CMR
INSTITUTE OF
TECHNOLOGY

Internal Assessment Test 1 – Sep. 2018

Scheme and Solution

Sub:	Urban Transportation planning					Sub Code:	15CV751	Branch:	Civil
Date:	09/09/2018	Duration:	90 mins	Max Marks:	50	Sem/Sec:	VII A and B		

Q1. Write in detail about "Urbanisation" mentioning its ill effects and positive effects.

Definition (2 marks)

Urbanization refers to general increase in population and the amount of industrialization of a settlement. It includes increase in the number and extent of cities. It symbolizes the movement of people from rural to urban areas.

Urbanization brings with it several consequences – both adverse and beneficial. They impact on social and environmental areas.

Adverse effects of Urbanization (5 marks)

There is increasing competition for facilities due to the high standard of living in urban areas, which has triggered several negative effects. Many people including farmers who move to cities in search of a better life end up as casual laborers as they lack adequate education. This leads to one of the worst problems of urbanization - the growth of slums.

Slums

They are urban areas that are heavily populated with substandard housing and very poor living conditions. As a result several problems arise.

• Land insecurity - Slums are usually located on land, which are not owned by the slum dwellers. They can be evicted at any time by the landowners.

• Poor living conditions - Crowding and lack of sanitation are main problems. This contributes to outbreak of diseases. Utilities such as water, electricity and sewage disposal are also scarce.

• Unemployment - Since the number of people competing for jobs is more than jobs available, unemployment is an inevitable problem.

• Crime - Slum conditions make maintenance of law and order difficult. Patrolling of slums is not a priority of law enforcing officers. Unemployment and poverty force people into anti-social activities. Slums become a breeding ground for criminal activities.

Environmental impacts of urbanization

• Temperature - Due to factors such as paving over formerly vegetated land, increasing number of residences and high-rise apartments and industries, temperature increases drastically.

• Air pollution - Factories and automobiles are symbols of urbanization. Due to harmful emissions of gases and smoke from factories and vehicles, air pollution occurs. Current research

shows high amount of suspended particulate matter in air, particularly in cities, which contributes to allergies and respiratory problems thereby becoming a huge health hazard.

• Water issues - When urbanization takes place, water cycle changes as cities have more precipitation than surrounding areas. Due to dumping of sewage from factories in water bodies, water pollution occurs which can lead to outbreaks of epidemics.

• Destruction of Habitats - To make an area urbanized, a lot of forested areas are destroyed. Usually these areas would have been habitats to many birds and animals.

Benefits of urbanization (3 marks)

Though urbanization has drawbacks, it has its benefits.

• Efficiency - Cities are extremely efficient. Less effort is needed to supply basic amenities such as fresh water and electricity. Research and recycling programs are possible only in cities. In most cities flats are in vogue today. Many people can be accommodated within a small land area.

• Convenience - Access to education, health, social services and cultural activities is readily available to people in cities than in villages. Life in cities is much more advanced, sophisticated and comfortable, compared to life in villages. Cities have advanced communication and transport networks.

• Concentration of resources - Since major human settlements were established near natural resources from ancient times, a lot of resources are available in and around cities. A lot of facilities to exploit these resources also exist only in cities.

• Educational facilities - Schools, colleges and universities are established in cities to develop human resources. A variety of educational courses and fields are available offering students a wide choice for their future careers.

• Social integration - People of many castes and religions live and work together in cities, which creates better understanding and harmony and helps breakdown social and cultural barriers.

• Improvements in economy - High-tech industries earn valuable foreign exchange and lot of money for a country in the stock markets.

Q2. What are the various transportation problems and explain ways to identify and rectify the same?

Urban Transport Problems (4 * 2.5 = 10 marks)

a**) Road congestion**

As populations increase, the average travel distances as well as intensity are expected to increase as there is a direct correlation between the two indicators. Average trips lengths for metro cities including Bengaluru are over 8 km, while it is 6 km or less for all other metro cities. This trend in trip length and frequency is only expected to increase with increasing income levels, migration, participation of women and a service-oriented economy. As more people travel over longer distances on regular basis for employment and education purposes, will inevitably lead to road congestion.

b) **Parking problems**

The acute shortage of parking spaces both on and off the streets in Indian cities increases the time spent searching for a parking spot and induces traffic congestion. Available data shows that a high proportion of Indian streets are faced with on-street parking issue.

This problem is especially acute in smaller, compact Indian cities. Delhi has 14 per cent of road lengths used for on-street parking while Surat has almost 60 per cent of its road lengths blocked by on-street parking. On-street parking is perversely incentivized because it is either free or priced lower than off-street parking. Even if cities invest in multilevel car parks in prime areas, the parking rates are not expected to recover the costs. In Delhi, the public parking charges are fixed as low as Rs10 for 8 hours during the daytime when it should be at least Rs40 per hour.

