

The K-Distance Neighborhood Polynomial of a Graph

Authors : Soner Nandappa D., Ahmed Mohammed Naji

Abstract : In a graph $G = (V, E)$, the distance from a vertex v to a vertex u is the length of shortest v to u path. The eccentricity $e(v)$ of v is the distance to a farthest vertex from v . The diameter $\text{diam}(G)$ is the maximum eccentricity. The k -distance neighborhood of v , for $0 \leq k \leq e(v)$, is $N_k(v) = \{u \in V(G) : d(v, u) = k\}$. In this paper, we introduce a new distance degree based topological polynomial of a graph G is called a k - distance neighborhood polynomial, denoted $N_k(G, x)$. It is a polynomial with the coefficient of the term x^k , for $0 \leq k \leq e(v)$, is the sum of the cardinalities of $N_k(v)$ for every $v \in V(G)$. Some properties of k - distance neighborhood polynomials are obtained. Exact formulas of the k - distance neighborhood polynomial for some well-known graphs, Cartesian product and join of graphs are presented.

Keywords : vertex degrees, distance in graphs, graph operation, N_k -polynomials

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