



Extended annihilating-ideal graph of a ring

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Abstract

In this paper we extend the concept of annihilating-ideal graph of a commutative ring and then we characterize commutative Artinian local ring whose Extended annihilating-ideal graph is star graph.

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1 Introduction

A graph (simple graph) G is an ordered pair of disjoint sets (V, E) such that $V = V(G)$ is the vertex set of G and $E = E(G)$ is its edge set. If the graph G contains a vertex, say v , to which all other vertices are joined and has no other edges, it is called a star graph with center v .

Throughout this paper, all rings R are assumed to be commutative with identity 1_R . For a ring R , let $I(R)$ be the set of ideals of R , $A(R)$ the set of annihilating-ideals of R , where a nonzero ideal I of R is called an annihilating-ideal if there exists a non-zero ideal J of R such that $IJ = 0$. The annihilating-ideal graph $AG(R)$ of R is a simple graph with vertex set $A(R)$, such that distinct vertices I and J are adjacent if and only if $IJ = 0$. Annihilating-ideal graphs of rings, first introduced and studied in [3], provide an excellent setting for studying some aspects of algebraic property of a commutative ring, especially, the ideal structure of a ring. Some fundamental results on the concept have been established in [1, 3]. For example, $AG(R)$ is always a simple, connected and undirected graph with diameter less than four; if $AG(R)$ contains a cycle, then its girth is less than five; if R is a non-domain ring, then $AG(R)$ is a finite graph if and only if R has finitely many ideals, if and only if every vertex of $AG(R)$ has finite degree. In this paper we extend the concept of annihilating-ideal graph of a ring and then we characterize commutative Artinian local rings whose Extended annihilating-ideal graph is star graph.

2 Artinian local ring and Extended annihilating-ideal graph

In this section we first extend the concept of annihilating-ideal graphs of a ring and then we state some properties of this graph.

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