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## CHAPTER - 4.

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4.1 Data Analysis

4.2 Formulation / Development of model  
using Goal Programming Technique

#### 4.1 Data Analysis :-

The Kolhapur Municipal Transport runs buses to various locations in and around the Kolhapur city, it even covers the nearby villages from where people come to either Kolhapur city for employment or go to Maharashtra Industrial and Development Corporation.

Kolhapur Municipal Transport is running buses to cover nearly forty intersecting routes. Thus, to cover all areas/locations in and around Kolhapur city the Kolhapur Municipal Transport has located six Control Points from where buses run to cover almost all parts of Kolhapur city.

The data regarding Passengers, Trips and Revenue earned per day per bus has been collected from Kolhapur Municipal Transport. And information regarding the Routes covered from each Control Point, total Kilometer covered to run each destination from a Control Point and total Time required is collected from Kolhapur Municipal Transport.

The six Control Points are --

- i) Bhawani Mandap
- ii) Shivaji Putla
- iii) Gangavesh
- iv) Shahu Maidan
- v) Maharana Pratap Chowk
- vi) Sonya Maruti Chowk



But it is found that the route lengths for --

Bhawani Mandap and Shivaji Putla is 1 to 7 Kilometer,  
Gangavesh and Shahu Maidan is 7 to 11 Kilometers and  
Maharana Pratap Chowk &  
Sonya Maruti Chowk is 11 to 18 Kilometers.

Thus, the data has been collected for each and every Control Point separately. But, for convenience the data has been selected on route length bases i.e. two Control Point merged together to represent sector of specified range of route length. And thus, three equations regarding Occupancy, Revenue and total Availability of buses are obtained.

The equations regarding Operational Cost has been dropped as there is as such no difference in Operating Cost as the Control Points are very much near to each other. Secondly, the data has been collected for Tuesday i.e. the day on which Schools, Colleges, Industries and other Service Centers including Market is open, whereas on Monday Industry is off, on Saturday Market is closed and on Sunday Educational Institutes are closed.

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## **4.2 Formulation / Development Of Model Using GOAL PROGRAMMING Technique :-**

In this present study three equations are formulated considering --

- i) Occupancy
- ii) Revenue
- iii) Availability of buses.

First of all the total Kolhapur Municipal Transport is divided into three sectors depending on route length and the data regarding total Passengers travelled, Time taken, Kilometers covered, Revenue collected, Trips done etc. has been summed up for each sector.

The data collected from Kolhapur Municipal Transport has been fed to computer and formulas are developed to formulate the problem using Lotus package.

To get left hand side of Occupancy Constraint the sum of the total passengers travelled per day of a sector is divided by total number of trips of the sector multiplied by the number of buses to be run in each sector, for each sector and is equated to right hand side which is total passengers travelled per day divided by total number of trips done by forty buses multiplied by 40.

To get left hand side of Revenue Constraint the sum of the total revenue collected per day of a sector is divided by total number of trips of the sector multiplied by the number of buses to be run in a sector, for each sector and is equated to right hand side which is total revenue collected per day divided by total number of trips done by forty buses multiplied by 40.

To get left hand side of Total Availability Constraint the sum of the total buses running per day on a sector, for each sector is equated to right hand side which is total buses with the Kolhapur Municipal Transport i.e. 40.

After formulation of the problem on route wise bases it was run by using a package written in BASIC Language.