PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

Past Papers

Faculty of Humanities & social Sciences
Department of Logistics & Transportation

Bsc.in International Transportation Management and Logistics Transportation
(Year 4 – Semester II)
2016-2022

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Faculty of Management and Social Sciences
Department of Logistics & Transport
BSc in International Transportation Management and Logistics
Course CODE: COM550

Year 4 Semester II

SEMETSER END EXAMINATION

Modelling in Transport and Logistics – MOTL0310

- This paper consists of EIGHT questions on SIX (06) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2020.09.20   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

Paris; the 15 Minute City

Since 2014, city of Paris has barred the most polluting vehicles from entry, banished cars from the Seine quayside and reclaimed road space for trees and pedestrians. Now, battered hard by enduring Corona crisis, Paris wants to go one step further and remodel itself so that residents can have all their needs met—be they for work, shopping, health, or culture—within 15 minutes of their own doorstep with Hyper-proximity model.

a) Explain the urban transport challenges in post-covid-19 era due to a combination of enduring economic crisis, changing work habits and behavioral shift with examples?

(06 Marks)

b) Elaborate on how new transport policy approaches in post-covid-19 era should tackle consequences on public health, evaluation of how economic stimulus plans could maximize social, health and climate co-benefits.

(07 Marks)

c) Explain the role of transport modelling in developing a new system thinking to find answers to new urban transport challenges and policy changes in post-covid-19 era.

(07 Marks)

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Question 02

a) What is substantive rationality? (05 Marks)

b) What is Relevance & Credibility in Transport Data collection? (05 Marks)

c) What are the main issues with Sampling? (05 Marks)

d) Explain the Person-category Approach in Transport Modelling (05 Marks)

Question 03

a) Covid-19 has made researchers rethink how they collect data as virus is creating a new-normal.
Explain what kind of changes that can be foreseen and what strategies that can be developed to capture transport related information during post-lockdown era.
(06 Marks)

b) Please refer below details obtained from a transport study.

Table Q3-b: Population distribution

	Low Income	High Income	Total
Car user	0.10	0.25	0.35
Bus User	0.45	0.20	0.65
Total	0.55	0.45	1.00

(i) Calculate the probability of a low-income traveler using bus when a sample is with 60% low income (LI) and 40% high income (HI) travelers.
(07 Marks)

(ii) Calculate the probability of a bus user having low income when a sample is of 60% bus users and 40% car users. (07 Marks)

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Question 04

a) Explain the importance of transport planning & modelling in the context of Sri Lanka.

(10 Marks)

b) Consider a zone with the following characteristics

Table Q3-b. Zone characteristics

Type	Quantity	Income – LKR	Family size	Trips per day
0 cars	200	50,000	4	7
1 car	75	100,000	5	9
2 or more cars	25	200,000	5	12

Due to an increase in import duties and a real income drop due to corona crisis, it is expected that in two years' time only 20% of households will have a car. Estimate how many trips the zone would generate in that case.

(10 Marks)

Question 05

Describe Gravity Model used in Trip Distribution with an appropriate example.

(06 Marks)

Travelers in a particular zone has access to three modes of transport, namely; Private vehicle (P), bus (B), and cycles(C).
It is given that all trip-makers have access to private transport and that the perceived utility of a mode m, is given by;

$$V(m) = -0.003t_m - 0.004\,c_m - 0.002\,w_m - 0.1d_m$$

where,
t is the in-vehicle travel time in minutes for mode m
c is the out-of-pocket cost in rupees for mode m

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w is the waiting time in minutes for mode m , and
d is a dummy variable which is 1 when the mode is private transport, 0 otherwise.

Assume that the variable values shown in the below table and that 1200 trips are made from the origin zone to the destination zone,

Mode	Variable Values			
	T_m (Minutes)	C_m (Rs.)	W_m(Minutes)	d_m
P	25	50	0	1
B	35	10	10	0
C	55	0	0	0

a) What are the utilities for three modes in concern? (06 Marks)

b) What's the probability of choosing a specific mode (m)? Use Logit model for calculations.

(06 Marks)

c) What is the specific trip count for each mode?

(03 Marks)

Question 06

The base year trip matrix for a study area consisting of three zones is given below.

	1	2	3	o_i
1	20	30	28	78
2	36	32	24	92
3	22	34	26	82
d_j	88	96	78	252

The productions from the zone 1, 2 and 3 for the horizon year is expected to grow to 98, 106, and 122 respectively. The attractions from these zones are expected to increase to 102, 118, 106 respectively. Compute the trip matrix for the horizon year using doubly constrained growth factor model.

a) Set Bj = 1, find A_i for the given OD matrix.

(05 Marks)

b) Compute B_j for the zonal system.

(05 Marks)

c) Find T_{ij} & perform trip assignment.

(05 Marks)

d) Compute the error of the assignment.

(05 Marks)

Question 07

a) Explain all-or-nothing assignment technique in transport using a real world example. (07 Marks)
b) Explain the factors that affect mode choice with examples. (06 marks)
c) Explain the step by step process of creating a transport network with zones with an example.

(07 Marks)

Question 08

An inter-urban mode choice study is being undertaken for people with a choice between car and rail. The figures below were obtained as a result of a survey on five origin-destination pairs A to E.

Table Q8. Cost Elements

O–D	Car		Rail		Proportion choosing car
	X_1	X_2	X_1	X_2	
A	3.05	9.90	2.50	9.70	0.80
B	4.05	13.10	2.02	14.00	0.51
C	3.25	9.30	2.25	8.60	0.57
D	3.50	11.20	2.75	10.30	0.71
E	2.45	6.10	2.04	4.70	0.63

Where X_1 is the travel time (in hours) and X_2 the out-of-pocket cost (in rupees). Assume that the 'value of time' coefficient is 2.00 per hour.

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a) Calculate the generalized cost of travelling by each mode.   (06 marks)

b) Calibrate a binary Logit modal-split model with these data.   (08 marks)

c) An improved rail service is to be introduced which will reduce travel times by 0.20 of an hour in every journey; by how much could the rail mode increase its fares without losing customers at each O–D pair?

(06 marks)

--------------------END OF THE QUESTION PAPER-----------------

Appendix

Equations

$$A_i = 1/\Sigma_j B_j D_j f(c_{ij})$$

$$B_j = 1/\Sigma_i A_i O_i f(c_{ij})$$

$$T_{ij} = A_i O_i B_j D_j f(C_{ij})$$

$$E = \Sigma |O_i - O_{i1}| + \Sigma |D_j - D_{j1}|$$

$$p(K) = \frac{e^{U_K}}{\sum_i e^{U_i}}$$

library
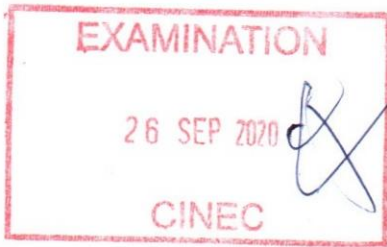
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Year 4 Semester II

SEMETSER END EXAMINATION

Chinese Language and Culture – CLAN0383

- This paper consists of EIGHT questions on SEVEN (07) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly.

Date: 2020.09.26   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)
Write the below English words in Chinese Characters   (20 Marks)

1) you = ...
2) person = ...
3) good = ...
4) mother=   ....
5) that=   ....
6) eat=   ....
7) also = ...
8) come = ...
9) month=   ....
10) can = ...
11) watch=   ....

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12) small = ...
13) father=   ....
14) I/me = ...
15) this=   ....
16) in/at = ...
17) very =...........
18) what = ...
19) Half = ...
20) Age = ...

Question 02

Create dialogue conversation from lessons which you have learned, write 10 couple
dialogues,   (20 Marks)

Example for a one couple dialogue:

  (1) A: ni hao ma?
      B: wo hen hao

Question 03

Please answer the Multiple choice question , Select the correct answer   (20 Marks)

(1) Ni Jiao————/ 你叫——— ?
        a.Naer/哪儿
        b.Zenme/怎么
        c.Shenme/什么
        d.Ji/几

(2)Wo de jia------Colombo/我的家——科伦坡
        a. Shang/上
        b. Xia/下

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    c. You/有
    d. Zai /在

(3)Ni qu ___/你去 ——?
    a.Naer/哪儿
    b.Zenme/怎么
    c.Shenme/什么
    d.Ji/几

(4)Ta bu ___wo baba/他不 ——我爸爸
    a.You/有
    b.Shi/是
    c.Mei/没
    d.Zai/在

(5)Ni he ___ he niu nai/ 你喝 —— 喝 牛奶?
    a.Ye/也
    b.Shi/是
    c.Mei/没
    d.Bu/不

（6) Wo ___ you yong/我 —— 游泳
    a.He / 喝
    b.Da/打
    c.Chi /吃
    d.Hui /会

（7) Xian zai ___ dian /现在 ___ 点？
    a.Na/那
    b.Ji/几
    c. Shenme / 什么
    d.Zhe /这

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（8）Ni hao ——/ 你好 ———?
    a. Ne /呢
    b. Ba / 吧
    c. Ma /吗
    d. Le / 了

（9）Ni ___ na guo ren/你 —— 哪国人？
    a.Bu / 不
    b.Shi / 是
    c. Si / 四
    d.Zhe / 这

（10）Ni ——/你 ——?
    a.Ne /呢
    b.Ba / 吧
    c. Na/那
    d.Le / 了

Question 04

Write about yourself in Chinese pin yin with 10 sentences   (20 Marks)

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Question 05

Write below numbers in Chinese characters   (10 Marks)

- (1) Ten = ……….
- (2) Three=………
- (3) Five=………
- (4) Four=……….
- (5) Seven=………

Draw a clock and mark the below time in the Clock   (10 Marks)

- (1) 一点
- (2) 两点
- (3) 六点半
- (4) 八点
- (5) 九点

Question 06

Make the sentences properly in order ,write it in pin yin .   (20 Marks)

- (1) 是/是/他/不/画家(shì/shì/Tā/bù/huàjiā)
  ………………………………………………
- (2) 我/做/演员/想(Wǒ/zuò/yǎnyuán/xiǎng)
  ………………………………………………
- (3) 您/科学家/吧?/ 是 (Nín/kēxuéjiā/ba?/ shì)

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....

(4) 不/医生/是/妈妈 (bù/yīshēng/shì/Māmā)

....

(5) 哪儿/爸爸/在 (nǎ'er/Bàba/zài)

....

(6) 有/我/一只/小猫 (yǒu/Wǒ/yī zhǐ/xiǎo māo)

....

(7) 小狗/两只/有/他 (xiǎo gǒu/liǎng zhī/yǒu/Tā

....

(8) 一只/猫/有/哥哥 (yī zhǐ/māo/yǒu/Gēgē)

....

(9) 爸爸/猫/吗？/有 (Bàba/māo/ma?/ yǒu)

....

(10)　　他/医院/在/工作 (Tā/yīyuàn/zài/gōngzuò)

....

Question 07

Translate the sentences in to Chinese, write it in pin yin.　　　　　(20 Marks)

(1) How are you?
(2) What is your name?
(3) Which country are you from?
(4) Where is your home?
(5) Is he a Chinese?
(6) I have Chinese class on Monday.
(7) I don't have class on Saturday
(8) Where are you going?
(9) Is it Cold today?
(10)　　　What is the time now?

