ABSTRACT

For several decades now, Operations Research had been successful for solving a wide variety of optimization problems in public transit. A typical urban passenger road transport undertaking has a large fleet of buses operating on different routes. Usually when the buses are not operating they are sent back to depots. In this depot they get parking as well as servicing facilities. Most of the time the buses are alight in depots during night time when commuting by the public do not take place. Everyday these buses leave the depots to their starting point and then after day’s scheduled number of trips comes back to depot for a halt. Sometimes these buses comes back to depot from their starting point itself whereas sometimes not. This journey of the buses from depot to starting point and return do not carry any commuters (passengers). Now this is where dead mileage incurs costs for the operators in terms of non revenue earning fuel usage, wages and the reduction in the utilization of the driver’s legal hours of driving. Assigning buses from depots to routes is a practice which if done optimally could lead to significant reduction in dead kilometers.

In this thesis the problem of allocating buses to depots in order to minimize the dead mileage is easily formulated as Transportation model. The whole idea was to minimize the overall distance travelled. A list of heuristic algorithms for the proposed computational analysis and the computational experiments were carried out to compare the performance of the heuristic algorithms with the exact solution as claimed by BMTC (Bangalore Metropolitan Transport Corporation). The work focused on both minimizing deadhead kilometers travelled by buses while preserving occupancy balance in depots. From the computational analysis, it is observed that all the heuristic algorithms considered in the work takes very meager computational time. It is also found that Vogel’s Approximation method (VAM) has high probability in reaching near to optimal solution.

The optimal allocation of buses with a conventional approach poses considerable difficulties owing to the combinatorial nature of the problem and the complex nature of the route choice model. With public transit system in Bengaluru as the instance, based on the existing schedule and number of trips; this work examined the methodology of bus trip optimization with optimal number of schedules as the goal. Heuristic algorithms (HAs) were proposed as the computational
tool because of their ability to handle large and complex problems. The solution framework for the present problem involves two phases: (1) allocation of buses on individual routes with maximum link flow as the criteria, and (2) further reduction of buses on network basis making use of heuristic algorithms as an optimization tool. The proposed model, is applied to the transit network of the city of Bengaluru.