MID-TERM EXAMINATION

SUBJECT: TRANSPORTATION PLANNING & MANAGEMENT

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IQRA NATIONAL UNIVERSITY PESHAWAR

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QUESTION NO. 1
What is planning briefly describe the studies carried out in the scope of transportation planning strategies in their modeling with assumptions & limitations. Present your answer in the form of a formal technical report?

ANS:

PLANNING:

Planning"… an activity or process that examines the potential of future actions to guide a situation or system toward a desired direction" Occurs in present but is oriented towards the future Goals:
In Transportation it relates the operation of the highway system, geometry of road and traffic operation facilities to achieve the desired goals: like
To meet the mobility needs of the population.
To provide enhanced economic development opportunities.

FUNDAMENTAL ASSUMPTIONS IN TRANSPORTATION PLANNING:
- ❖ Travel patterns are tangible, stable and predictable.
- ❖ Movement demands are directly related to the distribution, and intensity of land use, which is capable of being accurately determined for some future date.

ADDITIONAL ASSUMPTIONS:

- ❖ Decisive relationship exists between all modes of transport and that the future role of a particular mode cannot be determined without giving consideration to all other modes.
- ❖ The transportation system influences the development of an area, as well as serving that area.
- ❖ Area of continuous urbanization requires a region-wide consideration of transport situation.
- ❖ The transportation study is an integral part of the overall planning process, and cannot adequately be considered in isolation.
- ❖ The planning process is continuous, and requires continuous updating, validating and amendment.

SHORT & MEDIUM TERM TRANSPORTATION PLANNING (S&M):

- ❖ Efficient use of existing road space.
- ❖ Reduce vehicle use in congested area.
- ❖ Improve transit service.
- ❖ Improve internal management service.
- ❖ Planning with short range objectives based upon studies with limited scope and local orientation.
- ❖ Evaluation Criteria can be accidents, travel time etc.
- ❖ Making existing system efficient.
- ❖ Short range transportation needs.
- ❖ To increase efficiency:

SCOPE OF TRANSPORTATION PLANNING:

- ❖ All man-made projects should start with a plan.
- ❖ The more significant the project, the more intensive and long term the planning

For large transportation projects, planning starts 20 years before construction

TRAFFIC VOLUME COUNTS:

- ❖ Number of vehicles passing a point.
- ❖ May be comprehensive counts covering the entire main road system in an area.
- ❖ Counts on all roads intersecting a cordon line which encircles a particular area.
- ❖ Counts on screen line(s) which divide a city into two or more parts.
- ❖ Counts at specific points.
- ❖ **The information sought**

- ❖ Traffic volume and the direction.
- ❖ Volume of turning traffic at intersections.
- ❖ Hourly, daily, and seasonal variations of traffic
- ❖ Proportion of cars, trucks and buses.

STRATEGIC TRANSPORTATION PLANNING:

- ❖ Capital intensive improvement
- ❖ Major S&M synonymous to small strategic plan
- ❖ Recycling of S&M during long time possible
- ❖ New facilities.
- ❖ Major changes in existing facilities.
- ❖ Long range policy actions.
- ❖ Future land development policies, adding highway link, bus transit system.
- ❖ Travel demand forecasting play an important role

ORIGIN & DESTINATION SURVEYS:

- ❖ Traffic counts give the amount of traffic passing specified points on the road but they do not indicate where traffic desires to travel, i.e. Its origin and its destination.
- ❖ The survey is primarily for transportation planning, particularly the location, design, and programming of new or improved highways, public transport, and parking facilities.
- ❖ An origin and destination survey may range from a relatively simple study to determine the amount of traffic that would by-pass a town to a comprehensive transportation survey for planning and design of the transportation system in a large metropolitan area.

Methods include:

- ❖ Recording registration numbers
- ❖ Handing postcards to drivers
- ❖ Roadside interviews

SPEED STUDIES:

- ❖ Using a radar meter, this gives a direct reading of speed.

- ❖ Taking photographs of a section of road at a predetermined time interval and measuring the distance

- ❖ Results may be presented in tables, graphs and diagrams.

❖ These may include

❖ Speed distribution and cumulative frequency distribution curves.

❖ The mean speed (TMS & SMS)

❖ The 85th percentile Speed

TRAVEL TIME AND DELAY STUDIES:

❖ Travel time measures the average journey time and journey speed on sections

❖ Used in traffic assignment

❖ Quality of the traffic route

❖ Before and after effect of traffic engineering techniques

Delay study:

❖ By analyzing the delays, the location and cause of the congestion can be identified and remedied.

PARKING STUDIES:

❖ Carried out to
❖ Assist in cordon counts
❖ the number and location of existing parking spaces, both kerbside and off-street;
❖ existing parking practices, including usage of available spaces, parking duration, illegal parking;
❖ the need to impose or vary parking time limits or to install parking meters;
❖ The adequacy of existing enforcement measures.
❖ For larger cities, a comprehensive parking demand study is required
❖ It includes the determination of parking usage, parking habits as well as the origin, destination and purpose of trip of drivers parking in the area.

