Abstract

We first provide some background to the irregular labelings like irregular assignments, edge irregular, vertex irregular total, edge irregular total and face irregular entire labelings. Followed by this we summarize some known results and open problems in these schemes. As a variation of the previous irregular labelings we will introduce a new branch of irregular labelings called H-irregular labelings. These new labelings extend and generalize the concept of a weight of an edge of a graph. We orient on the weight of subgraphs of a graph that is isomorphic to a given subgraph H. The weight of a H-subgraph (H-weight) is then defined as the sum of labels (if present) of all vertices and edges belonging to the given H-subgraph.

The total (edge, vertex) H-irregular labeling is a total (edge, vertex) labeling such that the H-weights are distinct. The idea is to minimize H-weights and by using the smallest vertex/edge/both labels and thus keeping the total (edge, vertex) H-irregularity strength as low as possible.

We will present some lower and some upper general bounds on corresponding graph invariants. We will describe total, edge and vertex H-irregularity strength for many graphs such as paths, ladders, fan graphs, antiprisms, triangular ladders, diagonal ladders, wheels, gears and some joins of two graphs.

We also discuss the total (edge, vertex) H-irregularity strength for the disjoint union of multiple copies of a graph and the disjoint union of two non-isomorphic graphs. Some results have been established for the amalgamation of graphs.

Finally, we have posed some open problems and conjectures.