4 TRAFFIC PLANNING

4-1 General :

1) The traffic operational branch is primarily responsible for the effective utilization of bus & crew, route planning, movement of millions of passengers in the city of Mumbai and extended Suburbs quickly, efficiently and economically. The activities of Traffic Department are divided into two parts – one administration and operation. The operation is sub-divided into following parts:

Depots
Traffic Planning & Development Section
Traffic Control
Training School
Operational Monitoring Cell & KMPL Cell

2) The Traffic Planning & Control Section is playing a key role in the working of the traffic department. This department is headed by DGM(TO) and assisted by CM(Tr)/Dy. Chief Manager (Traffic) (Planning & Control) & other Traffic Officers. This section is mainly responsible for route planning, bus & crew scheduling, bus fare fixation and other departmental work. DGM(TO) is directly responsible to General Manager. The statistical data of bus operation is prepared and maintained in Planning Section.

3) The review of entire operation of Mumbai city and extended suburbs is taken in the Co-ordination meeting held under the Chairmanship of DGM(TO), every 4 months. During the Co-ordination meeting detailed discussion is held on the performance of bus routes and the demands from the commuters, their representatives. Besides this, the demands received from the passengers and public representatives through General Manager and other Senior officers are also taken into consideration. The Planning Section examines these suggestions/ demands and suitable action is initiated after obtaining the approval of the Management. The Planning Section maintains data bank and the same are furnished to the management from time to time for taking suitable and remedial actions. The prime job of the Planning Section is to prepare bus and crew schedules by keeping minimum requirement of staff since the staff cost is increasing day by day. The utilisation of bus and crew is also done carefully in the Planning Section by ensuring traffic operational efficiency and overall productivity of the organisation.

4) The Planning Section prepares various action plans to meet the increased demand of the citizens. During the festival period such as Diwali, Ganeshotsav, Mahashivratri, Bandra Fair, etc. Action plans for additional bus operation are prepared by reviewing the previous year's performance of such plans. The Planning Section prepares Holi Curtailment Plan (second day of Holi) as the passenger traffic is negligible.

5) The various types of cost cutting measures are also taken by the Planning Section to minimise the losses of the Undertaking especially of a traffic branch.

4-2 Bus & Crew scheduling

1) The activity of Bus and Crew Scheduling for the bus operation is done at the Planning Section. The implementations of operational changes are done after every four months along with the change in fixed duty of operating staff.

2) The Co-ordination meeting is conducted at the Planning Section for which guidelines are issued. The Depot Managers/Dy. Depot Managers/ Asstt. Depot Managers along with their Depot Officers and Engineering Ooficers attend the co-ordination meeting. After discussions the changes and suggestions in the bus operation are recorded. Once the details are tabulated the meeting is conducted by DGM(TO) / CM(Tr) along with Planning Officers, Dy. Chief Managers and same is discussed at length before submitting for Management's approval. Thereafter the Bus/Crew Schedules are prepared at Planning Section. The details of the Schedules with the concept and principle are given below:

i) An important step in Bus logistics is bus and Crew Scheduling, which is a most vital aspect in the transport planning. It is an ultimate exercise in Management of transport requirements by organising supply of transport services in relation to the demand by composing suitable bus and crew schedules. Buses and Crew, two important resources, require careful planning to ensure Traffic operational efficiency and overall productivity of an organisation. A schedule of bus route is the timetable showing expected arrival and departure at a fixed interval.

ii) Bus scheduling by definition means trips assigned to a vehicle during the day. Whereas Crew Scheduling means duties assigned to drivers and conductors in a day.

Necessity of a Schedule -

The schedules are prepared & revised under the following circumstances:

When a new route is introduced.

At the time of augmenting or curtailing the existing fleet of route.
If the timings of the trips operated are changed.
If the itinerary of the route is changed by way of Extension/Curtailment etc.
If the parameters involved in preparation of schedules such as Running time, Headway, First/Last bus timings, number of buses, Relief Point, Depot, Pattern of Operation, Type of buses etc are changed.

