases}f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+1 & \beta=1 \text{ and } p_\alpha \text{ is even } 2mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-4 & 2\le\beta\le\left\lfloor\frac{p_\beta}{2}\right\rfloor-1\\ & \text{and } p_\alpha \text{ is even } 2mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-3 & \beta=\left\lfloor\frac{p_\alpha}{2}\right\rfloor\\ & \text{and } p_\alpha \text{ is even } 2mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4\beta-6 & \beta=\left\lfloor\frac{p_\alpha}{2}\right\rfloor+1\\ & \text{and } p_\alpha \text{ is even } 2mm\\ f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+4p_\alpha+3-4\beta & \left\lfloor\frac{p_\alpha}{2}\right\rfloor+2\le j\le p_\alpha-1\\ & \text{and } p_\alpha \text{ is even,}\end{cases}\end{cases}$$

For $2 \le i \le n-1$,

$$f^*\left(v_1^{(\alpha)}v_{p_\alpha}^{(\alpha)}\right)=f\left(u_{k_{\alpha-1}}^{(\alpha-1)}\right)+3 \text{ and}$$

$$f^*\left(u_\beta^{(\alpha)}u_{\beta+1}^{(\alpha)}\right)=\begin{cases}f\left(v_{\left\lfloor\frac{p_\alpha}{2}\right\rfloor+2}^{(\alpha)}\right)+2\beta-1 & 1\le\beta\le k_\alpha-1 \text{ and } p_\alpha \text{ is odd } 2mm\\ f\left(v_{\left\lfloor\frac{p_\alpha}{2}\right\rfloor+1}^{(\alpha)}\right)+2\beta-1 & 1\le\beta\le k_\alpha-1 \text{ and } p_\alpha \text{ is even.}\end{cases}$$

Hence, f is a super exponential mean labeling of $\hat{G}(p_1,k_1,p_2,k_2,\dots,k_{n-1},p_n)$. Thus the graph $\hat{G}(p_1,k_1,p_2,k_2,\dots,k_{n-1},p_n)$ is a super exponential mean graph with $p_i \neq 4$ for $2 \le i \le n$ and for any k_i.

Corollary 2.2 $G^*(p_1,p_2,\dots,p_n)$ is a super exponential mean graph with $p_i \neq 4$, for all $2 \le i \le n$.

Corollary 2.3 Every triangular snake is a super exponential mean graph.

Corollary 2.4 Tadpoles $T(n,k)$ is a super exponential mean graph, for $n \ge 3$ and $k \ge 2$.

Theorem 2.5 TL_n is a super exponential mean graph, for $n \ge 3$.

Proof. Let the vertex set of TL_n be $\{v_1, v_2, \ldots, v_n, u_1, u_2, \ldots, u_n\}$ and the edge set of TL_n be $\{u_\alpha u_{i+1}, u_i v_{\alpha+1}, v_\alpha v_{\alpha+1} : 1 \le i \le n-1\} \cup \{u_\alpha v_\alpha : 1 \le \alpha \le n\}$. Then TL_n has $2n$ vertices and $4n-3$ edges. Define $f: V(TL_n) \to \{1,2,3,\ldots,6n-3\}$ as follows:

$$f(v_\alpha) = \begin{cases} 1 & \alpha = 1 \\ 6\alpha - 6 & 2 \le \alpha \le n, \end{cases}$$

$$f(u_\alpha) = 6\alpha - 2 \text{ for } 1 \le \alpha \le n-1$$

and $f(u_n) = 6n - 3$.

The induced edge labeling is as follows:

$f^*(v_\alpha v_{\alpha+1}) = 6\alpha - 3$ for $1 \le \alpha \le n-1$,

$f^*(u_\alpha u_{\alpha+1}) = 6\alpha + 1$ for $1 \le \alpha \le n-1$,

$f^*(u_\alpha v_\alpha) = 6\alpha - 4$ for $1 \le \alpha \le n$ and

$f^*(u_\alpha v_{\alpha+1}) = 6\alpha - 1$ for $1 \le \alpha \le n-1$.

Hence, f is a super exponential mean labeling of TL_n. Thus the graph TL_n is a super exponential mean graph for $n \ge 3$.

