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ON LEAP MODIFIED ECCENTRIC CONNECTIVITY INDEX OF GRAPHS

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Abstract. In this paper, we introduce a novel form of the eccentric connectivity index called as the leap modified eccentric connectivity index. We derive the mathematical features and exact values of this new topological index for various standard graph classes. Furthermore, we specify upper bounds for the index. We also establish the values of this index when applied to specific graph operations called the Join.

Keywords. Second degree, eccentricity, Leap modified eccentric connectivity index, leap Zagreb Indices, Zagreb indices.

AMS (MOS) subject classification: 05C07, 05C12, 05C90.

1 Introduction

A molecular graph is an undirected labeled graph $G = (V, E)$ that displays structural and functional features of chemical compound. The set of vertices $V(G)$ encodes atoms, while the edges $E(G)$ express the adjacency connection between atoms in the molecule. Each vertex is labeled with the corresponding chemical element (for example, C = Carbon, H = Hydrogen), and each edge is labeled with the type of covalent bond (single -, double =, triple, aromatic [10]). According to [1] topological indices play a key role in QSPR and QSAR modeling in chemical graph theory.

If $|V(G)| = n$ and $|E(G)| = m$, and two vertices u and v of the graph G are adjacent, the edge connecting them will be indicated as uv. If $u, v \in V(G)$, the distance $d_G(u, v)$ between u and v is defined as the length of the shortest $u - v$ path in G, and a shortest u - v path is often called a geodesic. The diameter of a connected graph G is the length of any longest geodesic, represented by $diam(G)$. We can define the first and second degrees of a vertex v respectively using the distance as follows: $d(v) = d_1(v) = d_1(v/G) = |\{u \in V(G) : d(u, v) = 1\}|$, $d_2(v) = d_2(v/G) = |\{u \in V(G) : d(u, v) = 2\}|$. The maximum and minimum degrees of the graph G are given by $\Delta = \Delta(G)$