When there is a need to co-ordinate the trips with other modes of transport viz., Railway, Ferry timings, etc.
On the representation and requests from passengers and Representatives of the people.

iv) **Pattern of Schedules -**
There are two main patterns of schedules: i)

London type ; and ii) Ahmedabad type

London Type	**Ahmedabad Type**
In this type buses are kept moving on line and fresh relief are fed from the depot.	During the rest period of the staff on the buses are detained at terminus.

v) **Basic factors in bus scheduling :**

(a) Traffic demand :- Assessing the volume of traffic demand is one of the essential prerequisites for bus scheduling. Demand is assessed not by mere guesswork but by conducting traffic surveys. In order to decide upon the route pattern, frequency of operation, time schedule, number of trips, origin, destination, etc. the entire area of operation is required to be studied carefully. The study mainly concentrates on the following aspects: -

(b) The category of the passengers for whom the route is proposed. e.g.:- If the proposed route is to serve the residents in housing colonies located at distant places from railway stations, their need would be for a service from residential complex to the nearest Railway Station. The study is also required in order to decide first bus/last bus timings of the route.

(c) During the day there are peak and slack traffic periods. This has to be studied taking into consideration schools, college area, market area, entertainment centers in the vicinity. Even in a week, there are days having high traffic and low traffic especially where industrial/ market weekly offs are staggered. This study should also includes, The road conditions, availability of street lighting, overhead clearance, reversing facility, infrastructural amenities for staff at both the ends etc.

In the absence of reversing facility in certain locations the route is then operated on a ring pattern if feasible.

(d) Similarly, if there is no place for having a control point, the route will have to be controlled at one end only, wherein it may not require to provide layover at the other end i.e. uncontrolled end. Availability of alternate mode of transport such as personalized transport, taxis, auto-rickshaws, etc. also needs to be studied while assessing the traffic demand.

3) **Running time:**

(i) Determination of running time is essential for correct scheduling. For this purpose on line survey is conducted. On a congested road having more traffic jam points and traffic signals; more running time is provided.

(ii) Even different running time will have to be provided for different hours of a day and days of week, considering the traffic conditions during different hours of the day. Even the running time may be different in different directions i.e. 'Up' and 'Down'. Similarly, while fixing running time of route, running time provided to the parallel routes will also have to be taken into consideration i.e. Ordinary, Limited or Express.

(iii) It also depends on the type of buses to be operated. viz., Single Deck or Double Deck. Determination of running time is very crucial as running time affects the level of bus service. Running time is provided from 3 minutes per Km. to 5 minutes per Km. depending upon the time, day and area of operation.

4) **Lay over (Stand time):**

Stand time, which is also called layover, i.e. the time given at both the terminating points. Its purpose is to allow time for the passengers to board and alight and to enable the staff to record arrival/departure time from Starter, to take ticket blocks, change, etc. The layover is suitably given to synchronise the trip time with the other trips.

5) Headway (Frequency/Interval)

Headway will depend on the hourly load of passengers expected and level of service to be offered. Headway means frequency/Interval at which the buses are available.

6) **Requirement of buses :-**

Requirement of buses depends on the frequency with which buses are planned to be operated. The number of buses to be operated and the headway are inversely proportionate, i.e., more the number of buses, lesser the interval and vice versa.

7) **Relief point:**

The nearest terminating point having the required facility for staff, such as rest room, canteen, toilet, etc., would be the convenient relief point. If the route passes via the out shedding depot, the relief can be provided at the depot as a mid-way relief point. However at times it adversely affects the level of service since the passengers are stranded in such buses in case the bus arrives before schedule time or relief crew is not available due to sudden absenteeism.

8) Ring route (control at one end):

If the route is short, or terminating point is not available we provide control at one end only. As a result, we have to provide layover at one end only.

