International Journal of Mathematics and Statistics Invention (IJMSI)
e-ISSN: 2321 – 4767 P-ISSN: 2321 - 4759
www.ijmsi.org Volume 13 Issue 4 || Jul. – Aug. 2025 || PP: 01-07

Leap Euler Sombor Banhatti Indices of Some Chemical Drugs

V.R.Kulli
[1]*Department of Mathematics, Gulbarga University, Kalaburgi-585106*
Corresponding Author: V.R.Kulli

ABSTRACT: *In this paper, we propose the leap Euler Sombor Banhatti index and modified leap Euler Sombor Banhatti index of a graph. Furthermore, we compute these newly defined indices and their corresponding exponentials for some important nanostructures which appeared in nanoscience.*

KEYWORDS: *leap Euler Sombor Banhatti index, modified leap Euler Sombor Banhatti index, nanostructure.*

Date of Submission: 11-07-2025 Date of acceptance: 24-07-2025

I. INTRODUCTION

In Chemical Graph Theory, concerning the definition of the topological index on the molecular graph and concerning chemical properties of drugs can be studied by the topological index calculation. Several degree based indices of a graph have been appeared in the literature and have found some applications, especially in QSPR/QSAR study, see [1, 2].

Let G be a finite, simple connected graph with vertex set $V(G)$ and edge set $E(G)$. The degree $d(u)$ of a vertex u is the number of edges incident to u. The number of edges in a shortest path connecting any two vertices u and v of G is the distance between these two vertices u and v, and denoted by $d(u,v)$. For a positive integer k and $v \in V(G)$, the open neighborhood of v in G is defined as $N_k(v/G) = \{u \in V(G) : d(u, v) = k\}$. The k-distance degree of v in G is the number of k neighbors of v in G and denoted by $d_k(v)$, see [3].

The leap Euler Sombor Banhatti index was introduced in [4] and it is defined as

$$LEU(G) = \sum_{uv\in E(G)} \sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}.$$

In [4], the leap Euler Sombor Banhatti exponential of a graph G is defined as

$$LEU(G,x) = \sum_{uv\in E(G)} x^{\sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}}.$$

The modified leap Euler Sombor Banhatti index was introduced in [4] and it is defined as

$${}^{m}LEU(G) = \sum_{uv\in E(G)} \frac{1}{\sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}}.$$

The modified leap Euler Sombor Banhatti exponential of a graph G was introduced in [4] and it is defined as

$${}^{m}LEU(G,x) = \sum_{uv\in E(G)} x^{\frac{1}{\sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}}}.$$

Recently, some leap indices were studied in [5-13].

In this paper, we compute the leap Euler Sombor Banhatti index and modified leap Euler Sombor Banhatti index and their corresponding exponentials of certain chemical structures.

II. RESULTS FOR CHLOROQUINE

Chloroquine is an antiviral drug. This drug is medication primarily used to prevent and treat malaria. Let G be the chemical structure of chloroquine. This structure has 21 atoms (vertices) and 23 bonds (edges).

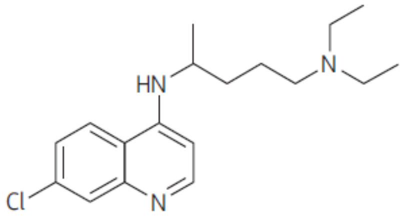

Figure 1. Chemical structure of chloroquine

From Figure 1, we obtain that $\{(d_2(u), d_2(v) \setminus uv \in E(G)\}$ has 9 edge set partitions.

Table 1. Edge set partitions of chloroquine

$d_2(u), d_2(v) \setminus uv \in E(G)$	(1, 2)	(2,2)	(2, 3)	(2, 4)	(3, 3)
Number of edges	2	2	8	1	2
	(3,4)	(3,5)	(4,4)	(4,5)	
	3	1	2	2	

We calculate the leap Euler Sombor Banhatti index and its exponential of chloroquine as follows.

