ADJACENCY MATRIX AND EIGENVALUES OF THE ZERO DIVISOR GRAPH $\Gamma(\mathbb{Z}_n)$

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Abstract. Let R be a commutative ring with non-zero identity and $Z^*(R)$ be 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 eigenvalues of $\Gamma(\mathbb{Z}_n)$ for $n = p^2 q^2$, where p and q are distinct primes, are investigated. Also, the girth, diameter, clique number and stability number of this graph are found.

Keywords: eigenvalues; zero-divisor graph; block matrix; adjacency matrix.

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1. INTRODUCTION

Beck [4] associated to a commutative ring R its zero-divisor graph $G(R)$ whose vertices are the zero-divisors of R (including 0) and two distinct vertices a and b are adjacent if and only if $ab = 0$. Anderson and Livingston [1] introduced and studied the subgraph $\Gamma(R)$ (of $G(R)$) whose vertices are the non-zero zero-divisors of R and the authors studied the interplay between the ring-theoretic properties of a commutative ring and the graph theoretic properties