9) Requirements of maintenance department:

In Urban transport since all the buses return to the depot in the night and some return to the depot even during mid-day. Therefore, the maintenance requirement needs to be planned accordingly as per the requirement of Transportation Engg. department during Mid-day and turnout of buses as per maintenance plan of Transportation Engg. department.

10) **Out shedding depot:-**

The out shedding depot depends upon the type of buses to be operated, flow of passenger traffic, minimum dead kms, parking/maintenance facility available, etc.

11) Requirement of duty schedules :-

(i) Legal provisions:

The Motor Transport Workers Act 1961 and the Rules made there under provide:

a) Duty hours shall not exceed 8 hours in a day.
b) Spread over should not exceed 12 hours.
c) Minimum of half an hour rest before the completion of 5 hours duty.
d) Not more than 2 spells in a duty.
e) Gap of 9 hours between completion of a day's duty and commencement of
f) next day's duty.
g) One day of rest in a week.
h) Handing over/taking over time.

(ii) Hours of Work: -

a) All the time spent in work done during the running time of transport vehicle.
i.i.b) The time spent in subsidiary work.
i.i.c) Period of mere attendance at terminus of less than 15 mts.

(iii) **Readiness period** :-

Duties with two spells but less than 6 Hours are assigned readiness period to the extent of 8 hours duty. During the readiness period the staff is at the disposal of the employer for any other work including steering/platform duty.

(iv) **Double booking**:

Some buses are operated on double booking pattern where heavy loading and unloading point exists on route, in order to make empty bus available at that point and to provide relief to the passengers at subsequent stops. This pattern is also useful for providing buses from a point where reversing facility does not exist. Even sometimes, the buses are booked to run non-stop without passengers to cater to passengers at heavy loading point situated close to the starting point.

(v) Special buses for CBD Commuters (Zero Waiting Time):-

CST and Churchgate are terminal of Central and Western Railways respectively. The passengers coming from distant suburbs like Kalyan, Dombivli, Thane by Central Railway alight at CST and intend to commute to their work centres located at Nariman Point, World Trade Centre, Colaba. We operate special buses to cater to their demand for about less than 2 1/2 hour period. For this type of operation some buses of suburban depots arriving in the City by a trunk route are utilised to clear the CBD traffic. Special buses are operated from Churchgate also for the convenience of Western Railway Commuters commuting towards World Trade Centre & NCPA.

4) Priorities of new routes :-

We have adopted the following principles for introducing new routes in order to balance demand and supply.

(4.a.a) First priority goes to Feeder route.
(4.a.b) Second priority goes to an East-West Connectors.
(4.a.c) Third priority goes to routes from Suburbs to City.
(4.a.d) Rail-road Co-ordination

5) Evaluation of a schedule i.e. cost benefit analysis of schedule :

(1.a.i) After the schedule is put into effect, it is necessary to evaluate the same, in terms of operational as well as financial performance. The operational performance means whether the running time, layover, travelling time provided are adequate and whether the trips are being operated as per the schedule.

(ii) The financial performance includes tripwise passengers carried, EPPK, CPPK, load factor. While evaluating performance of a route in global sense, the aspects, viz., overall occupation ratio of service, its cost recovery index, its position in respect of ABC analysis, Profit/Loss per bus, average steering/platform duty, scheduled vehicle utilisation, schedule Kms per duty.

(iii) Initially the performance is observed daily for a period of one month. Based on the study by Depot officers & Planning section the schedule is revised suitably by curtailing early morning/late night trips, reducing no. of buses, changing running time. Its monthly performance is also critically observed and changes are made in consultation with the Depot Manager / Traffic Officers in order to improve operational and financial performance.

1.1.6) Measures to improve performance: -

The Planning Section always takes measures to improve performance including the following:-

(1.1.6.a.a) Reduction in remunerative trips/operation;
(1.6.a.b) Low freqency during non-peak hours;

(1.6.b) Operation of single decker buses instead of double decker buses on Sundays & Holidays to reduce Staff requirement and early morning/late night period.