Theorem 1. Let G be the chemical structure of chloroquine. Then

(i) $LEU(G) = 4\sqrt{7} + 18\sqrt{3} + 8\sqrt{19} + 3\sqrt{37} + 2\sqrt{61} + 7.$

(ii) $LEU(G,x) = 2x^{\sqrt{7}} + 2x^{2\sqrt{3}} + 8x^{\sqrt{19}} + 1x^{2\sqrt{7}} + 2x^{3\sqrt{3}} + 3x^{\sqrt{37}} + 1x^{7} + 2x^{4\sqrt{3}} + 2x^{\sqrt{61}}.$

Proof: We deduce

(i) $LEU(G) = \sum_{uv\in E(G)} \sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}$

$$= 2\sqrt{1^2+2^2+1\times 2} + 2\sqrt{2^2+2^2+2\times 2} + 8\sqrt{2^2+3^2+2\times 3} + 1\sqrt{2^2+4^2+2\times 4} + 2\sqrt{3^2+3^2+3\times 3}$$
$$+3\sqrt{3^2+4^2+3\times 4} + 1\sqrt{3^2+5^2+3\times 5} + 2\sqrt{4^2+4^2+4\times 4} + 2\sqrt{4^2+5^2+4\times 5}.$$

By simplifying the above equation, we get the desired result.

(ii) $LEU(G,x) = \sum_{uv\in E(G)} x^{\sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}}$

$$= 2x^{\sqrt{1^2+2^2+1\times 2}} + 2x^{\sqrt{2^2+2^2+2\times 2}} + 8x^{\sqrt{2^2+3^2+2\times 3}} + 1x^{\sqrt{2^2+4^2+2\times 4}} + 2x^{\sqrt{3^2+3^2+3\times 3}}$$
$$+3x^{\sqrt{3^2+4^2+3\times 4}} + 1x^{\sqrt{3^2+5^2+3\times 5}} + 2x^{\sqrt{4^2+4^2+4\times 4}} + 2x^{\sqrt{4^2+5^2+4\times 5}}.$$

By simplifying the above equation, we obtain the desired result.

We compute the modified leap Euler Sombor Banhatti index and its exponential of chloroquine as follows.

Theorem 2. Let G be the chemical structure of chloroquine. Then

(i) ${}^{m}LEU(G) = \frac{2}{\sqrt{7}} + \frac{2}{2\sqrt{3}} + \frac{8}{\sqrt{19}} + \frac{1}{2\sqrt{7}} + \frac{2}{3\sqrt{3}} + \frac{3}{\sqrt{37}} + \frac{1}{7} + \frac{2}{4\sqrt{3}} + \frac{2}{\sqrt{61}}$

(ii) ${}^{m}LEU(G,x) = 2x^{\frac{1}{\sqrt{7}}} + 2x^{\frac{1}{2\sqrt{3}}} + 8x^{\frac{1}{\sqrt{19}}} + 1x^{\frac{1}{2\sqrt{7}}} + 2x^{\frac{1}{3\sqrt{3}}} + 3x^{\frac{1}{\sqrt{37}}} + 1x^{\frac{1}{7}} + 2x^{\frac{1}{4\sqrt{3}}} + 2x^{\frac{1}{\sqrt{61}}}.$

Proof: We derive

(i) $$^{m}LEU(G)=\sum_{uv\in E(G)}\frac{1}{\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}}$$

$$=\frac{2}{\sqrt{1^2+2^2+1\times 2}}+\frac{2}{\sqrt{2^2+2^2+2\times 2}}+\frac{8}{\sqrt{2^2+3^2+2\times 3}}+\frac{1}{\sqrt{2^2+4^2+2\times 4}}+\frac{2}{\sqrt{3^2+3^2+3\times 3}}$$
$$+\frac{3}{\sqrt{3^2+4^2+3\times 4}}+\frac{1}{\sqrt{3^2+5^2+3\times 5}}+\frac{2}{\sqrt{4^2+4^2+4\times 4}}+\frac{2}{\sqrt{4^2+5^2+4\times 5}}.$$
$$=\frac{2}{\sqrt{7}}+\frac{2}{2\sqrt{3}}+\frac{8}{\sqrt{19}}+\frac{1}{2\sqrt{7}}+\frac{2}{3\sqrt{3}}+\frac{3}{\sqrt{37}}+\frac{1}{7}+\frac{2}{4\sqrt{3}}+\frac{2}{\sqrt{61}}.$$

By simplifying the above equation, we get the required result.