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Question 08

Translate the sentences in to English   (20 Marks)

- (1) Nǐ de àihào shì shénme?
- (2) Wǒ tiāntiān kàn diànshì
- (3) Wǒ xǐhuān diànnǎo yóuxì
- (4) Zhè shì huǒchē zhàn
- (5) Nǐ zài nǎ'er
- (6) Nǐ zěnme qù shànghǎi
- (7) Wǒ zuò fēijī qù
- (8) Gēgē kāichē qù běijīng
- (9) Duìbùqǐ
- (10)   Wǒ de àihào shì yīnyuè

--------------------END OF THE QUESTION PAPER-----------------

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Year 4 Semester II
REPEAT EXAMINATION
Modelling in Transport and Logistics – MOTL0310

- This paper consists of EIGHT questions on EIGHT (08) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly
- Formulae sheet provided

Date: 2019.11.19   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

a) Describe four methods used transport modelling to gather data.

(07 Marks)

b) Explain the Modelling Process with examples.

(07 Marks)

c) Explain the benefits of data triangulation with examples

(06 Marks)

Question 02

a) Good measurements are the key in transport modelling. Explain using an example

(06 Marks)

b) A transport study has classified the population of a certain area into two income categories, and that there are only two modes of transport available (car and bus) for the journey to work & the details of the population distribution is given in below table.

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Table Q2-b: Population distribution

	Low income	High income	Total
Bus user	0.45	0.15	0.60
Car user	0.20	0.20	0.40
Total	0.65	0.35	1.00

I. Calculate the probability of a low-income traveler using bus when a sample is with 75% low income (LI) and 25% high income (HI) travelers.

(07 Marks)

II. Calculate the probability of a bus user having low income when a sample is of 75% bus users and 25% car users. (07 Marks)

Question 03

a) Explain the importance of transport modelling with examples.

(07 Marks)

b) Describe Growth Factor Model used in Trip Generation with an appropriate example. (06 Marks)

c) Consider a zone with the following characteristics

Table Q3-b. Zone characteristics

Household type	No.	Income ($/month)	Inhabitants	Trips/day
0 cars	180	4 000	4	6
1 car	80	18 000	4	8
2 or more cars	40	50 000	6	11

Due to a decrease in import duties and a real income increase of 30% it is expected that in five years' time 50% of households without a car would acquire one. Estimate how many trips the zone would generate in that case.

(07 Marks)

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Question 04

a) Explain the Utility Function used in Transport Modelling using an example.

(05 Marks)

For particular zone pair, three modes of travel between the zones exist – private transport like automobiles (PT), bus (B), and urban rapid transit system like local trains (RT). It is given that all trip-makers have access to private transport and that the perceived utility of a mode m, i.e. , is given by;

$$v(m) = -0.004t_m - 0.005c_m - 0.003w_m + 0.15d_m$$

where,
 t is the in-vehicle travel time in minutes for mode m
 c is the out-of-pocket cost in rupees for mode m
 w is the waiting time in minutes for mode m , and
 d is a dummy variable which is 1 when the mode is private transport, 0 otherwise.

Assume that the variable values shown in the below table and that 1000 trips are made from the origin zone to the destination zone,

Mode	Variable Values			
	Tm (Minutes)	Cm (Rs.)	Wm(Minutes)	dm
PT	65	60	0	1
B	75	5	5	0
RT	25	8	20	0

b) Calculate the perceived utility for each mode. (06 Marks)

c) Use Logit model to determine the probability, that a particular mode m, will be chosen.

(06 Marks)

d) Determine the number of trips made by the different modes. (03 Marks)

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Question 05

A mode choice survey has been undertaken on a corridor connecting four residential areas A, B, C and D with three employment areas U, V and W. The corridor is served by a good rail link and a reasonable road network. The three employment zones are in a heavily congested area and therefore journeys by rail there are often faster than by car. The information collected during the survey is summarized below:

Table Q5-c: Survey information

O–D pair	By car				By rail			Proportion by car
	X_1	X_2	X_3	X_4	X_1	X_2	X_3	
A–U	23	3	120	40	19	10	72	0.82
B–U	20	3	96	40	17	8	64	0.80
C–U	18	3	80	40	14	10	28	0.88
D–U	15	3	68	40	14	12	20	0.95
A–V	26	4	152	60	23	10	104	0.72
B–V	19	4	96	60	18	9	72	0.90
C–V	14	4	60	60	11	9	36	0.76
D–V	12	4	56	60	12	11	28	0.93
A–W	30	5	160	80	25	10	120	0.51
B–W	20	5	100	80	16	8	92	0.56
C–W	15	5	64	80	12	9	36	0.58
D–W	10	5	52	80	8	9	24	0.64

Where the costs per trip per passenger are as follows:
X_1 =in-vehicle travel time in minutes (line haul plus feeder mode, if any)
X_2 =excess time (walking plus waiting) in minutes
X_3 =out-of-pocket travel costs (petrol or fares), in pence
X_4 =parking costs associated with a one way trip, in pence.

a) Calibrate a Logit modal-split model assuming that the value of travel time is 8 rupees per minute and that the value of excess time is twice as much.

(06 Marks)

b) Estimate the impact on modal split on each O–D pair of an increase in petrol prices which doubles the perceived cost of running a car (X_3).

(07 Marks)

c) Estimate the shift in modal split which could be obtained if no fares were charged on the rail system.

(07 Marks)

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Question 06

a) What are Obtrusive methods in Transport Data Collection? Explain with examples.

(04 Marks)

b) Explain all-or-nothing assignment technique in transport using a real world example

(05 Marks)

c) Assign the vehicle trips shown in the following O-D trip table (Q6-a) to the network shown in figure Q6-a, using the all-or-nothing assignment technique.

Table Q6-a: Origin-Destination Trip table

From/to	Trips between Zones				
	1	2	3	4	5
1	-	100	100	200	150
2	400	-	200	100	500
3	200	100	-	100	150
4	250	150	300	-	400
5	200	100	50	350	-

Highway Network:

Figure Q6-a: Highway network

a. Select the routes that are suitable for loading.

(05 Marks)

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b. Calculate the traffic volumes of each link after loading

(06 Marks)

Question 07

a) What are pros & cons of Growth Factor Model in Transportation Modelling

(05 Marks)

b) Explain the Gravity Model in Transport Modelling.

(05 Marks)

c) What is Wardrop's Principles of Equilibrium in traffic assignment?

(05 Marks)

d) Explain the relationship between flow and density for highway traffic flow

(05 Marks)

Question 08

The productions from zone 1, 2, & 3 are 98, 106, 122 and attractions to zone 1, 2, & 3 are 102, 118. The function $f(C_i) = 1/(C_{2ij})$. The cost matrix is shown below.

$$\begin{bmatrix} 1.0 & 1.2 & 1.8 \\ 1.2 & 1.0 & 1.5 \\ 1.8 & 1.5 & 1.0 \end{bmatrix}$$

Use Gravity Model to perform below tasks.

a) Set $B_j = 1$, find A_i for the given OD matrix.

(05 Marks)

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b) Compute B_j for the zonal system.

(05 Marks)

c) Find T_{ij} & perform trip assignment.

(05 Marks)

d) Compute the error of the assignment.

(05 Marks)

--------------------END OF THE QUESTION PAPER----------------

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Appendix

Equations

$$A_i = 1/\Sigma_j B_j D_j f(c_{ij})$$

$$B_j = 1/\Sigma_i A_i O_i f(c_{ij})$$

$$T_{ij} = A_i O_i B_j D_j f(C_{ij})$$

$$E = \Sigma |O_i - O_{i1}| + \Sigma |D_j - D_{j1}|$$

$$p(K) = \frac{e^{U_K}}{\sum_i e^{U_i}}$$

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Year 4 Semester II
SEMESTER END EXAMINATION
Chinese Language and Culture – CLAN0383

- This paper consists of EIGHT (08) questions on EIGHT (08) pages.
- Answer FIVE (05) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2019.09.08   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

Write the below English words in Chinese Characters

1) You = ...

2) Good = ...   11) Class = ...

3) Very = ...   12) Boy = ...

4) People = ...   13) Girl = ...

5) I / Me = ...   14) Book = ...

6) In/ At = ...   15) Go = ...

7) Father = ...   16) Month = ...

8) Mother = ...   17) Number =...........

9) This = ...   18) How many = ...

10) That = ...   19) Half = ...

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20) Age =　　　............

(1x 20 marks)

Question 02

Make the below sentences properly in order write it in Pin Yin

1) 什么/叫/哥哥? Shénme/jiào/gēgē?

....

2) 哪/她/国/是/人? Nǎ/tā/guó/shì/rén?

....

3) 斯里兰卡/是/人/我。Sīlǎlánkǎ/shì/rén/wǒ.

....

4) 家/他/哪儿/在? Jiā/tā/nǎ'er/zài?

....

5) 不/他/我/爸爸/是。Bù/tā/wǒ/bàba/shì

....

6) 喜欢/牛奶/我。Xǐhuān/niúnǎi/wǒ.

....

7) 面条/姐姐/不/喜欢/也 。Miàntiáo/jiějiě/bù/xǐhuān/yě

....

8) 我/不/海鲜/喜欢。Wǒ/bù/hǎixiān/xǐhuān.

....

9) 中国/他/是/人。Zhōngguó/tā/shì/rén

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....

10) 上海／他／在／家。Shàngh□i／tā／zài／jiā.

....

(4 x 5 marks)

Question 03

Filling the blank using below words

前【qián】 后【hòu】 左【zu□】 右【yòu】 旁【páng】

1) 库玛丽在我的......................边 (Kù m□lì zài w□ de............Biān）

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2) 库玛拉在我的.....................边 (Kù m☐ lā zài w☐ de............Biān)

3) Carlos 在库玛拉的.............边 (Carlos zài kù m☐ lā de...... Biān)

4) 小海在的我的.....................边 (Xi☐oh☐i zài de w☐ de.........Biān)

5) 丽丽在的我的.....................边 (Lì lì zài de w☐ de...............Biān)

(4 x 5 marks)

Question 04

Filling the blank using below words and complete the dialogue conversation in chinese in Pin Yin.

不 (Bù)， 没 (Méi)，什么 (Shénme)　片 (Piàn) 吃 (Chī) 杯 (Bēi) 疼(Téng) 去(Qù)

了 (Le) 很 (Hěn)

王英： 医生，我肚子（1）.............

(Wáng yīng: Yīshēng, w☐ dùzi (1).............)

医生： 你是（2）.........是吃 (3) ....不干净的东西？

(Yīshēng: N☐ shì (2)......... shì chī (3)........ bù gānjìng de dōngxī?)

王英：(4)...........有啊。

（Wáng yīng:(4)........... y☐u a）

医生： 今天早上 (5) ....了(6)...........?

（Yīshēng: Jīntiān z☐oshang (5).........le (6)............?）

王英： 吃了几(7) ....面包，喝了一 (8)..........牛奶。不过，昨天晚上, 朋友请客，我们 (9) ....了学校附近的一个饭店。我吃了(10) ....多鱼片。

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（Wáng yīng: Chīle j□ (7)........ miànbāo, hēle yī (8).......... niún□i. bùguò, zuótiān
w□nshàng, péngy□u q□ngkè, w□men (9) ....le xuéxiào fùjìn de yīgè fàndiàn. w□
chīle (10) .... duō yú piàn.）　　　　　　　　　　　　　　　(2 x 10
marks)

Question 05

➢ Translate the following sentences in to Chinese ,write it in ping yin .

1) Where are you going ?

....

2) What is your hobby?

....

3) I can play basketball

....

4) Do you watch TV?

....

5) This is railway station

....

➢ Translate the following sentences in to English

6) 星期四你有中文课吗？ (Xīngqísì n□ y□u zhòng wén kè ma?)

....

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7) 他不去教室，他去图书馆。(Tā bù qù jiàoshì, tā qù túshū gu□n.)

....

8) 你喜欢电脑游戏吗？(N□ x□huān diànn□o yóuxì ma?)

....

9) 这个电影很好看 (Zhège diàny□ng hěn h□okàn)

....