Kolkata has the highest parking charges in India and these charges are time and place variable, i.e. higher parking charges in specific commercial zones and the rates increase by the hour. In Kolkata, a car pays Rs80 for eight hours of parking during daytime, while in Delhi MCD region, car parking charges are as low as Rs10 for up to 10 hours of parking. Figure 5 shows the eight-hour average parking rates in different cities but does not include special parking rates in parking spaces like malls, airports, etc.

c) **Air pollution**

The severity of air pollution in Indian cities is judged based on CPCB's (Central Pollution Control Board) air quality classification. According to available air quality data of 180 Indian cities, there is a wide variation in the pollution concentration and severity across cities. Cities are considered critically polluted if the levels of criteria pollutants (namely PM10 and NO2) are more than 1.5 times the standard. Results show that half of the residential areas in cities monitored by CPCB are at critical levels of air pollution.

According to US-based Health Effects Institute, people residing within 500 metres from roads are exposed to vehicular fumes. The danger is especially pronounced when diesel vehicles are operating, as diesel emissions are known to trigger adverse respiratory health effects. A study of select Indian cities indicates that the share of transport sector's contribution increases when tinier fractions of particulates are considered. In Indore, transport contributes to 30 per cent of PM10 but 46 per cent of PM2.5, while in Chennai, it is 20 per cent of PM10 and 35 per cent of PM2.5.

d) **Deteriorating road safety**

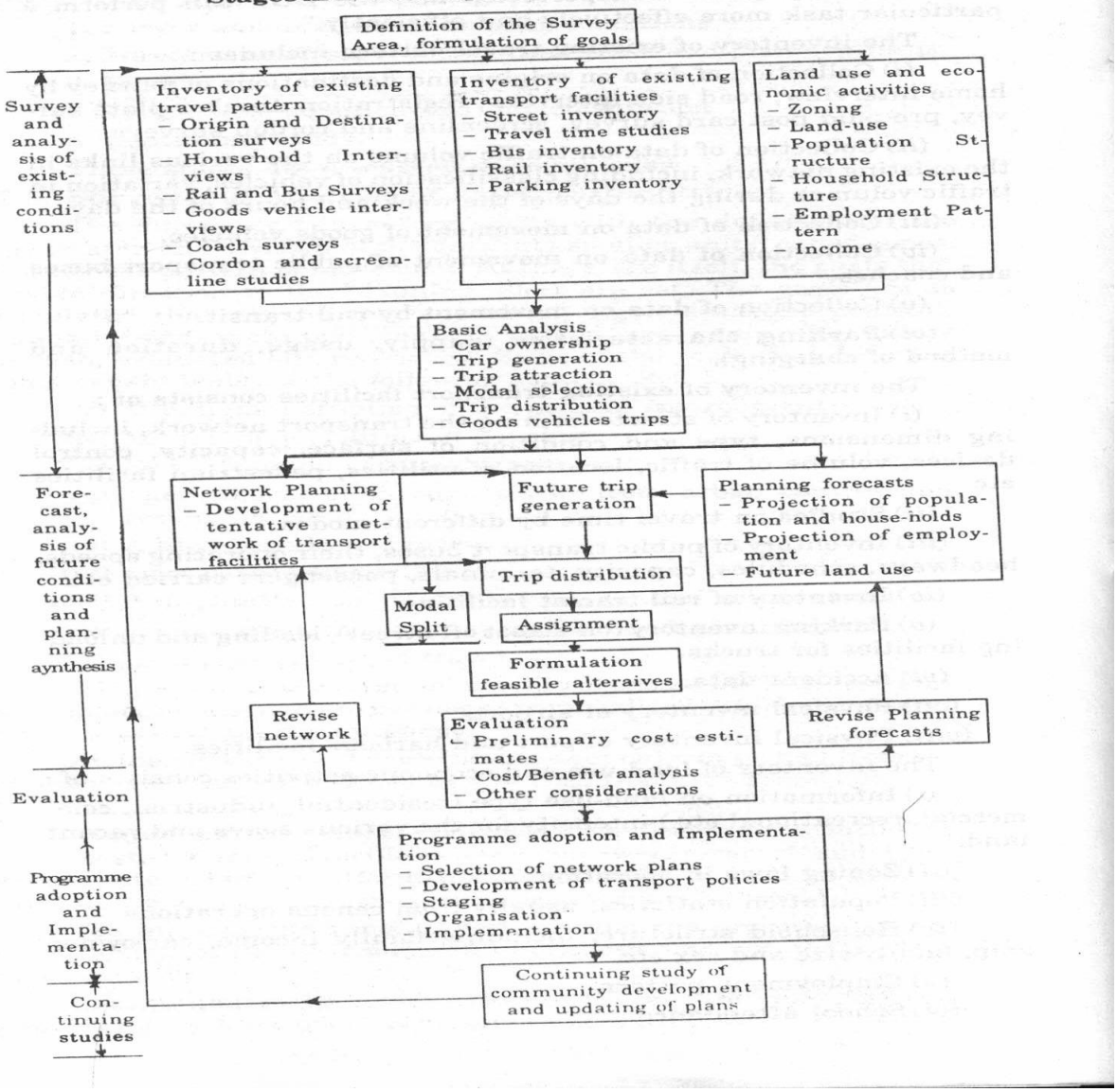
The high dependence of migrants on non-motorised transport modes such as walking and cycling causes traffic mix in common roads where fast-moving motorised traffic shares the roads with slow-moving modes leading to an increasing number of fatalities and road accidents (WHO, 2013). In most Indian cities, non-motorised modes like cycling and walking presently share the same right of way as cars and two-wheelers leading to unsafe conditions for all (National Urban Transport Policy (NUTP), 2008). The number of fatalities is also increasing in relation to the increasing motorisation and higher slow-moving vehicles in the traffic stream. While progress has been made towards protecting people in cars, the needs of vulnerable groups of road users, primarily cyclists and pedestrians, are not being met.