(ii) $$^{m}LEU(G,x)=\sum_{uv\in E(G)}x^{\frac{1}{\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}}}$$

$$=2x^{\frac{1}{\sqrt{1^2+2^2+1\times 2}}}+2x^{\frac{1}{\sqrt{2^2+2^2+2\times 2}}}+8x^{\frac{1}{\sqrt{2^2+3^2+2\times 3}}}+1x^{\frac{1}{\sqrt{2^2+4^2+2\times 4}}}+2x^{\frac{1}{\sqrt{3^2+3^2+3\times 3}}}$$
$$+3x^{\frac{1}{\sqrt{3^2+4^2+3\times 4}}}+1x^{\frac{1}{\sqrt{3^2+5^2+3\times 5}}}+2x^{\frac{1}{\sqrt{4^2+4^2+4\times 4}}}+2x^{\frac{1}{\sqrt{4^2+5^2+4\times 5}}}$$

By simplifying the above equation, we get the required result.

III. RESULTS FOR HYDROXYCHLOROQUINE

Let H be the chemical structure of hydroxychloroquine. This structure has 22 vertices and 24 edges.

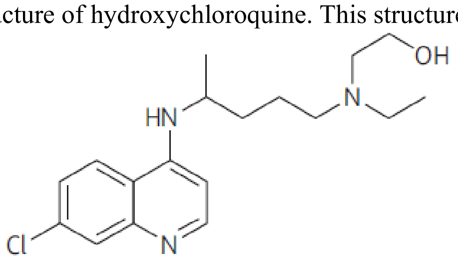

Figure 2. Chemical structure of hydroxychloroquine

From Figure 2, we obtain that $\{(d_2(u), d_2(v) \setminus uv \in E(H)\}$ has 11 edge set partitions.

Table 2. Edge set partitions of hydroxychloroquine

$d_2(u), d_2(v) \setminus uv \in E(H)$	(1, 1)	(1,2)	(1, 3)	(2, 2)	(2, 3)	(2,4)
Number of edges	1	1	1	2	8	1
	(3,3)	(3,4)	(3,5)	(4,4)	(4,5)	
	2	3	1	2	2	

We compute the leap Euler Sombor Banhatti index and its exponential of hydroxychloroquin .as follows.

Theorem 3. Let H be the chemical structure of hydroxychloroquine. Then

(i) $LEU(H)=3\sqrt{7}+19\sqrt{3}+1\sqrt{13}+8\sqrt{19}+3\sqrt{37}+2\sqrt{61}+7$

(ii) $LEU(H,x)=1x^{\sqrt{3}}+1x^{\sqrt{7}}+1x^{\sqrt{13}}+2x^{2\sqrt{3}}+8x^{\sqrt{19}}+1x^{2\sqrt{7}}+2x^{3\sqrt{3}}+3x^{\sqrt{37}}+1x^{7}+2x^{4\sqrt{3}}+2x^{\sqrt{61}}.$
$+2x^{18\sqrt{2}}+3x^{35}+1x^{8\sqrt{34}}+2x^{32\sqrt{2}}+2x^{9\sqrt{41}}$

Proof: We deduce

(i) $$LEU(H)=\sum_{uv\in E(H)}\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}$$

$$=1\sqrt{1^2+1^2+1\times 1}+1\sqrt{1^2+2^2+1\times 2}+1\sqrt{1^2+3^2+1\times 3}+2\sqrt{2^2+2^2+2\times 2}+8\sqrt{2^2+3^2+2\times 3}$$
$$+1\sqrt{2^2+4^2+2\times 4}+2\sqrt{3^2+3^2+3\times 3}+3\sqrt{3^2+4^2+3\times 4}+1\sqrt{3^2+5^2+3\times 5}$$
$$+2\sqrt{4^2+4^2+4\times 4}+2\sqrt{4^2+5^2+4\times 5}.$$

By simplifying the above equation, we get the desired result.