10) 她有两只小狗 (Tā y□u li□ng zhī xi□o g□u)

....

(2 x 10 marks)

Question 06

Write below numbers in Chinese Characters

1) Four = ...   6) Eight = ...
2) Five = ...   7) Ten = ...
3) Three = ...   8) One = ...
4) Two = ...   9) Six = ...
5) Seven = ...   10) Nine = ...

(1 x 10 marks)

Mark correct time in the Clock.

一点半   十二点   十一点   三点   两点

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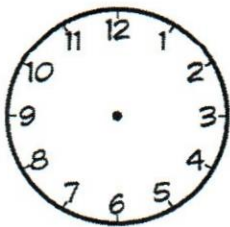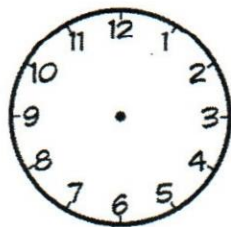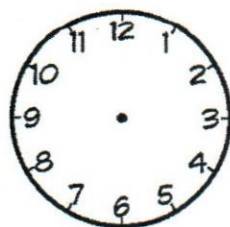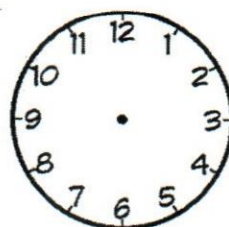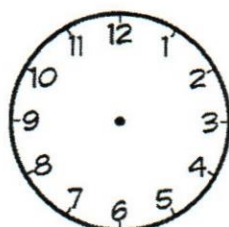
(2 x 5 marks)

Question 07

Read & Match

1) 生日（Shēngrì）	a) shop
2) 我的 （Wǒ de）	b) today
3) 昨天 （Zuótiān）	d) yesterday
4) 今天 （Jīntiān）	f) mine
5) 工人 （Gōngrén）	e) hospital
6) 画家 （Huàjiā）	f) actor
7) 医院 （Yīyuàn）	g) labourer
8) 商店 （Shāngdiàn ）	h) birthday
9) 演员 （Yǎnyuán）	i) artist
10) 科学家 （Kēxuéjiā）	j) scientist

(2 x 10 marks)

Question 08

Write about yourself in Chinese pin yin with 10 sentences

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(20 marks)

--------------------END OF THE QUESTION PAPER----------------

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Year 4 Semester II
SEMESTER END EXAMINATION
Modelling in Transport and Logistics – MOTL0310

- This paper consists of EIGHT questions on SEVEN (07) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly
- Formulae sheet provided

Date: 2019.09.01   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

(a) Explain how triangulation can be used to increase accuracy of data using an example   (07 Marks)

(b) Elaborate briefly on the Modelling Process with examples.

(07 Marks)

(c) Describe four methods used transport modelling to gather data.

(06 Marks)

Question 02

(a) What are the characteristics of a good measure in transportation? Explain using an example   (06 Marks)

(b) A transport study has classified the population of a certain area into two income categories, and that there are only two modes of transport available (car and bus) for the journey to work & the details of the population distribution is given in below table.

Table Q2-b: Population distribution

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	Low income	High income	Total
Bus user	0.45	0.15	0.60
Car user	0.20	0.20	0.40
Total	0.65	0.35	1.00

(i) Calculate the probability of a low-income traveler using bus when a sample is with 75% low income (LI) and 25% high income (HI) travelers.

(07 Marks)

(ii) Calculate the probability of a bus user having low income when a sample is of 75% bus users and 25% car users. (07 Marks)

Question 03

(a) Explain the need for transport modelling with examples.

(07 Marks)

(b) Describe Growth Factor Model used in Trip Generation with an appropriate example. (06 Marks)

(c) Consider a zone with the following characteristics

Table Q3-b. Zone characteristics

Household type	No.	Income ($/month)	Inhabitants	Trips/day
0 cars	180	4 000	4	6
1 car	80	18 000	4	8
2 or more cars	40	50 000	6	11

Due to a decrease in import duties and a real income increase of 30% it is expected that in five years' time 50% of households without a car would acquire one. Estimate how many trips the zone would generate in that case.

(07 Marks)

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Question 04

(a) Explain the Utility Function used in Transport Modelling using an example.

(05 Marks)

For particular zone pair, three modes of travel between the zones exist – private transport like automobiles (PT), bus (B), and urban rapid transit system like local trains (RT). It is given that all trip-makers have access to private transport and that the perceived utility of a mode m, i.e. , is given by;

$$v(m) = -0.004t_m - 0.005c_m - 0.003w_m + 0.15d_m$$

where,
t is the in-vehicle travel time in minutes for mode m
c is the out-of-pocket cost in rupees for mode m
w is the waiting time in minutes for mode m , and
d is a dummy variable which is 1 when the mode is private transport, 0 otherwise.

Assume that the variable values shown in the below table and that 1000 trips are made from the origin zone to the destination zone,

Mode	Variable Values			
	Tm (Minutes)	Cm (Rs.)	Wm(Minutes)	dm
PT	65	60	0	1
B	75	5	5	0
RT	25	8	20	0

(b) Calculate the perceived utility for each mode. (06 Marks)

(c) Use Logit model to determine the probability, that a particular mode m, will be chosen.

(06 Marks)

(d) Determine the number of trips made by the different modes. (03 Marks)

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Question 05

A mode choice survey has been undertaken on a corridor connecting four residential areas A, B, C and D with three employment areas U, V and W. The corridor is served by a good rail link and a reasonable road network. The three employment zones are in a heavily congested area and therefore journeys by rail there are often faster than by car. The information collected during the survey is summarized below:

Table Q5-c: Survey information

O–D pair	By car				By rail			Proportion by car
	X_1	X_2	X_3	X_4	X_1	X_2	X_3	
A–U	23	3	120	40	19	10	72	0.82
B–U	20	3	96	40	17	8	64	0.80
C–U	18	3	80	40	14	10	28	0.88
D–U	15	3	68	40	14	12	20	0.95
A–V	26	4	152	60	23	10	104	0.72
B–V	19	4	96	60	18	9	72	0.90
C–V	14	4	60	60	11	9	36	0.76
D–V	12	4	56	60	12	11	28	0.93
A–W	30	5	160	80	25	10	120	0.51
B–W	20	5	100	80	16	8	92	0.56
C–W	15	5	64	80	12	9	36	0.58
D–W	10	5	52	80	8	9	24	0.64

Where the costs per trip per passenger are as follows:

X_1 =in-vehicle travel time in minutes (line haul plus feeder mode, if any)
X_2 =excess time (walking plus waiting) in minutes
X_3 =out-of-pocket travel costs (petrol or fares), in pence
X_4 =parking costs associated with a one way trip, in pence.

(a) Calibrate a Logit modal-split model assuming that the value of travel time is 8 rupees per minute and that the value of excess time is twice as much.

(06 Marks)

(b) Estimate the impact on modal split on each O–D pair of an increase in petrol prices which doubles the perceived cost of running a car (X_3)

(07 Marks)

(c) Estimate the shift in modal split which could be obtained if no fares were charged on the rail system.

(07 Marks)

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Question 06

(a) What are Obtrusive methods in Transport Data Collection? Explain with examples.

(04 Marks)

(b) What is all-or-nothing assignment technique in transport. Explain using an example.

(05 Marks)

(c) Assign the vehicle trips shown in the following O-D trip table (Q6-a) to the network shown in figure Q6-a, using the all-or-nothing assignment technique.

Table Q6-a: Origin-Destination Trip table

From/to	Trips between Zones				
	1	2	3	4	5
1	-	100	100	200	150
2	400	-	200	100	500
3	200	100	-	100	150
4	250	150	300	-	400
5	200	100	50	350	-

Highway Network:

Figure Q6-a: Highway network

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(i) Select the routes that are suitable for loading.

(05 Marks)

(ii) Calculate the traffic volumes of each link after loading

(06 Marks)

Question 07

(a)   What are pros & cons of Growth Factor Model in Transportation Modelling
(05 Marks)

(b)   Explain the Gravity Model in Transport Modelling.

(05 Marks)

(c)   What is Wardrop's Principles of Equilibrium in traffic assignment?
(05 Marks)

(d)   Explain the relationship between flow and density for highway traffic flow
(05 Marks)

Question 08

The productions from zone 1, 2, & 3 are 98, 106, 122 and attractions to zone 1, 2, & 3 are 102, 118. The function $f(C_i) = 1/(C2ij)$. The cost matrix is shown below.

$$\begin{bmatrix} 1.0 & 1.2 & 1.8 \\ 1.2 & 1.0 & 1.5 \\ 1.8 & 1.5 & 1.0 \end{bmatrix}$$

Use Gravity Model to perform below tasks.

(a) Set $B_j = 1$, find A_i for the given OD matrix.   (0 5 Marks)
(b) Compute B_j for the zonal system.   (05 Marks)
(c) Find T_{ij} & perform trip assignment.   (05 Marks)
(d) Compute the error of the assignment.   (05 Marks)

--------------------END OF THE QUESTION PAPER-----------------

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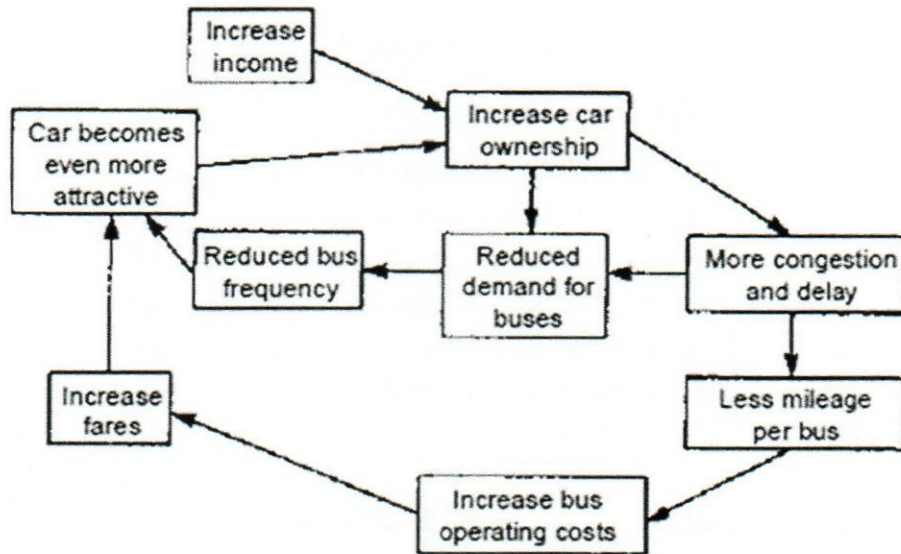Course CODE: COM550

Appendix

Equations

$$A_i = 1/\Sigma_j B_j D_j f(c_{ij})$$

$$B_j = 1/\Sigma_i A_i O_i f(c_{ij})$$

$$T_{ij} = A_i O_i B_j D_j f(C_{ij})$$

$$E = \Sigma |O_i - O_{i1}| + \Sigma |D_j - D_{j1}|$$

$$p(K) = \frac{e^{U_K}}{\sum_i e^{U_i}}$$

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Year 4 Semester II

REPEAT EXAMINATION

Modelling in Transport and Logistics – MOTL0310

- This paper consists of EIGHT questions on NINE (09) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2019.01.12   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

(a) A model is a simplified representation of a part of the real world–the system of interest which focuses on certain elements considered important from a particular point of view. State two advantages of developing models.

(02 Marks)

(b) Describe two (02) characteristics of each for transport demand and transport supply.

(04 Marks)

(c) The following simple cause-effect relationship illustrated in figure Q1-c depicts the Car-Public Transport vicious circle. Describe briefly the role of transport planning in this cycle.

