

# Abstract

This work describes a generalization of the *Traveling Salesman Problem* - *TSP* called *Black and White Traveling Salesman Problem* - *BWTSP*.

The *BWTSP* is defined in a graph  $G$  (oriented or not), in a such way that the associated vertex set is partitioned into black and white vertices. The objective is to find a shortest hamiltonian tour subject to *Cardinality* and *Length* constraints. These constraints are related to the number of white vertices (cardinality) and the total distance (length) between two consecutive black vertices in a feasible solution.

The main applications of this problem are found in the telecommunication area and the scheduling of airline operations that incorporate maintenance connections.

In this work we introduce mathematical formulations for asymmetrical and symmetrical *BWTSP*, we propose new construction and local search algorithms that are used in the metaheuristics *GRASP*, *VNS* and *VND*. Computational results show the viability of the proposed methods.

**Key Words:** *GRASP*, Heuristics, Metaheuristics, The Traveling Salesman Problem, Reduction Rules, *VND*, *VNS*.