(ii) $$LEU(H,x)=\sum_{uv\in E(H)}x^{\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}}$$

$$=1x^{\sqrt{1^2+1^2+1\times 1}}+1x^{\sqrt{1^2+2^2+1\times 2}}+1x^{\sqrt{1^2+3^2+1\times 3}}+2x^{\sqrt{2^2+2^2+2\times 2}}+8x^{\sqrt{2^2+3^2+2\times 3}}+1x^{\sqrt{2^2+4^2+2\times 4}}$$
$$+2x^{\sqrt{3^2+3^2+3\times 3}}+3x^{\sqrt{3^2+4^2+3\times 4}}+1x^{\sqrt{3^2+5^2+3\times 5}}+2x^{\sqrt{4^2+4^2+4\times 4}}+2x^{\sqrt{4^2+5^2+4\times 5}}.$$

By simplifying the above equation, we obtain the desired result.

Now, we compute the modified leap Euler Sombor Banhatti index and its exponential of hydroxychloroquine .as follows.

Theorem 4. Let H be the chemical structure of hydroxychloroquine. Then

(i) $${}^{m}LEU(H)=\frac{1}{\sqrt{3}}+\frac{1}{\sqrt{7}}+\frac{1}{\sqrt{13}}+\frac{2}{2\sqrt{3}}+\frac{8}{\sqrt{19}}+\frac{1}{2\sqrt{7}}+\frac{2}{3\sqrt{3}}+\frac{3}{\sqrt{37}}+\frac{1}{7}+\frac{2}{4\sqrt{3}}+\frac{2}{\sqrt{61}}.$$

(ii) $${}^{m}LEU(H,x)=1x^{\frac{1}{\sqrt{3}}}+1x^{\frac{1}{\sqrt{7}}}+1x^{\frac{1}{\sqrt{13}}}+2x^{\frac{1}{2\sqrt{3}}}+8x^{\frac{1}{\sqrt{19}}}+1x^{\frac{1}{2\sqrt{7}}}.$$
$$+2x^{\frac{1}{3\sqrt{3}}}+3x^{\frac{1}{\sqrt{37}}}+1x^{\frac{1}{7}}+2x^{\frac{1}{4\sqrt{3}}}+2x^{\frac{1}{\sqrt{61}}}.$$

Proof: We deduce

(i) $${}^{m}LEU(H)=\sum_{uv\in E(H)}\frac{1}{\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}}$$

$$=\frac{1}{\sqrt{1^2+1^2+1\times 1}}+\frac{1}{\sqrt{1^2+2^2+1\times 2}}+\frac{1}{\sqrt{1^2+3^2+1\times 3}}+\frac{2}{\sqrt{2^2+2^2+2\times 2}}+\frac{8}{\sqrt{2^2+3^2+2\times 3}}$$
$$+\frac{1}{\sqrt{2^2+4^2+2\times 4}}+\frac{2}{\sqrt{3^2+3^2+3\times 3}}+\frac{3}{\sqrt{3^2+4^2+3\times 4}}+\frac{1}{\sqrt{3^2+5^2+3\times 5}}$$
$$+\frac{2}{\sqrt{4^2+4^2+4\times 4}}+\frac{2}{\sqrt{4^2+5^2+4\times 5}}$$

By simplifying the above equation, we obtain the desired result.