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Figure Q1-c: Car-Public Transport vicious circle

(05 Marks)

(d) Describe the features of transport models for analytical approach with related to the following concerns. Assume suitable examples if required.

(i) Level of precision and accuracy required

(ii) The context of decision making

(iii) The availability of suitable data

(09 Marks)

Question 02

(a) State three (03) main factors affecting for the determination of sample size to estimate population parameters.

(03 Marks)

(b) Explain briefly the role of Central Limit Theorem in sample size estimation problem.

(03 Marks)

(c) Consider the following results of having collected stratified (based on income) and choice-based samples of a certain population:

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Table Q2-c1: Stratified Sample

Mode	Low Income	Medium Income	High Income
Car	3.33	18.00	20.00
Bus	33.34	7.20	4.00
Underground	3.33	4.80	6.00
Total	40	30.00	30.00

Table Q2-c2: Choice based sample

Mode	Low Income	Medium Income	High Income	Total
Car	6.67	20.00	13.33	40.00
Bus	17.24	2.07	0.69	20.00
Underground	16.67	13.33	10.00	40.00

If you know that the income-based proportions in the population are 60, 25 and 15% respectively for low, medium and high income, find an equivalent table for a random sample. Is it possible to validate your answer?

(05 Marks)

(d) Fill the table shown in Q2-d using transportation scenarios in using different types of sampling in transport modeling problems.

Table Q2-d: Table to be filled

Sampling Method	Scenario	Advantages	Disadvantages
Simple Random Sampling			
Stratified Random Sampling			
Choice Based Sampling			

(Note - Students have to draw this table in their answer sheets)

(09 Marks)

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Question 03

(a) State four (04) factors affecting freight trip generation of a manufacturing plant.

(04 Marks)

(b) Growth Factor Modelling is a technique which may be applied to predict the future number of journeys by any of the categories of trip makers. Its basic equation is:

$$T_i = F_i t_i$$

Where T_i and t_i are respectively future and current trips in zone i, and F_i is a growth factor.

F_i, is the factor related to variables such as population (P), income (I) and car ownership (C), in a function such as:

$$F_i = \frac{f(P_i^d, I_i^d, C_i^d)}{f(P_i^c, I_i^c, C_i^c)}$$

The superscripts d and c denote the design and current years respectively.
Explain two disadvantages of this approach in modeling trip generation

(06 Marks)

(c) Consider a zone with the following characteristics:

Table Q3-c: Trip characteristics

Household type	Numbers	Income (Rs/month)	Inhabitants	Trips/day
0 car	180	4,000	4	6
1 car	80	18,000	4	8
2 or more cars	40	50,000	6	4

Due to a decrease in import duties and a real income of people will increase by 30%. It is expected that in five years' time 50% of households without a car would acquire one.

Estimate how many trips the zone would generate in that case.

(10 Marks)

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Question 04

(a) Briefly describe the term 'traffic assignment' in transport planning process.

(03 Marks)

(b) Explain two each limitation of all or nothing traffic assignment methods in modeling trip distribution.

(06 Marks)

(c) Briefly explain the Gravity Distribution Model to model trip distributions.

(Hint – A possible scenario can be assumed and only singly constrained trip distribution can be thought of)

(11 Marks)

Question 05

(a) Determine the modal shares (M_k) between the following modes of transport for school children in a small town who travel daily to a popular school in a provincial town located 5 Km away;

Mode (k)	Waiting time (minutes)W_k	Speed (Km/hr) (S_k)	Costs (C_k)
School Bus	10	30	5
School Van	5	20	20

Where,

$$M_k = \frac{exp^{GC_k}}{\sum exp^{Gc_k}}$$

And where GC_k is the Generalized Cost for mode k computed as follows:
$GC_k = \alpha_k + \alpha_w W_k + \alpha_t T_k + \alpha_c C_k$

where
W_k = waiting time in minutes for mode k
T_k = travel time in minutes for mode k
S_k = speed of travel for mode k in Km/hr
C_k = cost for travel by mode k in Rupees
α_k = mode specification given as α_{bus} = - 0.1, α_{van} = - 0.2
α_w = - 0.04
α_t = - 0.02α_c = - 0.01

(12 Marks)

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(b) If there is a program to give school children free bicycles to come to school and the estimated speed of travel by bicycle is known to be 10 Km/h and $\alpha_{bicycle}$ = - 0.3. How many bicycles would be needed if there are a total of 200 students attending the school?

(08 Marks)

Question 06

(a) Are the following statements true or false?

(i) There would be no objection to the use of total household income and number of employed members in the household as independent variables in a trip generation equation.

(ii) The use of trip generation equations to predict future trips depends on the ability to estimate future values of the independent variables.

(iii) Growth factor model uses disaggregate survey data while regression analysis employs zonal aggregate survey data.

(iv) A transport system requires a number of fixed assets, the infrastructure, and a number of mobile units, the vehicles in combination with a set of rules for their operation

(v) Logit model can be used in modal split problems so that the proportion of trips selected for a certain mode can be calculated.

(05 Marks)

(b) 20 households in a city were sampled for household income, ownership of cars for household, and trips produced. The collected data is shown in the table given below.

(i) Develop matrices connecting monthly income vs cars available (use the table Q2 below) (03 Marks)

(ii) Draw a graph connecting trips per household vs monthly income.

(06 Marks)

(iii) How many trips per day will be made by a household with a monthly income of Rs.10, 000 and owning one car?

(06 Marks)

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Table Q6-b: Collected data

Household no	Trips	Monthly income (Rs)	Cars per household
1	2	4000	0
2	4	6000	0
3	10	17000	2
4	5	11000	0
5	5	4500	1
6	15	17000	3
7	7	9500	1
8	4	9000	0
9	6	7000	1
10	13	19000	3
11	8	18000	1
12	9	21000	1
13	9	7000	2
14	11	11000	2
15	10	11000	2
16	11	13000	2
17	12	15000	2
18	8	11000	1
19	8	13000	1
20	9	15000	1

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Question 07

(a) Assume that for the purposes of a transport study the population of a certain area has been classified according to two income categories, and that there are only two modes of transport available (car and bus) for the journey to work. Let us also assume that the ratio of population distribution is given by:

	Low income	High income	Total
Bus user	0.45	0.15	0.60
Car user	0.20	0.20	0.40
Total	0.65	0.35	1.00

(i)   Calculate the probability of a low-income traveler using bus when a sample is of 75% low income and 25% high income travelers.   (03 Marks)

(ii) Calculate the probability of a bus user having low income when a sample is of 75% bus users and 25% car users.   (03 Marks)

(iii) Calculate the probability that a high-income traveler selects car for the given population.   (03 Marks)

(b) Explain the usage of regression analysis in trip generation.

(05 Marks)

(c) If the generalised cost is measured in money units then is sometimes interpreted as the value of time (or more precisely the value of in-vehicle time) as its units are Rupees/time.

Briefely describe about the methodology that you would carry out to estimate the value of time of the passengers in the Galle road between Fort and Moratuwa .

Hint – assume that you have collected data to represent monthly travel behaviours of the passengers,

Only procedures need to be discussed.   (06 Marks)

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Question 08

(a) State THREE (03) factors that affect travel mode choice in general.

(06 Marks)

(b) Explain the term traffic congestion using traffic flow theorem.

(05 Marks)

(c) Write short notes for the following topics:
(i) Three challenges in data collection for freight demand modeling
(ii) Brief description of utility function in modeling trip assignment

(4.5X2 Marks)

--------------------END OF THE QUESTION PAPER----------------

Year 4 Semester II
SEMESTER END EXAMINATION
Chinese Language and Culture – CLAN0383

- This paper consists of EIGHT (08) questions on FIVE (05) pages.
- Answer FIVE (05) Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly
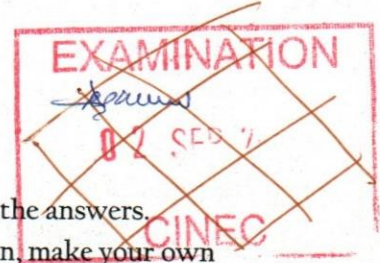
Date: 2018.09.02   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

A. Write the below numbers in Chinese Characters

1) Three..........................

2) Four...........................

3) Six.............................

4) Eight..........................

5) Nine ....   (2 x 5 = 10 marks)

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B. Write below words in Chinese Characters

1) I or me

2) This

3) Father

4) Boy

5) Student

6) Go

7) Number

8) Good

9) Age

10) Very   (1 x 10 = 10 marks)

Question 02

Filling the blanks using below words

(几 Jǐ，什么 Shénme，不 Bù，哪儿 Nǎ'er，吗 Ma，怎么 Zěnme）

(1) 你...........岁？ Nǐ... Suì?

(2) 妈妈.............去上海？ Māmā.... Qù shànghǎi?

(3) 他们来...........来？ Tāmen lái...... lái?

(4) 你去.............? Nǐ qù....?

(5) 您是老师.............? Nín shì lǎoshī......?

            (4 x 5 = 20 marks)

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Question 03

Translate the following sentences in to English

(1) 我喜欢海鲜，也喜欢菜 / Wǒ xǐhuān hǎixiān, yě xǐhuān cài................

(2) 星期一我没有英文课 / Xīngqí yī wǒ méiyǒu yīngwén kè................

(3) 妈妈不是医生 / Māmā bùshì yīshēng................

(4) 哥哥开车去西班牙/ Gēgē kāichē qù xībānyá................

(5) 汽车站在前边/Qìchē zhàn zài qiánbian ....

(4 x 5 = 20 marks)

Question 04

Imagine you met a chinese friend in somewhere and you talk to her/he in chinese ,
build up a dialogue conversation in between you and chinese friend , write it in Pin Yin.

(20 marks)

Question 05

Translate the following sentences in to Chinese ,write it in ping yin .

1) He is working at hospital................

2) Where does he work ?................

3) Do you like to be an actor ?................

4) This is Railway Station................

5) Where are you?................

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(4 x 5 = 20 marks)

Question 06

Mark correct time in the Clock.
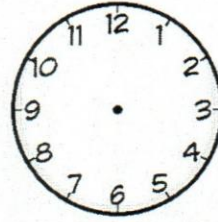
| 两点 | 五点 | 十二点 | 七点 | 一点半 |

(4 x 5 = 20 marks)

Question 07

Read & Match

1) 往 W□ng   a) Right Side

2) 前边 Qiánbian   b) Left Side

3) 左边 Zu□biān   d) In front of

4) 右边 Yòubiān   f) Behind

5) 后边 Hòubian   e) go toward

(4 x 5 = 20 marks)

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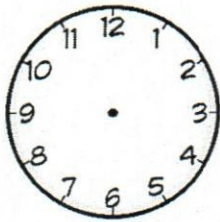BSc in International Transportation Management and Logistics
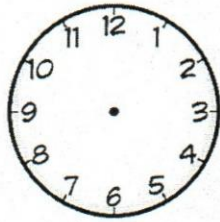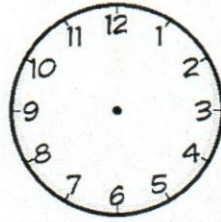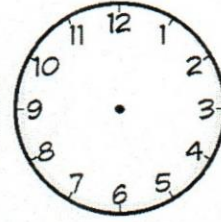Course CODE: COM550

Question 08

Write about yourself in Chinese pin yin with 10 sentences

(20 marks)

--------------------END OF THE QUESTION PAPER----------------

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Year 4 Semester II

SEMESTER END EXAMINATION

Modelling in Transport and Logistics – MOTL0310

- This paper consists of EIGHT questions on NINE (09) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly
- Students' T - distribution will be provided.

Date: 2018.09.01   Pass mark: 50%   Time: 03 Hours

Question 01: Compulsory

(a) State **two (02)** common transport problems in our country.