(1.6.b) Reduce running time on Sundays & Holidays because of Clear roads and less traffic for optimum utilisation of buses and staff.

7) Action Plans:-

In addition to these activities, plan for operation of extra buses during Diwali, Bhau-beej, Bandra Fair, Mahashivratri, etc, for clearance of passengers at heavy loading points, etc, are implemented.

8) **Computerisation of Bus and Crew Scheduling -**

(I) The Bus Schedules initially prepared manually and then fed in Computers. On the basis of running schedule of bus, the Master Card having trip- wise details of each and every bus, kms. etc, are generated. The crew schedules are prepared with the help of M/s. Trapeze to make the optimum utilization of staff.

(II) In the Computerisation, the following outputs are generated in addition to the Bus & Crew Schedule.

(1) Buses on Road time wise (DD & SD)
(2) Schedule Kms (Route wise Summary)
(3) Schedule trips (Route wise/ Depot wise)
(4) Turn out/stabling timing
(5) Maintenance plan.
(6) Allocation of duties
(7) Terminus particulars
(8) Schedule vehicle utilisation
(9) Starter points
(10) Operational hours/ Kms.
(11) Joint duties
(12) Platform duties etc.

4-3 Type of Surveys:-

1) The types of Surveys conducted are as follows:

Traffic survey is an important tool to assess the changing passenger demand. Origin-destination surveys conducted on a sample basis provide valuable data to plan the route-grid. Such surveys could be at regular intervals. However, for the purpose of scheduling more frequent survey are necessary say once in 6 months. Such surveys are of two types, i.e., the loading surveys and the waiting time surveys.

(i) Loading Surveys:

These surveys give us an idea about the stage-to-stage traffic load on individual routes. For conducting such surveys enumerators are posted on the buses. Survey Conductors/Inspectors are posted as enumerators on all the serials of a route or we may select a few serials preferably alternative ensuring that we cover a bus at least every half an hour or so. The enumerator notes down the number of passengers in the bus at every stage and also the time of the arrival of the bus at the stage. The average stage-wise load carried per bus for the given period with reference to its carrying capacity is worked out.

Now the data is available through e-ticketing machine.

(ii) On the basis of the survey extra buses can be arranged to clear the traffic at heavy loading points. The loading points differ in the morning and evening. In the morning as traffic trend is from North to South and buses come full from the northern termini, the extra buses are required from intermediate points.

2) **Waiting time surveys:-**

(i) Provision of 'adequate' bus service is the goal of every bus transport operator. The question is how to measure the adequacy. Waiting Time Surveys' provide the yardstick for the purpose. They tell the operator how long the passengers at different bus stops have to wait to get accommodation in the buses and thus enable him to decide whether the level of the waiting time assumed by the operator as ‘reasonable’. If the operator has fixed 20 mts. as the reasonable waiting time and the survey reveals that passengers have to wait for 30 mts., obviously the service is inadequate and calls for augmentation of the fleet. On the other hand, if all passengers on a route get a bus within 5 mts. the service is 'too good' in relation to the waiting time fixed for him. In that case we could reduce the fleet and transfer few buses to other routes where the waiting time is excessive. If fleet is short, the goal should be to equalise the waiting time of passengers by such transfers of buses.

(ii)Methodology of 'Waiting Time Surveys':-

For assessing the waiting time of passengers at particular bus stop between say, 8.00 and 11.00 hrs, the survey Conductor/Inspector is posted as enumerator at the bus stop for the said period. On arriving at the stop at 8.00 hrs the surveyor joins the bus queue and marks a passengers who joins the 'Q' at 8.00 hrs. The time that passengers get his bus is the waiting time for him. Observer then joins the queue again, noting down the time of joining and later on his getting the bus. He also keeps records of number of buses reaching the stop, number of passengers, alighting, boarding, vacant seats in the bus/number of passengers left behind for the want of accommodation in the bus for them.