(ii) $${}^{m}LEU(H,x)=\sum_{uv\in E(H)}x^{\frac{1}{\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}}}$$

$$=1x^{\frac{1}{\sqrt{1^2+1^2+1\times 1}}}+1x^{\frac{1}{\sqrt{1^2+2^2+1\times 2}}}+1x^{\frac{1}{\sqrt{1^2+3^2+1\times 3}}}+2x^{\frac{1}{\sqrt{2^2+2^2+2\times 2}}}+8x^{\frac{1}{\sqrt{2^2+3^2+2\times 3}}}$$
$$+1x^{\frac{1}{\sqrt{2^2+4^2+2\times 4}}}+2x^{\frac{1}{\sqrt{3^2+3^2+3\times 3}}}+3x^{\frac{1}{\sqrt{3^2+4^2+3\times 4}}}+1x^{\frac{1}{\sqrt{3^2+5^2+3\times 5}}}+2x^{\frac{1}{\sqrt{4^2+4^2+4\times 4}}}+2x^{\frac{1}{\sqrt{4^2+5^2+4\times 5}}}$$

By simplifying the above equation, we get the desired result.

IV. RESULTS FOR REMDESIVIR

Let R be the molecular structure of remdesivir. This graph has 41 vertices and 44 edges.

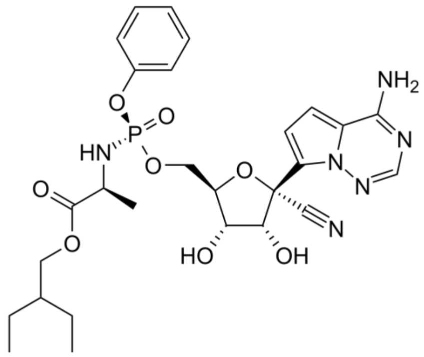

Figure 3. Chemical structure of remdesivir

From Figure 3, we obtain that { ($d_2(u)$, $d_2(v)$ \ $uv \in E(R)$ } has 13 edge set partitions.

Table 3. Edge set partitions of remdesivir

$d_2(u), d_2(v) \setminus uv \in E(R)$	(1, 2)	(2,2)	(2, 3)	(2, 4)	(2, 5)
Number of edges	2	3	10	1	1
	(3,3)	(3,4)	(3,5)	(3,6)	(4,4)
	7	3	8	1	1
	(4,5)	(5,5)	(5,6)		
	2	3	2		

We compute the leap Euler Sombor Banhatti index and it's exponential of remdesivir as follows.

Theorem 5. Let R be the chemical structure of remdesivir. Then

(i) $LEU(R) = 332\sqrt{2} + 45\sqrt{5} + 50\sqrt{13} + 7\sqrt{29} + 64\sqrt{34} + 9\sqrt{41} + 22\sqrt{61} + 105.$

(ii) $LEU(R,x) = 2x^{3\sqrt{5}} + 3x^{8\sqrt{2}} + 10x^{5\sqrt{13}} + 1x^{12\sqrt{5}} + 1x^{7\sqrt{29}} + 7x^{18\sqrt{2}} + 3x^{35}$
$+8x^{8\sqrt{34}} + 1x^{27\sqrt{5}} + 1x^{32\sqrt{2}} + 2x^{9\sqrt{41}} + 3x^{50\sqrt{2}} + 2x^{11\sqrt{61}}.$

Proof: We derive

(i) $LEU(R) = \sum_{uv \in E(R)} \sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}$

$$= 2\sqrt{1^2+2^2+1\times2} + 3\sqrt{2^2+2^2+2\times2} + 10\sqrt{2^2+3^2+2\times3} + 1\sqrt{2^2+4^2+2\times4}$$
$$+7\sqrt{3^2+3^2+3\times3} + 3\sqrt{3^2+4^2+3\times4} + 8\sqrt{3^2+5^2+3\times5} + 1\sqrt{3^2+6^2+3\times6}$$
$$+1\sqrt{4^2+4^2+4\times4} + 2\sqrt{4^2+5^2+4\times5} + 3\sqrt{5^2+5^2+5\times5} + 2\sqrt{5^2+6^2+5\times6}.$$

By simplifying the above equation, we get the desired result.