OTHER TRAFFIC STUDIES:

- ❖ Queue lengths
- ❖ Gap study
- ❖ Vehicle occupancy study
- ❖ Commercial vehicle survey
- ❖ Trip generation study
- ❖ Turning movement counts
- ❖ Vehicle delay studies
- ❖ Saturation flow rate

QUESTION NO. 2

What activities are Exercised in planning for a four step conventional transportation modeling discuss in detail with reference to different zonal productions and attractions attributes?

ANS: BASIC ACTIVITIES IN TRANSPORTATION PLANNING

1. Collect travel information
2. Identify existing system performance levels
3. Estimate future travel demand
4. Forecast future system performance levels
5. Identify different alternative solutions
   Main focus: meet existing and forecast travel demand

STUDY AREA:

1. Clearly define the area under consideration
2. May be country
3. May be regional
4. Metropolitan area
5. Overall impact to major street/highway network
6. Local
7. Divide study area into study zones, TAZs (Travel Analysis Zones)
8. Homogenous urban activities (generate same types of trips)

9. Residential
10. Commercial
11. Industrial

TRAVEL ANALYSIS ZONES-TAZs

- May be as small as one city block or as large as 10 sq. miles
- Natural boundaries --- major roads, rivers, airport boundaries
- Sized so only 10-15% of trips are intraoral
- Links: sections of roadway (or railway)
- Nodes: intersection

FOUR STEPS OF CONVENTIONAL TRANSPORTATION MODELING

- **Trip Generation :**
Decision to travel for a specific purpose (eat lunch etc)
- **Trip Distribution:**
Choice of destination   (a particular restaurant? The nearest restaurant?)
- **Mode Choice:**
Choice of travel mode (by bike/ by car/ by public transport)
- **Network Assignment:**
Choice of route or path

TRIP GENERATION:

- Calculate number of trips generated/ produced in each zone
- Calculate number of trips attracted to each zone
- Number of trips that begin from or end in each TAZ
- Trips for a "typical" day
- Trips are produced or attracted
    - TAZs land use activities
    - Socioeconomic characteristics of TAZ
    - Population

- **3 measurable variables influencing trip production and attraction**
  - Density of land use
  - Social and socioeconomic characters of users
  - Location

Trip purpose:
- Zonal trip making estimated separately by trip purpose
- School trips
- Work trips
- Shopping trips
- Social/ Recreational trips

Travel behavior depends on trip purpose :
- School & work – regular (time of day)
- Recreational & shopping - highly irregular
- Forecast # of trips that produced or attracted by each TAZ for a "typical" day
- Forecast – function of other variables

Attraction:
- Number and types of retail facilities
- Number of employees
- Land use

Production
- Car ownership
- Income
- Population (employment characteristics)

TRIP PURPOSE:

- Trips are estimated by purpose (categories)
- Travel behavior of trip-makers depends somewhat on trip purpose
  - Work trips
    - regular
    - Often during peak periods
    - Usually same origin/destination
  - School trips
    - Regular
    - Same origin/destination

- Shopping recreational
- Highly variable by origin and destination, number, and time of day

HOUSEHOLD BASES

- Trips based on "households" rather than individual
- Individual too complex
- Theory assumes households with similar characteristics have similar trip making characteristics
- However
  - Concept of what constitutes a "household"
  - Changed dramatically outside Pakistan

TRIP DISTRIBUTION
- Predicts where trips go from each TAZ
- Determines trips between pairs of zones
- Different methods but gravity model is most popular

MODE CHOICE/SPLIT

- In most situations, a traveler has a choice of modes
- Transit, walk, bike, carpool, motorcycle, drive alone
- Mode choice determines # of trips between zones made by auto or other mode, usually transit

ANSWER:

(Solution)

Land use category		Area (ha)						
		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
Residential		990720	2689200	1586952	3015300	1612435	25938720	2030910
	Retail	5926200	2406024	14761860	4135240	58380133	7405950	490200
	wholesale	2016900	966960	2412240	563195	5403900	366480	77400
Commercial	Service	2659320	65224	882740	2376220	59172705	3440840	564160
Manufacturing		455370	911340	104912	127604	254595	1909378	445375
Transportation		141255	224100	199080	131100	60177	1621170	152700
Public building		1535100	2639400	1659000	1713040	277740	12104736	305400
Public open space		15050	68724	158000	358340	462900	1405014	343575

Trip Production: Putting residential value of each zone

Zone 1 = 990720

Zone 2 = 2689200

Zone 3 = 1586952

Zone 4 = 3015300

Zone 5 = 1612435

Zone 6 = 25938720

Zone 7 = 2030910

Trip Generation: Adding column of zone 1 we get

Zone 1 = 13739915

Zone 2 = 9970972

Zone 3 = 21764784

Zone 4 = 12420039

Zone 5 = 125624585

Zone 6 = 54192288

Zone 7 = 4409720

Trip Attraction: Adding all except residential value

Zone 1 = 12749195

Zone 2 = 7281772

Zone 3 = 20177832

Zone 4 = 9764739

Zone 5 = 124012150

Zone 6 = 28253563

Zone 7 = 2378810

With best Regards