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GENERAL $(\alpha, 2)$-PATH SUM-CONNECTIVITY INDICES OF TWO CLASSES OF GRAPHS

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Abstract

General $(\alpha, 2)$-path sum-connectivity index of a molecular graph originates from many practical problems such as discovering new drugs. In this paper, we completely compute their values of two classes graphs.

Keywords: general $(\alpha, 2)$-path sum-connectivity index, path, cycle.

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1. Introduction

Topological indices of molecular graphs are very important invariants of molecular graphs, which can be used to explore properties of molecular structured graphs. They have been studied by a lot of scientists both in mathematics and in chemistry for many years. Researchers propose one

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new class of topological index, named the general $(\alpha, 2)$-path sum-connectivity index of a molecular graph. It originates from many practical problems such as three dimensional quantitative structure-activity (3DQSAR), molecular chirality and discovering many new drugs [2].

Let $G = (V, E)$ be a simple molecular graph with the vertex set V and the edge set E. Denote the numbers of vertices and edges by $|V|$ and $|E|$, respectively. In physico-chemical graph theory, the vertices and the edges correspond to the atoms and the bonds, respectively. Two vertices u and v are *adjacent* if there exist an edge $e = uv$ between them in G. The number of all adjacent vertices of u is called its *degree*, denoted by $d(u)$. An i-vertex denotes a vertex degree i. Let $v_{i_0}v_{i_1}v_{i_3}$ be a path P^2 of length 2 in G. Let m_{122} and m_{222} denote the numbers of all 2-paths of the degree sequence types (1, 2, 2) and (2, 2, 2) in G, respectively. Let P_n and C_n denote Path and Cycle with n vertices, respectively. All other notations and terminologies are referred to [1].

With the intention of extending the applicability, we begin to consider *the general* $(\alpha, 2)$*-path sum-connectivity index* of G as where we take the sum over all possible paths of length 2 of G

$$^2\chi_\alpha(G) = \sum_{P^2 = v_{i_1}v_{i_2}v_{i_3} \subseteq G} [d(v_{i_1}) + d(v_{i_2}) + d(v_{i_3})]^\alpha,$$

with any nonzero real number α and any positive integer t, and two paths $v_{i_1}v_{i_2}v_{i_3}$ and $v_{i_3}v_{i_2}v_{i_1}$ are considered to be one path.

2. Main Results

In this section, we begin to compute *general* $(\alpha, 2)$*-path sum-connectivity indices* of Path and Cycle.

Theorem 1. $^2\chi_\alpha(P_n) = 2 \cdot 5^\alpha + (n-3) \cdot 6^\alpha$.

Proof. According to the structures of Path P_n, there are in all two different 2-paths, which degree sequences are (1, 2, 2) and (2, 2, 2), respectively. Then $m_{122} = 2$ and $m_{222} = n - 3$ in P_n. Then ${}^2\chi_\alpha(P_n) = 2(1 + 2 + 2)^\alpha + (n - 3)(2 + 2 + 2)^\alpha = 2 \cdot 5^\alpha + (n - 3) \cdot 6^\alpha$.

Theorem 2. ${}^2\chi_\alpha(C_n) = n \cdot 6^\alpha$.

Proof. According to the structures of C_n, there are unique type 2-path, which degree sequences is (2, 2, 2). Then $m_{222} = n$. Then ${}^2\chi_\alpha(C_n) = n(2 + 2 + 2)^\alpha = n \cdot 6^\alpha$.

References

[1] J. A. Bondy and U. S. R. Murty, Graph Theory with Applications, MacMillan, New York, NY, 1976.

[2] L. B. Kier and L. H. Hall, Molecular Connectivity in Chemistry and Drug Research, Academic Press, New York, 1976.

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