Theorem 2.6 $M(P_n)$ is a super exponential mean graph, forn ≥ 4.

Proof. Let $V(P_n) = \{v_1, v_2, \ldots, v_n\}$ and $E(P_n) = \{e_\alpha = v_\alpha v_{\alpha+1} : 1 \le \alpha \le n-1\}$ be the vertex set and edge set of the path P_n. Then

$$V(M(P_n)) = \{v_1, v_2, \ldots, v_n, e_1, e_2, \ldots, e_{n-1}\} \text{ and}$$

$$E(M(P_n)) = \{v_\alpha e_\alpha, e_\alpha v_{\alpha+1} : 1 \le \alpha \le n-1\} \cup \{e_\alpha e_{\alpha+1} : 1 \le \alpha \le n-2\}.$$

Define $f: V(M(P_n)) \to \{1,2,3,\ldots,5n-5\}$ as follows:

$$f(v_\alpha) = \begin{cases} 1 & i = 1 \\ 2\alpha + 1 & 2 \le \alpha \le 3 \\ 5\alpha - 5 & 4 \le \alpha \le n \text{ and} \end{cases}$$

$$f(e_\alpha) = \begin{cases} 8\alpha - 5 & 1 \le \alpha \le 2 \\ 5\alpha - 2 & 3 \le \alpha \le n-1. \end{cases}$$

The induced edge labeling is as follows:

$$f^*(e_\alpha e_{\alpha+1}) = \begin{cases} 6\alpha & 1 \le \alpha \le 2 \\ 5\alpha + 1 & 3 \le \alpha \le n-2, \end{cases}$$

$$f^*(e_\alpha v_\alpha) = \begin{cases} 2 & \alpha = 1 \\ 2\alpha + 4 & 2 \le \alpha \le 3 \\ 5i - 3 & 4 \le \alpha \le n-1 \end{cases}$$

and $f^*(e_\alpha v_{\alpha+1}) = 5i - 1$ for $1 \le \alpha \le n-1$.

Hence, f is a super exponential mean labeling of $M(P_n)$. Thus the graph $M(P_n)$ is a super exponential mean graph for $n \ge 4$.

Theorem 2.7 The total graph $T(P_n)$ is a super exponential mean graph, for $n \ge 2$.

Proof. Let $V(P_n) = \{v_1, v_2, \ldots, v_n\}$ and $E(P_n) = \{e_\alpha = v_\alpha v_{\alpha+1} : 1 \le \alpha \le n-1\}$ be the vertex set and edge set of the path P_n. Then

$$V(T(P_n)) = \{v_1, v_2, \ldots, v_n, e_1, e_2, \ldots, e_{n-1}\} \text{ and}$$

$$E(T(P_n)) = \{v_\alpha, v_{\alpha+1}, e_\alpha v_\alpha, e_\alpha v_{\alpha+1} : 1 \le \alpha \le n-1\} \cup \{e_\alpha e_{\alpha+1} : 1 \le \alpha \le n-2\}.$$

Define $f: V(T(P_n)) \to \{1,2,3,\ldots,6n-6\}$ as follows:

$$f(v_\alpha) = \begin{cases} 1 & i = 1 \\ 6\alpha - 6 & 2 \le \alpha \le n \text{ and} \end{cases}$$

$f(e_\alpha) = 6\alpha - 2$, for $1 \le \alpha \le n-1$.

The induced edge labeling is as follows:

$f^*(v_\alpha v_{\alpha+1}) = 6i - 3$, for $1 \le \alpha \le n-1$,

$f^*(e_\alpha v_\alpha) = 6\alpha - 4$, for $1 \le \alpha \le n-1$,

$f^*(e_\alpha v_{\alpha+1}) = 6\alpha - 1$, for $1 \le \alpha \le n-1$ and

$f^*(e_\alpha e_{\alpha+1}) = 6\alpha + 1$, for $1 \le \alpha \le n-2$.

Hence, f is a super exponential mean labeling of $T(P_n)$. Thus the graph $T(P_n)$ is a super exponential mean graph, for $n \ge 2$.