Pedestrian fatalities constitute a significant share of total fatalities and the magnitude is in fact much higher in cities that lack adequate pedestrian facilities. In New Delhi, Bengaluru and Kolkata, the pedestrian fatality share is greater than 40 per cent. In the case of Bengaluru, three pedestrians are killed on roads every two days and more than 10,000 are hospitalised annually. Elderly people and school children carry a large share of the burden with 23 per cent fatalities and 25 per cent injuries. The percentage of streets with pedestrian pathways is hardly 30 per cent in most Indian cities. The main reason behind this is inequitable distribution of road space and the fact that streets in India are not designed with the intention of accommodating all the functions of a street. Furthermore, only a part of the right of way is developed leading to unorganised and unregulated traffic, which is unsafe for pedestrians and cyclists.

Q3. With a neat flow chart, explain various stages involved in transportation planning process.

(10 marks)

Table 29-2
Stages in the Transport Planning Process



Q4. A) Define "zones'. Mention the various factors considered in dividing the whole area into zones.

The defined study area is sub-divided into smaller areas called zones. The purpose of such a sub-division is to facilitate the spatial quantification of land use and economic factors which influence travel pattern. (2 marks)

Factors : (3 marks)

The external zones are defined by the catchment area of the major transport links feeding to the study area. Few guidelines to be considered for selecting zones are given below.

1. Zones should match other administrative divisions, particularly census zones.

2. Zones should have homogeneous characteristics, especially in land use, population etc.

3. Zone boundaries should match cordon and screen lines, but should not match major roads.

4. Zones should be as smaller in size as possible so that the error in aggregation caused by the assumption that all activities are concentrated at the zone centroids is minimum.

5. The zones should have a homogenous land use.

6. Natural or physical barriers such as canals, rives etc can form convenient zone boundaries.

7. Zones boundaries should preferably be water-shed of trip making.

8. The zones should preferably have regular geometric form for easily determining the centroid which represents the origin and termination of travel.

9. Sectors should represent the catchment of trips generated on a primary route.

10. Land-use is the most important factor in establishing zones for a transportation survey. It is only when the origin and destination zones reflect properly the land-use can traffic generated within the zones be predicted, measured and quantified accurately.

B) Mention the factors to be considered while drawing a cordon line for a study area.

(5 marks)

The selection of the external cordon line for an urban transportation study should be done carefully due to the following factors.

i. The external cordon lines should circumscribe all areas which are already built-up and those areas which are considered likely to be developed during the period of study.

ii. The external cordon line should be compatible with previous studies and the area of studies planned for the future.

iii. The external cordon line should be continuous and uniform in its course so that movement crosses it once. The line should intersect roads where it is safe and convenient to carry out traffic surveys.

iv. The external cordon line should be contain all areas of systematic daily life of the people oriented towards the city centre and should in effect be the ‘commuter-shed’.

Q5. A) Explain in detail with sketch about the basic movements in transportation survey.

List (2 marks)
Figure (3 marks)

Types of Surveys

The basic movements for which survey data are required are:

1. Internal to Internal
2. Internal to External
3. External to Internal
4. External to External

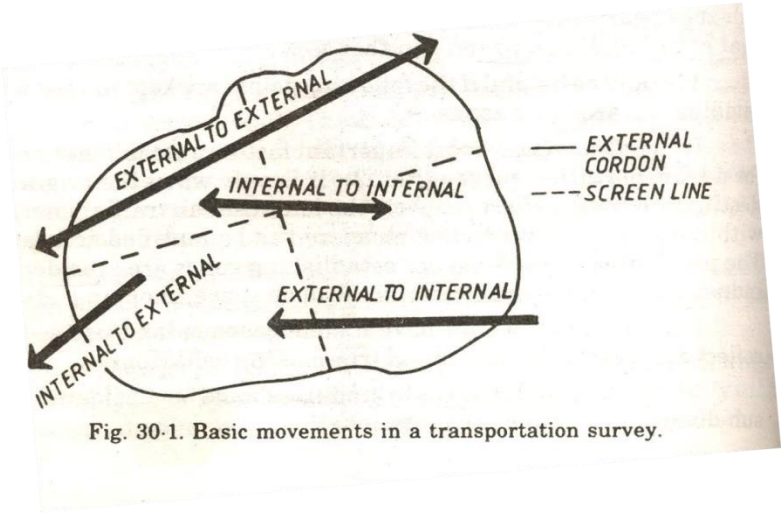


Fig. 30·1. Basic movements in a transportation survey.

For large urban areas, the internal to internal travel is heavy whereas for small areas having a small population the internal to internal travel is insignificant. The internal to internal travel is best studied by the home interview technique with checks by screen-line surveys. The internal to external, external to internal and external to external travels can be studied by cordon surveys and also be surveyed by home interview technique.

B) Mention the different types of transport surveys to be conducted to collect a primary data.

List of surveys (5 Marks)

The surveys can collect the data, (i) at the home, (ii) during the trip and (iii) at the destination end of the trip.

When collected at the home, the data can be wide-ranging and can cover all the trips made during a given period. The data collected during the trip is necessarily of limited scope since the procedure yields data only on the particular trip intercepted. At the destination ends, the direct

interview types of surveys provide data on demand for parking facilities and on major traffic attractors such as factories, offices and commercial establishments.

The following are some of the surveys that are usually carried out,

1. Home interview surveys
2. Commercial vehicle surveys
3. Taxi surveys
4. Road-side interview surveys
5. Post card questionnaire surveys
6. Registration number surveys
7. Tag surveys
8. Public transport surveys

Q6. Write short notes on

(i) BRTS (5 marks)

Bus rapid transit (BRT) includes bus systems with many physical and operational elements that give them higher capacity, better performance, and a stronger imagethan regular buses. The minimal features a bus line must have to be considered BRT are:

- Most of ROW is category B and limited line sections of ROW category C.

• Clearly designated stops / stations with passenger amenities spaced 300 to 500 m apart.
• Regular or articulated buses with distinct appearance, good riding comfort, low floor or high platform, and multiple doors for easy and fast boarding/ alighting at stops / stations.
• Service offered with regular headways throughout the day—i.e., it is regular transit rather than commuter transit.
• Movement of buses along the line, dispatching at stops and passenger information are well organized and controlled by various ITS measures, guaranteeing reasonably high reliability.

Performance of BRT systems depends greatly on the design and quality of the elements mentioned above. Its quality of service, particularly reliability and image, depend mostly on the enforcement of bus priorities along ROW and operational organization. Ifother vehicle categories are allowed to use formerly exclusive bus lines or busways, BRT is degraded into a regular bus mode on HOV facilities.

There is a broad range of improved bus services. In some cases, bus lines may include only a few of the above-mentioned elements. For example, buses may use HOV lanes, travel only in the peak direction, and operate for several hours. Such systems are not BRT .

Typical BRT, such as a line with physically protected lanes, operating articulated buses at 2-min headways during peak hours, offers a capacity of 3000 to 5000 spaces/hour. Much greater

capacities can be reached on lines with multiple stations, with four lanes at stations allowing overtaking of buses, or even four-lane roadways along most sections of a line (Bogota).

(i) Metro rail system (5 marks)

Metro typically consists of large four-axle electrically powered rail vehicles (area up to 70 m^2) that operate in trains of up to 10 cars on fully controlled (A) ROW with full signal control. This allows high speed, reliability, and capacity, rapid boarding/ alighting at stations, and fail-safe operation (in the case of driver's error or disability, the train is stopped automatically). Some RRT systems are further characterized by a high degree of automated operation or fully automated operation without a driver. Rail rapid transit represents the ultimate mode for line-haul transport (i.e., for serving a number of points along a route). Trains of spacious vehicles with several doors on each side board passengers from high-level platforms without fare collection delays at rates of up to 40 persons/second (prs/ s), many times higher than any other mode. With train capacities, where required, exceeding 2000 spaces and up to 40 trains /hour (TU/h) passing a point, the capacity of RRT greatly exceeds those of other modes; full ROW control allows the most reliable and safe travel of all modes at the maximum speeds that station spacings and passenger comfort permit. In all these features there is no physical way that a further major improvement in performance can be achieved for line haul service. This highest performance is achieved, however, at an investment cost higher than that for any other mode: provision of its major component, a fully controlled ROW and stations in urban areas, requires considerably higher investment cost than any other transit mode infrastructure.