Abstract

Let vertex and edge sets of graph G are denoted by $V(G)$ and $E(G)$, respectively. An *edge-covering* of G is a family of different subgraphs $H_1, H_2, \ldots, H_k$ such that each edge of $E(G)$ belongs to at least one of the subgraphs H_j, $1 \leq j \leq k$. Then it is said that G admits an $(H_1, H_2, \ldots, H_k)$-(edge)covering. If every H_j is isomorphic to a given graph H, then G admits an *H-covering.*

For a fixed graph H, a total labeling $\phi : V(G) \cup E(G) \to \{1, 2, \ldots, |V(G)| + |E(G)|\}$ is said to be *H-magic* if all subgraphs of G isomorphic to H have the same weight.

One can ask for different properties of a total labeling ϕ. The total labeling is said to be *antimagic* if the weights of subgraphs isomorphic to H are pairwise distinct. By further requiring that the weights form an arithmetic progression with difference d and first element a.

If graph G is a *plane* graph then the H-antimagic labeling is equivalent to d-antimagic labeling of type $(1, 1, 0)$, where weights of all faces form an arithmetic sequence having a common difference d and the weight of a face under a labeling of type $(1, 1, 0)$ is the sum of labels carried by the edges and vertices on its boundary.

In the first part of the thesis we will study the known results on H-magic, H-antimagic and d-antimagic labelings of graphs.

In the second part of the thesis we will examine the existence of super d-antimagic labelings for the Jahangir graphs for certain differences d.