Theorem 2.8 $\mathrm{TW}(\mathrm{P_n})$ is a super exponential mean graph, for $\mathrm{n} \geq 3$.

Proof. Let $u_1, u_2, \dots, u_n$ be the vertices of the path P_n and $v_1^{(\alpha)}, v_2^{(\alpha)}$ be the pendant vertices at each vertex u_α of the path P_n,for $2 \leq \alpha \leq n-1$. Then

$$V(TW(P_n)) = V(P_n) \cup \left\{v_1^{(\alpha)}, v_2^{(\alpha)} : 2 \leq \alpha \leq n-1\right\} \text{ and}$$

$$E(TW(P_n)) = E(P_n) \cup \left\{u_\alpha v_1^{(\alpha)}, u_\alpha v_2^{(\alpha)} : 2 \leq \alpha \leq n-1\right\}.$$

Define $f: V(TW(P_n)) \to \{1,2,3,\dots,6n-9\}$ as follows:

$$f(u_\alpha) = \begin{cases} 1 & \alpha = 1 \\ 6\alpha - 7 & 2 \leq \alpha \leq n-2, \end{cases}$$

$$f(u_{n-1}) = 6n - 11, f(u_n) = 6n - 9,$$

$$f\left(v_1^{(\alpha)}\right) = \begin{cases} 2 & \alpha = 2 \\ 6\alpha - 9 & 3 \leq \alpha \leq n-2, \end{cases}$$

$$f\left(v_1^{(n-1)}\right) = 6n - 16,$$

$$f\left(v_2^{(\alpha)}\right) = 6\alpha - 5 \quad \text{for} \quad 2 \leq \alpha \leq n-2$$

and $f\left(v_2^{(n-1)}\right) = 6n - 14$.

The induced edge labeling is as follows:

$$f^*(u_\alpha u_{\alpha+1}) = \begin{cases} 3 & \alpha = 1 \\ 6\alpha - 4 & 2 \leq \alpha \leq n-3, \end{cases}$$

$$f^*(u_{n-2}u_{n-1}) = 6n - 15, f^*(u_{n-1}u_n) = 6n - 10,$$

$$f^*\left(u_\alpha v_1^{(\alpha)}\right) = 6\alpha - 8 \quad \text{for} \quad 2 \leq \alpha \leq n-2,$$

$$f^*\left(u_{n-1} v_1^{(n-1)}\right) = 6n - 13 \quad \text{and}$$

$$f^*\left(u_i v_2^{(\alpha)}\right) = 6\alpha - 6 \quad \text{for} \quad 2 \leq \alpha \leq n-1.$$

Hence, f is a super exponential mean labeling of $TW(P_n)$. Thus the graph $TW(P_n)$ is a super exponential mean graph, for $n \geq 3$.

3 Conclusion

In this paper, the results on super exponential meanness of some standard graphs have been discussed. It is possible to investigate the super exponential meanness for other graphs.

References

[1] A.Rajesh Kannan, R.Rathajeyalakshmi and P.Manivannan, Exponential meanness of graphs obtained from paths, Journal of Advanced Research in Dynamical and Control Systems 10(14)(2018), 1598-1601.

[2] A.Rajesh Kannan, P.Manivannan and R.Rathajeyalakshmi, Exponential meanness of graphs obtained from some graph operations, Journal of Advanced Research in Dynamical and Control Systems 10(15)(2018), 525-529.

[3] A.Durai Baskar and S.Arockiaraj, Super geometric mean graphs, SUT Journal of Mathematics 52(2)(2016), 97–116.

[4] S.Arockiaraj and A.Rajesh Kannan, Further results on super **F**-root square mean graphs, International Journal of Pure and Applied Mathematics, 117 (2017), 83–90.

[5] A.Rajesh Kannan, R.Rathajeyalakshmi and A.Durai Baskar, Super exponential mean graphs (Communicated).

[6] J.A.Gallian, A Dynamic Survey of Graph Labeling, The Electronic Journal of Combinatorics, 17(2017), #DS6.

[7] F.Harary, Graph Theory, Narosa Publishing House Reading, New Delhi (1988).