(ii) $LEU(R,x) = \sum_{uv \in E(R)} x^{\sqrt{d_2(u)^2 + d_2(v)^2 + d_2(u)d_2(v)}}$

$$= 2x^{\sqrt{1^2+2^2+1\times2}} + 3x^{\sqrt{2^2+2^2+2\times2}} + 10x^{\sqrt{2^2+3^2+2\times3}} + 1x^{\sqrt{2^2+4^2+2\times4}} + 1x^{\sqrt{2^2+5^2+2\times5}} + 7x^{\sqrt{3^2+3^2+3\times3}} + 3x^{\sqrt{3^2+4^2+3\times4}}$$
$$+8x^{\sqrt{3^2+5^2+3\times5}} + 1x^{\sqrt{3^2+6^2+3\times6}} + 1x^{\sqrt{4^2+4^2+4\times4}} + 2x^{\sqrt{4^2+5^2+4\times5}} + 3x^{\sqrt{5^2+5^2+5\times5}} + 2x^{\sqrt{5^2+6^2+5\times6}}.$$

By simplifying the above equation, we obtain the desired result.

We compute the modified leap Euler Sombor Banhatti index and it's exponential of remdesivir as follows.

Theorem 6. Let *R* be the chemical structure of remdesivir. Then

(i) $$^{m}LEU(R)=\frac{2}{3\sqrt{5}}+\frac{3}{8\sqrt{2}}+\frac{10}{5\sqrt{13}}+\frac{1}{12\sqrt{5}}+\frac{1}{7\sqrt{29}}+\frac{7}{18\sqrt{2}}+\frac{3}{35}+\frac{8}{8\sqrt{34}}+\frac{1}{27\sqrt{5}}+\frac{1}{32\sqrt{2}}+\frac{2}{9\sqrt{41}}+\frac{3}{50\sqrt{2}}+\frac{2}{11\sqrt{61}}$$

(ii) $$^{m}LEU(R,x)=2x^{\frac{1}{3\sqrt{5}}}+3x^{\frac{1}{8\sqrt{2}}}+10x^{\frac{1}{5\sqrt{13}}}+x^{\frac{1}{12\sqrt{5}}}+1x^{\frac{1}{7\sqrt{29}}}+7x^{\frac{1}{18\sqrt{2}}}+3x^{\frac{1}{35}}+8x^{\frac{1}{8\sqrt{34}}}+1x^{\frac{1}{27\sqrt{5}}}+1x^{\frac{1}{32\sqrt{2}}}+2x^{\frac{1}{9\sqrt{41}}}+3x^{\frac{1}{50\sqrt{2}}}+2x^{\frac{1}{11\sqrt{61}}}.$$

Proof: By using the definitions and edge partitions of G_3, we deduce

(i) $$^{m}LEU(R)=\sum_{uv\in E(R)}\frac{1}{\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}}$$

$$=\frac{2}{\sqrt{1^2+2^2+1\times2}}+\frac{3}{\sqrt{2^2+2^2+2\times2}}+\frac{10}{\sqrt{2^2+3^2+2\times3}}+\frac{1}{\sqrt{2^2+4^2+2\times4}}+\frac{1}{\sqrt{2^2+5^2+2\times5}}+\frac{7}{\sqrt{3^2+3^2+3\times3}}+\frac{3}{\sqrt{3^2+4^2+3\times4}}+\frac{8}{\sqrt{3^2+5^2+3\times5}}+\frac{1}{\sqrt{3^2+6^2+3\times6}}+\frac{1}{\sqrt{4^2+4^2+4\times4}}+\frac{2}{\sqrt{4^2+5^2+4\times5}}+\frac{3}{\sqrt{5^2+5^2+5\times5}}+\frac{2}{\sqrt{5^2+6^2+5\times6}}$$

By simplifying the above equation, we obtain the desired result.

