Birla Institute of Technology & Science, Pilani, Pilani Campus

Midsemester Examination – 2023 – 24

Transportation Systems Planning and Management (CE G523)

Total marks: 50 (Closed book) **Time: 90 minutes**

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1) Choose the correct option(s) for the following questions. **(For each wrong answer negative 0.5 mark will be given.)** **($1.5 \times 5 = 7.5$ Marks)**

a) Direct interaction between interviewer and passenger happens in which type(s) of survey method?
   i. Cordon line survey
   ii. Registration number survey
   iii. Tag-on vehicle survey
   iv. Public transport survey

b) Which of the following factors is not affecting the trip production?
   i. Land use
   ii. Household size
   iii. Accessibility
   iv. Household income

c) Which one of the following growth factor methods accounts the interzonal movements?
   i. Average factor method
   ii. Furness method
   iii. Fratar method
   iv. Uniform factor method

d) Choose the correct sequence of travel forecasting process.
   i. Land use analysis → Population and economic analysis → Trip generation → Trip distribution → Traffic assignment → Modal split
   ii. Population and economic analysis → Land use analysis → Trip generation → Trip distribution → Traffic assignment → Modal split
   iii. Population and economic analysis → Land use analysis → Trip generation → Trip distribution → Modal split → Traffic assignment
   iv. Trip generation → Trip distribution → Modal split → Traffic assignment → Population and economic analysis → Land use analysis

e) Which of the following is/are correct about home-interview survey method?
   i. Yields very accurate data
   ii. Faster than other survey methods
   iii. Can be done through postal questionnaire
   iv. Comparatively more expensive

2) Answer the following questions. **($4 \times 4 = 16$ Marks)**

a) What are the different components considered in the zoning system of a study area for transportation planning? Illustrate these components with diagram.

b) What are the different types of transportation planning surveys? Figure out the differences between roadside interview survey, registration number survey and tag-on-vehicle survey methods.

c) Derive the singly constrained gravity model expression and also write the generalised expression for the same representing all the associated terms/notations.

d) How the equilibrium, shortage and surplus conditions of transportation demand can be explained using classical economy? Illustrate all the conditions.

3) For a study area the trip matrix for the base year is given in the following table. After 15 years the trip productions from zones 1, 2 and 3 are expected to be 95, 110 and 125, respectively and trip attractions for these zones are expected to be 100, 120 and 105, respectively. Compute the trip matrix for the future using Furness method. Justify the result after completing two iterations. **(11.5 Marks)**

O \ D	1	2	3
1	20	30	28
2	36	32	24
3	22	34	26

4) The number of trips produced and attracted to three zones 1, 2 and 3 by public transit are given in Table 4.1. The average travel times between each zone are shown in Table 4.2. The friction factor for each travel time increment is given in Table 4.3. Assume K_{ij} value as unity for all zones. Using singly constrained gravity model determine the number of zone-to-zone trips through two iterations.

(15 Marks)

Table 4.1: Trip productions and attractions for three zones

Zones	1	2	3	Total
Productions	120	350	280	750
Attractions	320	250	180	750

Table 4.2: Travel time between zones (minutes)

Zone	1	2	3
1	4	8	5
2	8	7	6
3	5	6	2

Table 4.3: Travel time versus friction factor

Time (minutes)	Friction factor
1	82
2	52
3	50
4	41
5	39
6	26
7	20
8	14

-------All the Best-------