(a) A completed sheet then shows the waiting time of passengers join the queue at

different times during the period of 8.00 to 11.00 hrs. An half hourly summary of the waiting time is prepared wherein the 'maximum' waiting time for a passenger joining the queue during the particular half an hour is indicated, together with other details such as number of buses touching the stop, No. of passengers alighting, boarding, left behind at the half hourly period and vacant seats, if any, carried during the period.

(b) It is necessary that during the period of conducting a survey the service run regularly and there are no irregularities. Thus, if two buses do not arrive at a time and the waiting time increases, then there is no case for augmentation of fleet. If the waiting time is excessive despite regular service then only augmentation is called for. Likewise the number of passengers left behind is also important. If a small number of say 4 passengers at one bus stop are left behind, it may not be worthwhile to augment the service. If buses do not arrive regularly for some reason, the summary indicates a gap in service. If buses are full then the waiting time, summary indicates accordingly.

(c) When a particular bus route is to be surveyed, its loading survey is taken and simultaneously, the waiting time survey is also conducted at important bus stops enroute. The study of the waiting time together with the loading surveys give an idea of the changes needed in the operating schedules.

(d) Thus, if at some successive stops, the waiting time is high but loading survey indicates that buses are running with meager load after a certain later stop, it might be possible (depending on the traffic in the opposite direction) to reduce the number of buses operating direct and run a few of them upto the stop where there is heavy traffic. This will increase the number of trips and help reduce the waiting time with the same number of buses. On other occasions, the surveys might indicate the need for 'reduction of fleet' or augmentation of fleet or 'no change' etc.

3) <u>Traffic Checking System- Jackpot Method:-</u>

(i) We follow two methods for carrying out Jack-pot operation. In the first Method we post two Survey Conductors in each bus operating on the particular route, right from the 1st bus in the morning to the last bus in the night. One Survey Conductor stands at the front door near the exit platform in the bus and ensures that every passengers alighting from the bus has purchase a ticket while other Survey Conductor stands at the rear door of the bus and does not allow any passenger to alight from that door which is meant for boarding only. Thus every bonafide passenger travelling by that bus is made to purchase a ticket, for the journey. The operation Jack-pot goes on for a period of 3/4 days in a week. Then the daily earnings on this route during the day of the survey is compared with the earnings of the corresponding days of the previous month. If there is substantial jack-pot noticed in the earnings of this route, as a result of the Operation Jack-pot, the Division is instructed to alert the traffic supervisory staff as also the Vigilance Squad and intensify the supervision on this route.

(ii) In the other method, incognito survey is carried out by Survey Conductor from

1st bus to last bus on the specific route. The Survey Conductor posted for carrying out the survey stands at the rear door of the bus. He is not supposed to disclose the purpose of his survey to the on duty Conductor. However, he instructs the Conductor to let him know the no. of pass holders travelling in the bus. He silently enumerates the total no. of passengers boarding the bus. He deducts the no. of pass-holders and luggage tickets from the figure arrived at by him indicating total no. of passengers. Then the total figure of bonafide passengers arrived at by the enumerator is compared next day with the actual sale of tickets by the Conductors since we consider tickets sold by the Conductor on a given day as no. of passengers. If there is a considerable difference between the figure of the survey conductor and the actual sale of tickets by the Conductor on that particular day, then the Vigilance Squad is alerted through Traffic Control, to keep an eye on the working of the Conductor, and to take such steps as surprise and incognito checks etc. to bring the defaulter to book.

4) <u>Running time survey:-</u>

(i) Running Time survey is carried out to assess the adequacy or otherwise of the scheduled running time. The running time survey is carried out when a bus route runs behind schedule, resulting in a number of short trips.

