Abstract

In design of a toll plaza the most important parameter that needs to be determined is the number of toll booths. In this thesis, the problem of determining the right number of toll booths is formulated as a queuing theory problem. The toll plaza is modelled as a coupled multiple queue-multiple server queuing model, where each server is toll booth with its own waiting line. This model is then solved numerically with the help of the Power Series Algorithm. The toll booth assignment of the traffic is done using two strategies: (i)using a utility based choice model for the queues and (ii) joining the shortest queue. In the end, we come up with design charts for the number of toll booths at a toll plaza and the length of the queueing region ahead of a toll plaza.