(02 Marks)

(b) Describe how the combination of globalization and telecommunication has influenced in transport planning.

(04 Marks)

(c) 'Mathematical transport models attempt to replicate the system of interest and its behavior by means of mathematical equations based on certain theoretical statements about it'. Describe the statement using a classic example for a theoretical statement that is applicable in transport modeling purposes.

(05 Marks)

(d) Explain how the separation of providers of infrastructure and suppliers of transport services introduces economic complexities in transport operations from the supply of transport side.

(05 Marks)

(e) Describe **two (02)** features of transport models which must be considered when specifying an analytical approach.

(04 Marks)

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Question 02

Consider an urban area where 100,000 people travel to work; assume you possess the following information about them.

Table Q2-1. General information

Mode	Average number of cars per household	Family income (1000$/year)
Car	2.40	120
Underground	1.60	60
Bus	0.20	10
Total	0.55	25

Table Q2-2. Population distribution

Family income (1000$/year)	Cars per household			
	0	1	2+	Total
Low (< 25)	63.6	15.9	0.0	79.5
Medium (25–75)	6.4	3.7	2.4	12.5
High (> 75)	0.0	2.4	5.6	8.0
Total	70.0	22.0	8.0	100.0

You are required to collect a sample of travelers to estimate a series of models (with a maximum of 8 parameters) which guarantee a negligible specification error if you have available at least 50 observations per parameter. You are also assured that if you take a 20% random sample of all travelers the error will be negligible and there will be no bias.

Your problem is to choose the most convenient sampling method (random, stratified or choice based), and for this you have available also the following information:

Hourly cost of an interviewer ....$2 per hour
Questionnaire processing cost..0.3 per form
Time required to classify an interviewee..4 min

Time required to complete an interview...10 min

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You are also given the following table containing recommended choice-based sample sizes

Table Q2-3. Recommended choice-based sample sizes

Subpopulation size	% to be interviewed
< 10 000	25
10 000–15 000	20
15 000–30 000	15
30 000–60 000	10
>60 000	5

(20 Marks)

Question 03

(a) Consider a zone with the following characteristics

Table Q3-1. Zone characteristics

Household type	No.	Income ($/month)	Inhabitants	Trips/day
0 cars	180	4 000	4	6
1 car	80	18 000	4	8
2 or more cars	40	50 000	6	11

Due to a decrease in import duties and a real income increase of 30% it is expected that in five years' time 50% of households without a car would acquire one. Estimate how many trips the zone would generate in that case.

(10 Marks)

(b) Consider the following trip attraction models estimated using a standard computing package (t-ratios are given in parentheses);

$$Y = 123.2 + 0.89X_1 \qquad\qquad R^2 = 0.90$$

$$(5.2) \quad (7.3)$$

$$Y = 40.1 + 0.14X_2 + 0.61X_3 + 0.25X_4 \qquad R^2 = 0.925$$

$$(6.4) \qquad (1.9) \quad (2.4) \quad (1.8)$$

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$$Y = -1.7 + 2.57X_1 - 1.78X_2 \quad R^2 = 0.996$$

(-0.6)   (9.9)   (-9.3)

Where Y are work trips attracted to the zone, X_1 is total employment in the zone, X_2 is industrial employment in the zone, X_3 is commercial employment in the zone and X_4 is service employment.

(10 Marks)

Question 04

(a) A small study area has been divided into four zones and a limited survey has resulted in the following trip matrix

Q4-1. Trip Matrix

	1	2	3	4
1	–	60	275	571
2	50	–	410	443
3	123	61	–	47
4	205	265	75	–

Estimates for future total trip ends for each zone are as given below:

Table Q4-2. Future estimates

Zones	Estimated future origins	Estimated future destinations
1	1200	670
2	1050	730
3	380	950
4	770	995

Use an appropriate growth-factor method to estimate future inter-zonal movements.

(12 Marks)

(b) Explain two each advantages and limitations of growth factor methods in modeling trip distribution.

(04 Marks)

(c) Briefly explain the Gravity Distribution Model to model trip distributions.

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(Hint – A possible scenario can be assumed and only singly constrained trip distribution can be thought of)

(04 Marks)

Question 05

An inter-urban mode choice study is being undertaken for people with a choice between car and rail. The figures below were obtained as a result of a survey on five origin-destination pairs A to E.

Table Q5-1. Survey results

| O–D | Elements of cost by each mode | | | | Proportion choosing car |
| | Car | | Rail | | |
	X_1	X_2	X_1	X_2	
A	3.05	9.90	2.50	9.70	0.80
B	4.05	13.10	2.02	14.00	0.51
C	3.25	9.30	2.25	8.60	0.57
D	3.50	11.20	2.75	10.30	0.71
E	2.45	6.10	2.04	4.70	0.63

where X_1 is the travel time (in hours) and X_2 the out-of-pocket cost (in rupees). Assume that the 'value of time' coefficient is 2.00 per hour.

(a) Calculate the generalized cost of travelling by each mode.

(06 Marks)

(b) Calibrate a binary Logit modal-split model with these data.

(06 Marks)

(c) An improved rail service is to be introduced which will reduce travel times by 0.20 of an hour in every journey; by how much could the rail mode increase its fares without losing customers at each O–D pair?

(08 Marks)

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Question 06

(a) 20 households in a city were sampled for household income, ownership of cars for household, and trips produced. The collected data is shown in the table given below.

    (i) Develop matrices connecting monthly income vs cars available (use the table Q6-a below)

(05 Marks)

    (ii) Draw a graph connecting trips per household vs monthly income.

(05 Marks)

    (iii)   How many trips per day will be made by a household with a monthly income of Rs.10, 000 and owning one car?

(05 Marks)

(b) If the generalised cost is measured in money units then is sometimes interpreted as the value of time (or more precisely the value of in-vehicle time) as its units are Rupees/time.

Briefely describe about the methodology that you would carry out to estimate the value of time of the passengers in the Galle road between Fort and Moratuwa.

Hint – assume that you have collected data to represent monthly travel behaviours of the passengers,

Only procedures need to be discussed.

(05 Marks)

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Table Q6-a: Collected data

Household no	Trips	Monthly income (Rs)	Cars per household
1	2	4000	0
2	4	6000	0
3	10	17000	2
4	5	11000	0
5	5	4500	1
6	15	17000	3
7	7	9500	1
8	4	9000	0
9	6	7000	1
10	13	19000	3
11	8	18000	1
12	9	21000	1
13	9	7000	2
14	11	11000	2
15	10	11000	2
16	11	13000	2
17	12	15000	2
18	8	11000	1
19	8	13000	1
20	9	15000	1

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Question 07

(a) Assign the vehicle trips shown in the following O-D trip table (Q7-a) to the network shown in figure Q7-a, using the all-or-nothing assignment technique.

Table Q7-a: Origin-Destination Trip table

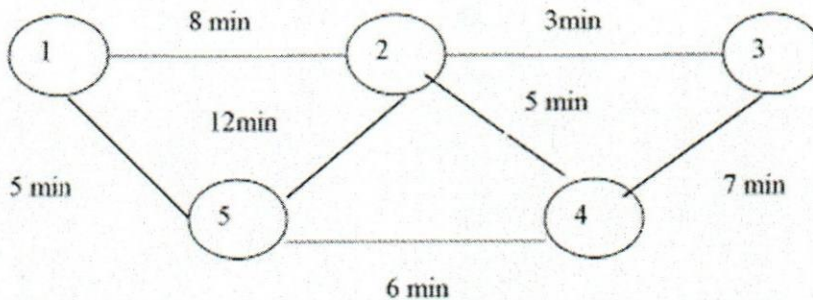| From/to	Trips between Zones				
	1	2	3	4	5
1	-	100	100	200	150
2	400	-	200	100	500
3	200	100	-	100	150
4	250	150	300	-	400
5	200	100	50	350	-

Highway Network:

Figure Q7-a: Highway network

(08 Marks)

(b) Let the trip rate of a zone is explained by the household size in the field survey conducted. It was found that the household size is 1, 2, 3 and 4. The trip rates of the corresponding household are as shown in the table below.

(i) Fit a linear equation relating trip generation rate and household size.

(08 Marks)

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(ii)   Test whether there is a linear relationship between number of trips generated and household size. Assume a reliable significance value.

(04 Marks)

Table Q7-b: Survey information

	Household size (x)			
	1	**2**	**3**	**4**
Trips per day (y)	1	2	4	6
	2	4	5	7
	2	3	3	4
$\sum y$	5	9	12	17

Question 08

Write short notes for the following.

(a) Comparison of simple linear regression and multiple linear regression for modeling trip generation
(b) A brief description of any method of utility estimation in mode choice of passengers
(c) Two characteristics of demand for supply
(d) Central Limit Theorem for sample size estimation
(e) Definition for Wardrop's principles of equilibrium, user equilibrium and system optimal in traffic assignment

(4X5 Marks)

--------------- *END OF THE QUESTION PAPER* ----------------

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
Z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%

Confidence Level

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Year 4 Semester II
REPEAT EXAMINATION
Modelling in Transport and Logistics – MOTL0310

- This paper consists of EIGHT questions on EIGHT (08) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2017.12.16   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

(a) A model is a simplified representation of a part of the real world–the system of interest which focuses on certain elements considered important from a particular point of view. State two advantages of developing models.

(02 Marks)

(b) Describe two (02) characteristics of each for transport demand and transport supply.   (04 Marks)

(c) The following simple cause-effect relationship illustrated in figure Q1-c depicts the Car-Public Transport vicious circle. Describe briefly the role of transport planning in this cycle.
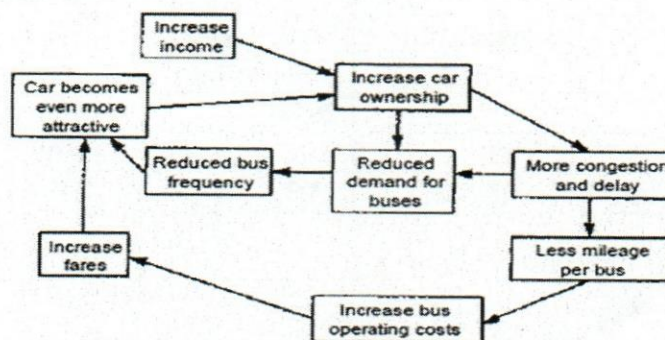

Figure Q1-c: Car-Public Transport vicious circle

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(05 Marks)

(d) Describe the features of transport models for analytical approach with related to the following concerns. Assume suitable examples if required.
- (i) Level of precision and accuracy required
- (ii) The context of decision making
- (iii) The availability of suitable data

(09 Marks)

Question 02

(a) State three (03) main factors affecting for the determination of sample size to estimate population parameters.

(03 Marks)

(b) Explain briefly the role of Central Limit Theorem in sample size estimation problem.

(03 Marks)

(c) Consider the following results of having collected stratified (based on income) and choice-based samples of a certain population:

Table Q2-c1: Stratified Sample

Mode	Low Income	Medium Income	High Income
Car	3.33	18.00	20.00
Bus	33.34	7.20	4.00
Underground	3.33	4.80	6.00
Total	40	30.00	30.00

Table Q2-c2: Choice based sample

Mode	Low Income	Medium Income	High Income	Total
Car	6.67	20.00	13.33	40.00
Bus	17.24	2.07	0.69	20.00
Underground	16.67	13.33	10.00	40.00

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If you know that the income-based proportions in the population are 60, 25 and 15% respectively for low, medium and high income, find an equivalent table for a random sample. Is it possible to validate your answer?

(05 Marks)

(d) Fill the table shown in Q2-d using transportation scenarios in using different types of sampling in transport modeling problems.