(ii) In fact, adequate running time is a prerequisite for operating the buses as per schedule. At the same time the running time should not be either excessive or less. A balance has to be struck between liberal running time and less running time while fixing the scheduled running time of a route. For this purpose the localities and the roads on which the route passes are taken into account. If one route passes through congested roads and the other on clean road such as Express Highway, then even if the route distance of both these routes is equal, the running time will differ.

(iii) The running time survey is carried out by the Planning Section as follows:

For carrying out the running time check of a particular route, we post survey conductors in incognito at both the termini from the 1st bus for about two days. The survey conductor at the respective terminus note down details such as bus no., actual arrival time, actual departure time etc. on the form provided to him. In this manner we get the actual arrival/departure time of all the buses on that particular route on a given day, which arrived or departed from the termini.

(iv) From the data collected by the survey observer, an hour wise summary is prepared taking the average running time for that particular period. The running time thus arrived at, is compared with the scheduled running time to assess the adequacy or otherwise of the scheduled running time. In such survey all the trips except short trips are covered. Further, since the driving habit varies from driver to driver, it is necessary to work out the average running time.

(v) Sometimes on receipt of complaint regarding deliberate slow driving or time

wasting by operating staff a punctuality check is carried out by making the survey conductor travel in the bus from 1st bus to last bus. The survey conductor makes a note of instances such as deliberate slow driving, wasting time, detention at junction due to signals, traffic jams etc. and submits his report. On the basis of his finding suitable action is taken to remedy the situation.

(vi) With the introduction of E-ticketing machine, maximum data is available from ETIM, which enable us to do away with maximum surveys and thereby saving the cost of survey.

4-4 Statistical Bulletin:-

After doing detailed analysis of the route net work, the Planning Section is preparing a Monthly Statistical Bulletin Part I & II and also one page bulletin giving the performance of various major parameter of traffic department.

4-5 Fare tables:-

The bulk of revenue of the transport wing of the Undertaking is received through passenger receipts. The proposal for fare revision is put up by the Planning Section by working out various options, which are beneficial to the Undertaking as well as to the passengers. The details of staging numbers and charging of fares are given below:

1) Staging principles & charging of fares:-

(i) In spite of surpassing all the efficiency targets and adopting several economy measures, we are still incurring heavy losses on the transport wing of the Undertaking. This is mainly due to the fare not matching with the cost of operation. It is necessary to raise the level of fares by revision of bus fares so as to narrow down the gap between the earnings and cost of operation, i.e. to say income and expenditure or to achieve break-even points.

(ii) We have to fix our fare structures within the frame-work of the Notification issued by Government of Maharashtra. After preparing a proposal for fare revision, the same is put up to the BEST Committee, Municipal Corporation of Greater Mumbai and the Regional Transport Authority for their approval. After getting the approval from the above three authorities, we effect the revised fares.

2) **Fare structure:** There are different types of fare structure, viz.

(I) Multiple Fare Structure ;

(II) Telescopic Fare Structure ;

(III) Zonal Fares and;

(IV) Flat Fares ;

(I) **Multiple Fare Structure** :-

According to this fare structure, fares are in exact multiples of every stage of 1 Km., 2 Kms. etc. for e.g. if the fare is Re. 1/- per stage of 1 Km., the fares are in multiples of Rs.2/- for 2 Kms., Rs. 3/- for 3 Kms., Rs.4/- for 4 Kms. and so on.

(II) Telescopic Fare Structure :-

Under this fare structure, the rate per kilometer tapers down progressively for larger distances, for e.g. if the rate is Re.8/- per kilometer for first two Kms., thereafter, it would be Re.4/- for next two Kms. and Rs.2/- for next 2 Kms. and so on.

(III) Zonal Fares :-

In some of the Undertakings, their operational area is divided into Zones and if the fare is Rs. 10/- per zone, then the passenger has to pay Rs.10/- if he travels in zone-I, Rs. 20/- if he travels in zone I & II, and Rs. 30/- if he travels in zones I, II and III and so on.

(IV) Flat Fares:-

Under this system, the fares are charged for travel ranging from 1 Km. to 10 Kms. or whatever the range is decided by the Operator.