(ii) $$^{m}LEU(R,x)=\sum_{uv\in E(R)}x^{\frac{1}{\sqrt{d_2(u)^2+d_2(v)^2+d_2(u)d_2(v)}}}$$

$$=2x^{\frac{1}{\sqrt{1^2+2^2+1\times2}}}+3x^{\frac{1}{\sqrt{2^2+2^2+2\times2}}}+10x^{\frac{1}{\sqrt{2^2+3^2+2\times3}}}+1x^{\frac{1}{\sqrt{2^2+4^2+2\times4}}}+1x^{\frac{1}{\sqrt{2^2+5^2+2\times5}}}+7x^{\frac{1}{\sqrt{3^2+3^2+3\times3}}}+3x^{\frac{1}{\sqrt{3^2+4^2+3\times4}}}+8x^{\frac{1}{\sqrt{3^2+5^2+3\times5}}}+1x^{\frac{1}{\sqrt{3^2+6^2+3\times6}}}+1x^{\frac{1}{\sqrt{4^2+4^2+4\times4}}}+2x^{\frac{1}{\sqrt{4^2+5^2+4\times5}}}+3x^{\frac{1}{\sqrt{5^2+5^2+5\times5}}}+2x^{\frac{1}{\sqrt{5^2+6^2+5\times6}}}$$

By simplifying the above equation, we get the desired result.

V. CONCLUSION

In this study, we have determined the leap Euler Sombor Banhatti and modified leap Euler Sombor Banhatti indices of some important chemical drugs such as chloroquine, hydroxychloroquine, remdesivir.

REFERENCES

[1]. I.Gutman and O.E.Polansky, *Mathematical Concepts in Organic Chemistry,* Springer, Berlin (1986).
[2]. M.V.Diudea (ed.) *QSPRIQSAR studies by Molecular Descriptors*, NOVA, New York (2001).
[3]. A.M.Naji, N.D.Soner and I.Gutman, On leap Zagreb indices of graphs, *Communications in Combinatorics and Optimization,* 2(2) (2017) 99-117.
[4]. V.R.Kulli, Euler Sombor Banhatti indices, *International Journal Engineering Sciences & Research Technology,* 13(6) (2024) 12-45.
[5]. F.Asif, Z.Zahid and M.Cancan, On some leap indices of polycyclic aromatic hydrocarbons, *Journal of Discrete Mathematical Sciences and Cryptography,* 23(6) (2020) 1269-1277.

[6]. B.Basavagoud and E.Chitra, On leap hyper Zagreb indices of some nanostructures, *International Journal Mathematics Trends and Technology,* 64(1) (2018) 30-36.
[7]. F.Dayan, M.Javaid and M.A.Rehman, On leap Gourava indices of some wheel related graphs, *Scientific Inquiry and Review,* 2(4) (2018) 14-24.
[8]. V.R.Kulli, Leap indices of graphs, *International Journal of Current Research in Life Sciences,* 8(1) (2019) 2998-3006.
[9]. V.R. Kulli, Computation of leap Adriatic indices and their polynomials of polycyclic aromatic hydrocarbons, *International Journal of Mathematics Trends and Technology,* 67(4) (2021) 20-25. Doi: 10.14445/22315373/IJMTT-V67I4P504.
[10]. I.Gutman, Z.Shao, Z.Li, S.Wang and P.Wu, Leap Zagreb indices of trees and unicyclic graphs, 3(2) (2018) 179-194.
[11]. B.K.Majhi, V.R.Kulli and I.N.Cangul, Nirmala leap indices of some chemical drugs against COVID-19, *Journal of Discrete Mathematics and its Applications,* 10(1) (2023) 13-21.
[12]. V.R.Kulli, G.O.Kizilirmak and Z.B.Pendik, Leap elliptic Sombor indices of some chemical drugs, *International Journal of Mathematical Archive,* 16(4) (2025) 1-8.
[13]. V.R.Kulli, Leap Kepler Banhatti indices of some chemical drugs, *International Journal of Mathematics and its Applications,* 13(2) (2025) 1-12.