Table Q2-d: Table to be filled

Sampling Method	Scenario	Advantages	Disadvantages
Simple Random Sampling			
Stratified Random Sampling			
Choice Based Sampling			

(Note - Students have to draw this table in their answer sheets)

(09 Marks)

Question 03

(a) State four (04) factors affecting freight trip generation of a manufacturing plant.

(04 Marks)

(b) Growth Factor Modelling is a technique which may be applied to predict the future number of journeys by any of the categories of trip makers. Its basic equation is:

$$T_i = F_i t_i$$

Where T_i and t_i are respectively future and current trips in zone i, and F_i is a growth factor.

F_i, is the factor related to variables such as population (P), income (I) and car ownership (C), in a function such as:

$$F_i = \frac{f(P_i^d, I_i^d, C_i^d)}{f(P_i^c, I_i^c, C_i^c)}$$

The superscripts d and c denote the design and current years respectively. Explain two disadvantages of this approach in modeling trip generation

(06 Marks)

(c) Consider a zone with the following characteristics:

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Table Q3-c: Trip characteristics

Household type	Numbers	Income (Rs/month)	Inhabitants	Trips/day
0 car	180	4,000	4	6
1 car	80	18,000	4	8
2 or more cars	40	50,000	6	4

Due to a decrease in import duties and a real income of people will increase by 30%. It is expected that in five years' time 50% of households without a car would acquire one.

Estimate how many trips the zone would generate in that case.

(10 Marks)

Question 04

(a) Briefly describe the term 'traffic assignment' in transport planning process.

(03 Marks)

(b) Explain two each limitation of all or nothing traffic assignment methods in modeling trip distribution.

(06 Marks)

(c) Briefly explain the Gravity Distribution Model to model trip distributions.
(Hint – A possible scenario can be assumed and only singly constrained trip distribution can be thought of)

(11 Marks)

Question 05

(a) Determine the modal shares (M_k) between the following modes of transport for school children in a small town who travel daily to a popular school in a provincial town located 5 Km away;

Mode (k)	Waiting time (minutes)W_k	Speed (Km/hr) (S_k)	Costs (C_k)
School Bus	10	30	5
School Van	5	20	20

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Where,

$$M_k = \frac{exp^{GC_k}}{\sum exp^{GC_k}}$$

And where GC$_k$ is the Generalized Cost for mode k computed as follows:
GC$_k$ = α_k + α_wW$_k$ + α_tT$_k$ + α_cC$_k$

where
W$_k$ = waiting time in minutes for mode k
T$_k$ = travel time in minutes for mode k
S$_k$ = speed of travel for mode k in Km/hr
C$_k$ = cost for travel by mode k in Rupees
α_k = mode specification given as α_{bus} = - 0.1, α_{van} = - 0.2
α_w = - 0.04
α_t = - 0.02
α_c = - 0.01

(12 Marks)

(b) If there is a program to give school children free bicycles to come to school and the estimated speed of travel by bicycle is known to be 10 Km/h and $\alpha_{bicycle}$ = - 0.3. How many bicycles would be needed if there are a total of 200 students attending the school?

(08 Marks)

Question 06

(a) Are the following statements true or false?

(i) There would be no objection to the use of total household income and number of employed members in the household as independent variables in a trip generation equation.

(ii) The use of trip generation equations to predict future trips depends on the ability to estimate future values of the independent variables.

(iii) Growth factor model uses disaggregate survey data while regression analysis employs zonal aggregate survey data.

(iv) A transport system requires a number of fixed assets, the infrastructure, and a number of mobile units, the vehicles in combination with a set of rules for their operation

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(v)   Logit model can be used in modal split problems so that the proportion of trips selected for a certain mode can be calculated.

(05 Marks)

(b) 20 households in a city were sampled for household income, ownership of cars for household, and trips produced. The collected data is shown in the table given below.

(i) Develop matrices connecting monthly income vs cars available (use the table Q2 below)   (03 Marks)

(ii) Draw a graph connecting trips per household vs monthly income.   (06 Marks)

(iii)   How many trips per day will be made by a household with a monthly income of Rs.10, 000 and owning one car?   (06 Marks)

Table Q6-b: Collected data

Household no	Trips	Monthly income (Rs)	Cars per household
1	2	4000	0
2	4	6000	0
3	10	17000	2
4	5	11000	0
5	5	4500	1
6	15	17000	3
7	7	9500	1
8	4	9000	0
9	6	7000	1
10	13	19000	3
11	8	18000	1
12	9	21000	1
13	9	7000	2
14	11	11000	2
15	10	11000	2
16	11	13000	2
17	12	15000	2
18	8	11000	1
19	8	13000	1
20	9	15000	1

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Question 07

(a) Assume that for the purposes of a transport study the population of a certain area has been classified according to two income categories, and that there are only two modes of transport available (car and bus) for the journey to work. Let us also assume that the ratio of population distribution is given by:

	Low income	High income	Total
Bus user	0.45	0.15	0.60
Car user	0.20	0.20	0.40
Total	0.65	0.35	1.00

(i)   Calculate the probability of a low-income traveler using bus when a sample is of 75% low income and 25% high income travelers.   (03 Marks)

(ii) Calculate the probability of a bus user having low income when a sample is of 75% bus users and 25% car users.   (03 Marks)

(iii) Calculate the probability that a high-income traveler selects car for the given population.   (03 Marks)

(b) Explain the usage of regression analysis in trip generation.

(05 Marks)

(c) If the generalised cost is measured in money units then is sometimes interpreted as the value of time (or more precisely the value of in-vehicle time) as its units are Rupees/time.

Briefely describe about the methodology that you would carry out to estimate the value of time of the passengers in the Galle road between Fort and Moratuwa .

Hint – assume that you have collected data to represent monthly travel behaviours of the passengers,
Only procedures need to be discussed.   (06 Marks)

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Question 08

(a) State three (03) factors that affect travel mode choice in general.

(06 Marks)

(b) Explain the term traffic congestion using traffic flow theorem.

(05 Marks)

(c) Write short notes for the following topics:
   (i) Three challenges in data collection for freight demand modeling
   (ii) Aggregate data
   (iii)   Brief description of utility function in modeling trip assignment

(3*3 Marks)

--------------------END OF THE QUESTION PAPER----------------

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Year 4 Semester II
SEMESTER END EXAMINATION
Modelling in Transport and Logistics – MOTL031

- This paper consists of EIGHT questions on ELEVEN (11) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2017.08.05   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

(a) State three main components that a transport system is composed of in general.

(03 Marks)

(b) Traffic congestion in road is highly influenced by the level of transport supply and demand. Briefly explain the term 'congestion' in terms of traffic flow and travel time using the figure Q1-b given below.

(05 Marks)
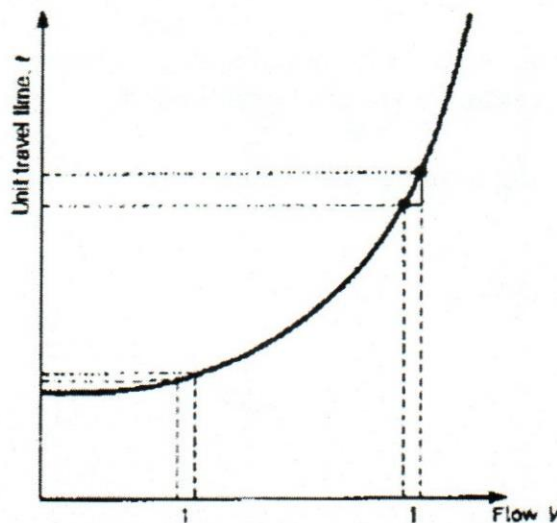
Figure Q1-b: Defining traffic congestion

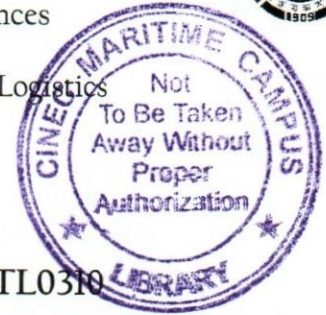Colombo International Nautical and Engineering College
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(c) "We can find a set of equilibrium points for a transport system between transport supply and transport demand. But again there would be changes in level of service as to the changes in activity levels. Hence we would need to find two equilibrium points one for the short term and next for the long term".

Based on the above concept, explain the below mentioned statement 'The task of Transport Planning is to forecast and manage these equilibrium points so that the welfare of the society is maximized.'

(04 Marks)

(d) Are the following statements true or false?
  (i) There would be no objection to the use of total household income and number of employed members in the household as independent variables in a trip generation equation.

  (ii) The use of trip generation equations to predict future trips depends on the ability to estimate future values of the independent variables.

  (iii) Category analysis uses disaggregate survey data while regression analysis employs zonal aggregate survey data.

  (iv) A transport system requires a number of fixed assets, the infrastructure, and a number of mobile units, the vehicles in combination with a set of rules for their operation

  (v) Logit model can be used in modal split problems so that the proportion of trips selected for a certain mode can be calculated.

(05 Marks)

(e) Define the following terminologies commonly used in statistics.
  (i) Data
  (ii) Sample
  (iii) Population of interest

(03 Marks)

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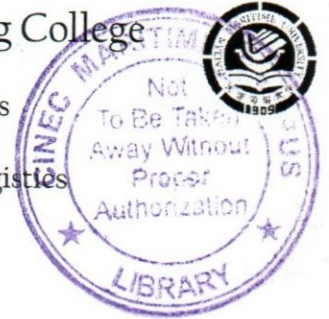
Question 02

(a) Assume that for the purposes of a transport study the population of a certain area has been classified according to two income categories (low income and high income), and that there are only two modes of transport available (car and bus) for the journey to work.

Assume that the population distribution is given by:

Table Q2-a: Population distribution

	Low income	High income	Total
Bus user	0.45	0.15	0.60
Car user	0.20	0.20	0.40
Total	0.65	0.35	1.00

(i) Calculate the probability of a low-income traveler using bus when a sample is with 75% low income (LI) and 25% high income (HI) travelers.

(ii) Calculate the probability of a bus user having low income when a sample is of 75% bus users and 25% car users.

(06 Marks)

(b) Explain the use of Central Limit Theorem in the sample size estimation in general transport modelling studies.

(03 Marks)

(c) Consider the following results of having collected stratified (based on income) and choice-based samples of a certain population:

Table Q2-c1: Stratified Sample

Mode	Low Income	Medium Income	High Income
Car	3.33	18.00	20.00
Bus	33.34	7.20	4.00
Underground	3.33	4.80	6.00
Total	40	30.00	30.00

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Table Q2-c2: Choice based sample

Mode	Low Income	Medium Income	High Income	Total
Car	6.67	20.00	13.33	40.00
Bus	17.24	2.07	0.69	20.00
Underground	16.67	13.33	10.00	40.00

If you know that the income-based proportions in the population are 60, 25 and 15% respectively for low, medium and high income, find an equivalent table for a random sample. Is it possible to validate your answer?

(05 Marks)

(d) Fill the table shown in Q2-d using transportation scenarios in using different types of sampling in transport modeling problems.

Table Q2-d: Table to be filled

Sampling Method	Scenario	Advantages	Disadvantages
Simple Random Sampling			
Stratified Random Sampling			
Choice Based Sampling			

(Note - Students have to draw this table in their answer sheets)

(06 Marks)

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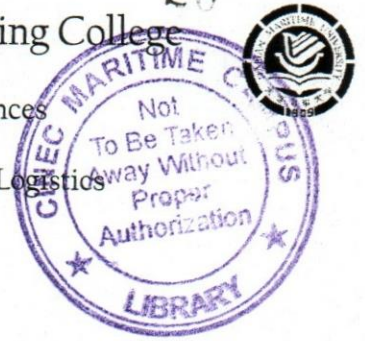
Question 03

The city in which this super market is located has 3 transport zones. The population and the number of supermarkets in each zone and the total floor areas of these supermarkets and the total number of supermarkets employees in each zone are given below.

