# Abstract

Starting from Cayley graphs, the research on graphs defined on algebraic objects like groups, rings, vector spaces forms an integral part of algebraic graph theory. Such graphs reflect the algebraic properties of the underlying structure and hence it is useful to study the algebraic objects with the help of graphs defined on them.

Our present study is focussed on defining graphs on groups and rings and investigate their properties. This includes studying the interplay between algebraic properties of the objects and their corresponding graph properties. The graphs studied by us are defined below:

Let $G$ be a group and $S$ be the collection of all non-trivial proper subgroups of $G$. The comaximal subgroup graph of $G$, denoted by $\Gamma(G)$, whose vertex set is $S$ and two vertices $H$ and $K$ are adjacent if and only if $HK = G$.

Let $R$ be a commutative ring with identity. The prime ideal sum graph of $R$, denoted by $G(R)$, is a graph whose vertices are non-zero proper ideals of $R$ and two distinct vertices $I$ and $J$ are adjacent if and only if $I + J$ is a prime ideal of $R$.

We study different structural and isomorphism properties of these graphs which provides nice insights on the algebraic as well as graph theoretic aspects.