Abstract

Our aim in this thesis is to compute certain algebraic invariants like primary decomposition, dimension, depth, regularity, Hilbert series and multiplicity of some particular classes of binomial edge ideals J_G of graphs G and also the initial ideal of J_G in degree 2. A large amount of information of an ideal is carried by its minimal free resolution. So we give information on the minimal free resolution on certain binomial edge ideals and its initial ideal in degree 2. As an application we give a lower bound of the Castelnuovo-Mumford regularity of arbitrary graphs depending on its induced subgraphs.

Moreover for an R-module M it is well-known that there is a natural homomorphism

$$R \to \mathrm{End}_R(M)$$

In the last few year there is a lot of work on the study of the endomorphism ring $\mathrm{End}_R(H_I^c(R))$ for $c = \mathrm{grade}(I)$. For instance it is shown that (see [16]) if R is a complete local ring then the natural homomorphism

$$R \to \mathrm{End}_R(H_I^c(R))$$

is an isomorphism under the additional assumption that the ideal $I \subseteq R$ is of cohomologically complete intersection. We will extend some of these results to the case of a finitely generated module.