Details	Zone		
	A	B	C
Population in zone	100,000	120,000	120,000
Number of supermarkets in zone	2	4	2
Floor area of all supermarkets in zone (sq mt)	500	1000	1000
Number of employees in all supermarkets in zone	30	40	20

If the attraction to a particular supermarket i can be given by the equation:

$$A_i = 10 \, F_i + 100 \, E_i$$

Where

F_i = floor area (sq mt) of supermarket i
E_i = number of employees in supermarket i

(a) Calculate the total number of supermarkets shopping trips that would be attracted to each zone in the city

(05 Marks)

(b) If average household size in the city is 5 persons, how many supermarket trips on average are made per household per week (Supermarkets are open on all seven days of the week)

(05 Marks)

(c) If each supermarket has 100 parking stalls and if 50% of the customers are expected to arrive by private vehicles, estimate the average number of parking stalls that are required by each supermarket. You may assume that the supermarkets are open 20 hours a day and that the arrival rate is uniform with each vehicle staying on average one hour.

(05 Marks)

(d) Discuss also the adequacy of providing only this average number of parking stalls.

(05 Marks)

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Question 04

(a) 20 households in a city were sampled for household income, ownership of cars for household, and trips produced. The collected data is shown in the table given below.

    (i) Develop matrices connecting monthly income vs cars available (use the table Q4-a below)

(05 Marks)

    (ii) Draw a graph connecting trips per household vs monthly income.

(05 Marks)

    (iii) How many trips per day will be made by a household with a monthly income of Rs.10, 000 and owning one car?

(05 Marks)

(b) If the generalised cost is measured in money units then is sometimes interpreted as the value of time (or more precisely the value of in-vehicle time) as its units are Rupees/ time.

Briefely describe about the methodology that you would carry out to estimate the value of time of the passengers in the Galle road between Fort and Moratuwa.

Hint – assume that you have collected data to represent monthly travel behaviours of the passengers,
Only procedures need to be discussed.

(05 Marks)

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Table Q4-a: Collected data

Household no	Trips	Monthly income (Rs)	Cars per household
1	2	4000	0
2	4	6000	0
3	10	17000	2
4	5	11000	0
5	5	4500	1
6	15	17000	3
7	7	9500	1
8	4	9000	0
9	6	7000	1
10	13	19000	3
11	8	18000	1
12	9	21000	1
13	9	7000	2
14	11	11000	2
15	10	11000	2
16	11	13000	2
17	12	15000	2
18	8	11000	1
19	8	13000	1
20	9	15000	1

Question 05

(a) State briefly the content of discrete choice model.

(02 Marks)

(b) Briefly explain the random utility theory commonly applicable in discrete choice models.

(02 Marks)

(c) An inter-urban mode choice study is being undertaken for people with a choice between car and rail. The figures below were obtained as a result of a survey on five origin-destination pairs A to E.

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Table Q5-c: Survey results

| O–D | Elements of cost by each mode | | | | |
| | Car | | Rail | | |
	X_1	X_2	X_1	X_2	Proportion choosing car
A	3.05	9.90	2.50	9.70	0.80
B	4.05	13.10	2.02	14.00	0.51
C	3.25	9.30	2.25	8.60	0.57
D	3.50	11.20	2.75	10.30	0.71
E	2.45	6.10	2.04	4.70	0.63

Where X_1 is the travel time (in hours) and X_2 the out-of-pocket cost (in rupees). Assume that the 'value of time' coefficient is 2.00 per hour.

(i) Calculate the generalized cost of travelling by each mode.

(05 Marks)

(ii) Calibrate a binary Logit modal-split model with these data.

(05 Marks)

(iii)   An improved rail service is to be introduced which will reduce travel times by 0.20 of an hour in every journey; by how much could the rail mode increase its fares without losing customers at each O–D pair?

(06 Marks)

Question 06

(a) A small study area has been divided into four zones and a limited survey has resulted in the following trip matrix

Q6-a1: Trip Matrix

	1	2	3	4
1	–	60	275	571
2	50	–	410	443
3	123	61	–	47
4	205	265	75	–

Estimates for future total trip ends for each zone are as given below:

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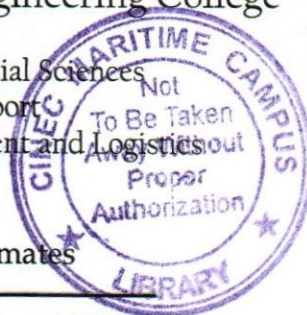
Table Q6-a2: Future estimates

Zones	Estimated future origins	Estimated future destinations
1	1200	670
2	1050	730
3	380	950
4	770	995

Use an appropriate growth-factor method to estimate future inter-zonal movements.

(08 Marks)

(b) Explain two each advantages and limitations of growth factor methods in modeling trip distribution.

(06 Marks)

(c) Briefly explain the Gravity Distribution Model to model trip distributions.
(Hint – A possible scenario can be assumed and only singly constrained trip distribution can be thought of)

(06 Marks)

Question 07

(a) Assign the vehicle trips shown in the following O-D trip table (Q7-a) to the network shown in figure Q7-a, using the all-or-nothing assignment technique.

Table Q7-a: Origin-Destination Trip table

| From/to | Trips between Zones | | | | |
	1	2	3	4	5
1	-	100	100	200	150
2	400	-	200	100	500
3	200	100	-	100	150
4	250	150	300	-	400
5	200	100	50	350	-

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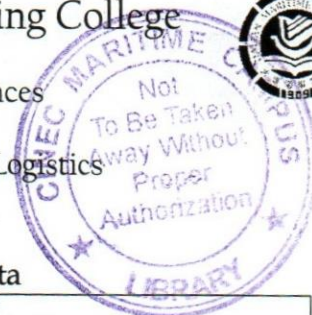Course CODE: COM550

Highway Network:
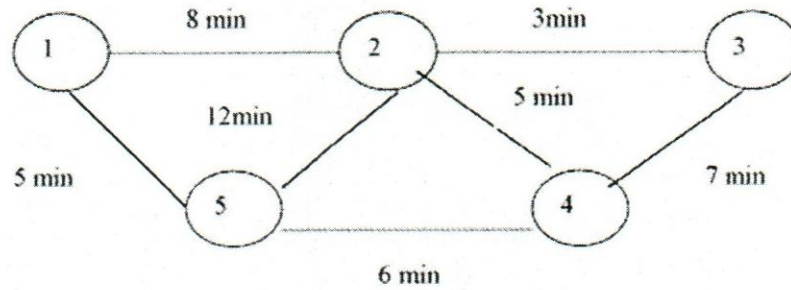
Figure Q7-a: Highway network

(08 Marks)

(b) Let the trip rate of a zone is explained by the household size in the field survey conducted. It was found that the household size is 1, 2, 3 and 4. The trip rates of the corresponding household are as shown in the table below.

(i) Fit a linear equation relating trip generation rate and household size.

(08 Marks)

(ii) Test whether there is a linear relationship between number of trips generated and household size. Assume a reliable significance value.

(04 Marks)

Table Q6-b: Survey information

		Household size (x)			
		1	2	3	4
	Trips	1	2	4	6
	per	2	4	5	7
	day				
	(y)	2	3	3	4
	$\sum y$	5	9	12	17

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Question 08

Write short notes for the following:
- (a) Four integrated processes in transport planning
- (b) Usage of Nested Logit Model
- (c) Description of two differences between Aggregate and Disaggregate demand models
- (d) Transport as a derived demand

(4*5 Marks)

--------------------END OF THE QUESTION PAPER-----------------
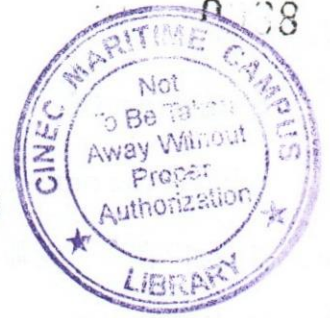
Year 4 Semester II
SEMESTER END EXAMINATION
Chinese Language and Culture – CLAN0383

- This paper consists of NINE questions on FIVE (05) pages.
- Answer EIGHT Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2017.08.06   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)
Write the Suitable Chinese Character

(1) Very/ hěn ....

(2) Middle/ zhōng ....

(3) In /At/ zài ....

(4) Book/ shū ....

(5) How many/several / jǐ ....

(6) O'clock / diǎn ....

(7) Day/ rì ....

(8) Month/ yuè ....

(9) Eat / chī ....

(10) Small / xiǎo ....

(30 Marks)

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Question 02

What is the numeral in the sentence?

(1) 我们有两个老师...............

(2) 他有四只猫...............

(3) 我要一杯茶...............

(4) 我们家有五口人...............

(5) 今天九号...............

(10 Marks)

Question 03

Translate the following sentences in to English

(1) 我的爱好是音乐 / Wǒ de àihào shì yīnyuè...............

(2) 我会打网球 / Wǒ huì dǎ wǎngqiú...............

(3) 这个电影很好看 / Zhège diànyǐng hěn hǎokàn...............

(4) 那是飞机场 / Nà shì fēijī chǎng...............

(5) 哥哥怎么去上海？/Gēgē zěnme qù shànghǎi? ....

(10 Marks)

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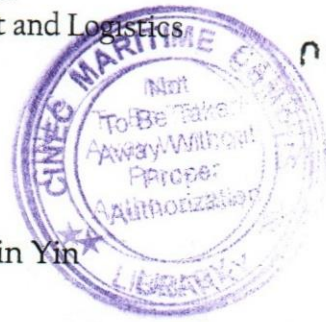
Question 04

Translate the following sentences in to Chinese, write it in Pin Yin

(1) He is a Basketball player ....

(2) I like watch TV................

(3) I am at Railway station................

(4) Airport is at left side................

(5) What is your hobby? ....

(10 Marks)

Question 05

Answer the following questions in Pin Yin

(1) 你好吗？ / Nǐ hǎo ma?................

(2) 你叫什么？ / Nǐ jiào shénme?................

(3) 你是哪国人？ / Nǐ shì nǎ guórén?................

(4) 你家在哪儿？ / Nǐ jiā zài nǎ'er?................

(5) 你爸爸叫什么？ / Nǐ bàba jiào shénme?................

(10 Marks)

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Question 06

Make the below sentences in properly and write it in Pin Yin

(1) 喜欢 xǐhuān / 我 Wǒ / 不 bù / 面条 miàntiáo...............

(2) 我 wǒ / 英文 Yīngwén / 有 yǒu / 课 kè / 星期一 Xīngqí yī...............

(3) 喜欢 xǐhuān / 他 Tā / 牛肉 niúròu / 也 yě ....

(4) 我 wǒ / 课 kè / 没有 méiyǒu ....

(5) 喜欢 xǐhuān / 我 wǒ / 我们 Wǒmen / 班 Bān ....

(10 Marks)

Question 07

Write the TIME in Chinese characters

(1) Six O' clock................

(2) Seven O'clock................

(3) Eight O'Clock...............

(4) Ten O' clock................

(5) Three O' clock...............

