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DISTANCE RELATED SPECTRUM OF THE ZERO-DIVISOR GRAPH ON THE RING OF INTEGERS MODULO n

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Abstract. For a commutative ring R with non-zero identity, let $Z^*(R)$ denote the set of non-zero zero-divisors of R . The zero-divisor graph of R , denoted by $\Gamma(R)$, is a simple undirected graph with all non-zero zero-divisors as vertices and two distinct vertices $x, y \in Z^*(R)$ are adjacent if and only if $xy = 0$. In this paper, the distance, distance Laplacian and the distance singless Laplacian spectrum of $\Gamma(\mathbb{Z}_n)$, for $n = p^3, pq$ are investigated.

Keywords: eigenvalues; distance spectrum; zero-divisor graph; block matrix.

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1. INTRODUCTION

Let $G = (V(G), E(G))$ be a simple, finite, undirected graph where $V(G)$ denotes vertex set and $E(G)$ denotes edge set. The cardinality of $V(G)$ is the order of G . A graph G , is connected if there is a path between any two vertices. For distinct vertices u and v , let $d_G(u, v)$ denote the distance between them, that is the length of a shortest path between u and v . Clearly $d_G(u, u) = 0$ and $d_G(u, v) = \infty$, if there is no path between u and v . If $u \in V(G)$, the open neighborhood of u ; denoted by $N_G(u)$ is the set of vertices adjacent to u in G . The cardinality of $N_G(u)$ is

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