

Multiple Tour Plant Location Problem

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Abstract— We develop a method to obtain an optimal solution for multiple tour plant location problem (MTPLP), where the objective is to simultaneously locate facilities and to establish delivery routes from these facilities to a set of given customers. Our approach in essence consists of two prime transformations: the first transformation converts MTPLP problem into a limited number of generalized traveling salesman problems (GTSPs) while the second transformation converts every resulting GTSP problem into a single traveling salesman problem (TSP). However, to reduce the computational complexity involved in the above transformations, we introduce an equivalent transformation that converts the underlying MTPLP problem into the TSP problems in a single stage. We prove that every set of optimal solutions of the resulting TSP problems is associated with an optimal solution of the original MTPLP problem. Consequently, the efficiency of the proposed algorithm relies on the method selected for solving the TSP problems.

Keywords: Graph; generalized traveling salesman problems (TSP); multiple tour plant location problem (MTPLP); traveling salesman problem (TSP); transformation.