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ON HARARY ENERGY OF GRAPHS

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Abstract: The Harary matrix of a connected graph G is defined as $H(G) = [a_{ij}]_{n\times n}$, where $a_{ij} = \dfrac{1}{d(v_i, v_j)}$; for v_i and v_j are non adjacent in G and $a_{ii} = 0$; for all $i, j = 1, 2, 3, \cdots, n$. The Harary energy of G is the sum of the absolute values of the eigenvalues of Harary matrix of G. In this paper, the Harary characteristic polynomial of $K_{m,n}$ and Harary energy of some graphs are investigated.

Keywords and Phrases: Eigenvalue, Graph Polynomial, Graph Energy.

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1. Introduction and Preliminaries

Let G be a simple, undirected and connected graph with vertex set $V(G) = \{v_1, v_2, v_3, \cdots, v_n\}$. The *distance* between two vertices v_i and v_j is the length of shortest path between them; for all $1 \leq i, j \leq j$. The maximum distance between any pair of vertices is known as *diameter* of graph G. For standard terminology and notations in graph theory, rely upon West [14] while for any undefined term related to energy of graphs, refer to Gutman [6].

Definition 1.1. *The m-Shadow graph, $D_m(G)$ of a connected graph G is constructed by taking m copies of G say $G_1, G_2, ..., G_m$. Then Join each vertex u in*