The Undertaking operates the following types of services under stage carriage system viz. Ordinary Services, Limited Services, Express Services and Air Conditioned services.

3) Charging of Fares:-

(I) The fares are charged from one fare stage to another and not from one stop to another stop. If the passenger boards and/ or alights at a stop, which is not a fare stage, he is charged from the preceding fare stage of the place of boarding and upto the succeeding stage of the place of alighting. This system is followed by all the State Transport Undertaking and they are given permit for 'stage carriage' by Regional Transport Authority concerned.

(II) Reservation of buses:-

The Planning Section also provides buses on hire to outside parties. The buses are given on Km basis and on flat rate basis. Reservation Section does the transaction of booking and the reservation slip is send to the concerned depot from where the buses are given. After the reservation date is over and the slip is received back from the depot, the Refund bill of Security Deposit is prepaid and sent to Accounts, Audit & Cash Department.

The BEST undertaking is also having 5 open deck buses. The same are provided to passengers for birthday parties and sightseeing purpose. The details of schedule charges are available on our website. On Saturday and Sunday evening one open deck bus is given to MTDC for Heritage Tour in South Mumbai.(MTDC Tel. No. 22845678)

4-6 Marketing cell:-

The marketing cell of the Traffic Department ensures that the revenue is increased through the marketing of services. This cell is also responsible for Corporate trips.

4-7 Disaster Management Plan:-

The Planning Section prepares a comprehensive disaster management plan to meet the emergency especially during monsoon period in the city of Mumbai. This plan is updated every year prior to monsoon. During monsoon, it is observed that many a times on account of heavy rain there is flood in the Mumbai city and the services of the local trains are disrupted. In that case, the disaster management plan is executed from the control room to carry stranded local train passengers in our buses from various railway stations. The posting of officers during 'on duty' and 'off duty' hours is also published in this disaster management plan.

4-8 Co-ordination with various utilities/Agencies:

The Planning Section also co-ordinates with MMRDA, MCGM, Transport Commissioners Office, RTO, etc in connection with the activities of Transportation.

4-9 E-ticketing & RFID based bus-pass systems

The Undertaking introduced e-ticketing and RFID based bus-pass systems in the year 2010-11.

Bus conductors are now issuing tickets using electronic ticket issuing machines (ETIMs) instead of old system of punching on tickets having stage numbers already printed on them. In new system, names of the boarding & alighting bus-stops and amount of fare along with date, time route no. & conductor no. are printed on the ticket. Monthly & Quarterly bus-passes are introduced for regular travellers. The passes are of two types viz. between desired destinations and travel anywhere type. Any no. of changeovers en-route is permitted and there shall not be any restrictions on no. of journeys using bus-passes. Bus-pass sale counters are opened at bus depots & bus stations for registration and/or renewal of bus-passes. Passengers are also given option of registering/renewing their bus-passes on-line using net banking/ debit card/credit card. Passengers can renew their bus-passes up to seven days in advance. The bus-passes are electronically validated RFID cards where name of the passenger, bus-pass no., type of bus-pass and its validity are written on the electronic chip of the card. Passenger's photograph is printed on the front side of the bus pass. ETIMs with bus-conductors are capable of reading the data on the RFID card and details are displayed on its LCD screen. The student's concessional bus-pass scheme is available for students up to 20 years or students studying up to 12th standard. They are also issued RFID based bus-passes of monthly, quarterly & half-yearly duration. Students can use dedicated school trip facility for a group of 50 or more students between their residence and school. The Undertaking has introduced Cashless Travel facility using Pre-paid cards (e-purse) w.e.f. 07.08.2012. Passengers can load any amount between ` 100 and ` 10000 on the RFID card and purchase a ticket on a bus by showing his card to the bus-conductor. The amount of fare is deducted from the card when bus-conductor generates ticket using ETIM by holding the pre-paid card behind it.