(10 Marks)

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Question 08

Read & Match

1. 昨天 / Zuótiān
2. 医生 / Yīshēng
3. 司机 / Sījī
4. 想 / Xiǎng
5. 狗 / Gǒu

a) Doctor
b) Yesterday
d) Hope/Wish
f) Driver
e) Dog

(10 Marks)

Question 09

Write about yourself in Chinese pin yin not less than 5 sentences

----

(10 Marks)

-------------------END OF THE QUESTION PAPER----------------

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Year 4 Semester II
REPEAT EXAMINATION
Chinese Language and Culture – CLAN0383

- This paper consists of NINE questions on SIX (07) pages.
- Answer SEVEN Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2017.04.03   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)
(A) Write the Suitable Chinese Character for below Pinyin

(1) Nǐ ....   (05 Marks)

(2) hǎo ....   (05 Marks)

(3) rén ....   (05 Marks)

(4) Māmā ....   (05 Marks)

(5) wǒ ....   (05 Marks)

(B) Find the odd words and underline

(1) 牛肉 Niúròu / 鱼 yú / 哥哥 gēgē   (03 Marks)

(2) 姐姐 Jiějiě / 妹妹 mèimei / 菜 cài   (03 Marks)

(3) 海鲜 Hǎixiān / 鱼 Yú / 面包 Miànbāo   (03 Marks)

(4) 米饭 Mǐfàn / 面条 miàntiáo / 吃 Chī   (03 Marks)

(5) 苹果 píngguǒ / 咖啡 kāfēi / 果汁 guǒ zhī   (03 Marks)

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Question 02

Mark the time on the given clock
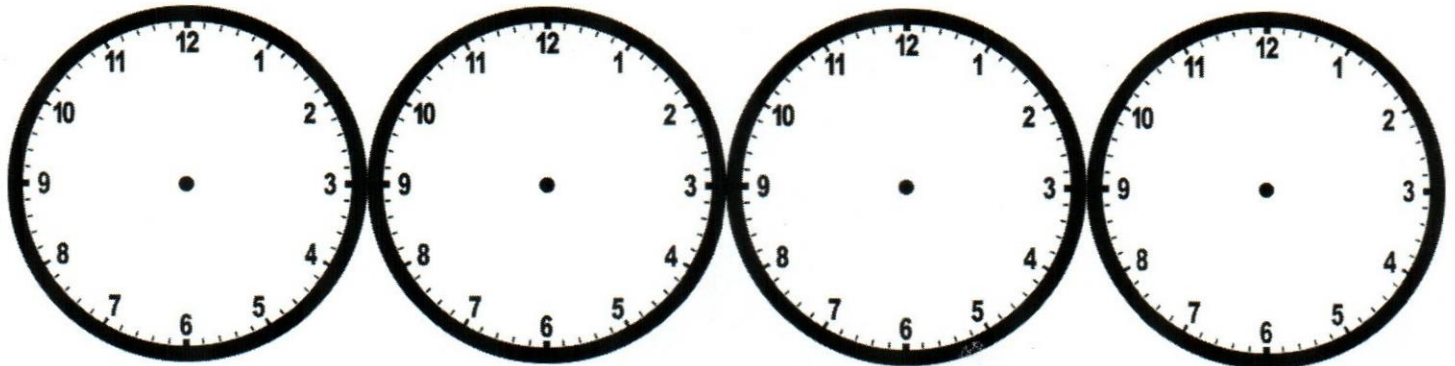
两点　　　　　　　六点　　　　　　　四点　　　　　　　七点

(10 Marks)

Question 03

Identify the following symbols and write down the correct numbers in English.

(1)　　　　　　(2)　　　　　　(3)　　　　　　(4)　　　　　　(5)

----------　　----------　　----------　　----------　　----------

(10 Marks)

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619
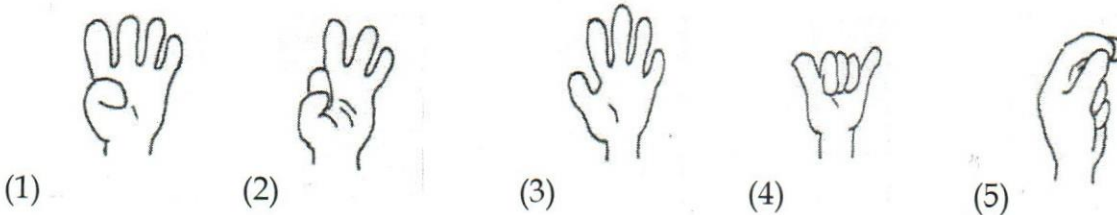
Question 04

Write about yourself in Chinese ping yin not less than 5 sentences

----

(10 Marks)

Question 05

Translate the following sentences in to Chinese and write it in Ping Yin.

1. Hello!   (02 Marks)
    Thank you.   (02 Marks)

3. Bye Bye.   (02 Marks)

4. Good Morning!   (02 Marks)

5. How are you?   (02 Marks)

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Question 06

Read & Match

1. chī- 吃	a) Morning
2. kāfēi- 咖啡	b) Milk
3. niúnǎi- 牛奶	d) Egg
4. jīdàn – 鸡蛋	f) Eat
5. hē- 喝	e) Drink

(10 Marks)

Question 07

According to the meaning find the correct sentence in pin yin

1) Father is not a doctor	nǐ mèimei shì lǎoshī ma?
2) Does your younger sister a teacher?	Bà Bà bùshì yīshēng
3) Are you a teacher?	Wǒ yǒuyī zhǐ gǒu
4) This is my elder brother	Nǐ shì lǎoshī ma?
5) I have one dog	Zhè shì wǒ dí gēgē

(10 Marks)

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Question 08

Mark down ✓ or ✗

1		吃 Chī	
2		喝 Hē	
3		再见 Zàijiàn	
4		游泳 Yóuyǒng	
5		面条 Miàntiáo	

(10 Marks)

Question 09

Write about your school in Chinese pin yin not less than 5 sentences

----

(10 Marks)

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Year 4 Semester II
REPEAT EXAMINATION
Modelling in Transport and Logistics -- MOTL0310

- This paper consists of EIGHT questions on NINE (09) pages.
- Answer FIVE Questions including Question 01.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.
- Write legibly

Date: 2017.04.03   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

(a) A model is a simplified representation of a part of the real world–the system of interest which focuses on certain elements considered important from a particular point of view. State two advantages of developing models.

(02 Marks)

(b) Describe two (02) characteristics of each for transport demand and transport supply.

(04 Marks)

(c)The following simple cause-effect relationship illustrated in figure Q1-c depicts the Car-Public Transport vicious circle. Describe briefly the role of transport planning in this cycle.

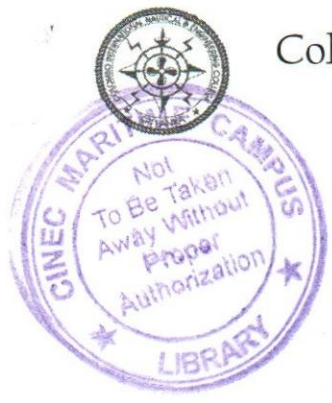Colombo International Nautical and Engineering College
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Figure Q1-c: Car-Public Transport vicious circle

(05 Marks)

(d) Describe the features of transport models for analytical approach with related to the following concerns. Assume suitable examples if required.

(i)   Level of precision and accuracy required

(ii)   The context of decision making

(iii)   The availability of suitable data

(09 Marks)

Question 02

(a) State three (03) main factors affecting for the determination of sample size to estimate population parameters.

(03 Marks)

(b) Explain briefly the role of Central Limit Theorem in sample size estimation problem.

(03 Marks)

(c) Consider the following results of having collected stratified (based on income) and choice-based samples of a certain population:

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Table Q2-c1: Stratified Sample

Mode	Low Income	Medium Income	High Income
Car	3.33	18.00	20.00
Bus	33.34	7.20	4.00
Underground	3.33	4.80	6.00
Total	40	30.00	30.00

Table Q2-c2: Choice based sample

Mode	Low Income	Medium Income	High Income	Total
Car	6.67	20.00	13.33	40.00
Bus	17.24	2.07	0.69	20.00
Underground	16.67	13.33	10.00	40.00

If you know that the income-based proportions in the population are 60, 25 and 15% respectively for low, medium and high income, find an equivalent table for a random sample. Is it possible to validate your answer?

(05 Marks)

(d) Fill the table shown in Q2-d using transportation scenarios in using different types of sampling in transport modeling problems.

Table Q2-d: Table to be filled

Sampling Method	Scenario	Advantages	Disadvantages
Simple Random Sampling			
Stratified Random Sampling			
Choice Based Sampling			

(Note - Students have to draw this table in their answer sheets)

(09 Marks)

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Question 03

(a) State four (04) factors affecting freight trip generation of a manufacturing plant.

(04 Marks)

(b) Growth Factor Modelling is a technique which may be applied to predict the future number of journeys by any of the categories of trip makers. Its basic equation is:

$$T_i = F_i t_i$$

Where T_i and t_i are respectively future and current trips in zone i, and F_i is a growth factor.

F_i, is the factor related to variables such as population (P), income (I) and car ownership (C), in a function such as:

$$F_i = \frac{f(P_i^d, I_i^d, C_i^d)}{f(P_i^c, I_i^c, C_i^c)}$$

The superscripts d and c denote the design and current years respectively.
Explain two disadvantages of this approach in modeling trip generation

(06 Marks)

(c) Consider a zone with the following characteristics:

Table Q3-c: Trip characteristics

Household type	Numbers	Income (Rs/month)	Inhabitants	Trips/day
0 car	180	4,000	4	6
1 car	80	18,000	4	8
2 or more cars	40	50,000	6	4

Due to a decrease in import duties and a real income of people will increase by 30%. It is expected that in five years' time 50% of households without a car would acquire one.

Estimate how many trips the zone would generate in that case.

(10 Marks)

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Question 04

(a) Briefly describe the term 'traffic assignment' in transport planning process.

(03 Marks)

(b) Explain two each limitation of all or nothing traffic assignment methods in modeling trip distribution.

(06 Marks)

(c) Briefly explain the Gravity Distribution Model to model trip distributions.
(Hint – A possible scenario can be assumed and only singly constrained trip distribution can be thought of)

(11 Marks)

Question 05

(a) Determine the modal shares (M_k) between the following modes of transport for school children in a small town who travel daily to a popular school in a provincial town located 5 Km away;

Mode (k)	Waiting time (minutes) W_k	Speed (Km/hr) (S_k)	Costs (C_k)
School Bus	10	30	5
School Van	5	20	20

Where,

$$M_k = \frac{exp^{GC_k}}{\sum exp^{GC_k}}$$

And where GC_k is the Generalized Cost for mode k computed as follows:
$GC_k = \alpha_k + \alpha_w W_k + \alpha_t T_k + \alpha_c C_k$
where
W_k = waiting time in minutes for mode k
T_k = travel time in minutes for mode k
S_k = speed of travel for mode k in Km/hr
C_k = cost for travel by mode k in Rupees
α_k = mode specification given as α_{bus} = - 0.1, α_{van} = - 0.2
α_w = - 0.04
α_t = - 0.02
α_c = - 0.01

(12 Marks)

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(b) If there is a program to give school children free bicycles to come to school and the estimated speed of travel by bicycle is known to be 10 Km/h and $\alpha_{bicycle} = -0.3$. How many bicycles would be needed if there are a total of 200 students attending the school?

(08 Marks)

Question 06

(a) Are the following statements true or false?
   (i)   There would be no objection to the use of total household income and number of employed members in the household as independent variables in a trip generation equation.
   (ii)   The use of trip generation equations to predict future trips depends on the ability to estimate future values of the independent variables.
   (iii)   Growth factor model uses disaggregate survey data while regression analysis employs zonal aggregate survey data.
   (iv)   A transport system requires a number of fixed assets, the infrastructure, and a number of mobile units, the vehicles in combination with a set of rules for their operation
   (v)   Logit model can be used in modal split problems so that the proportion of trips selected for a certain mode can be calculated.

(05 Marks)

(b) 20 households in a city were sampled for household income, ownership of cars for household, and trips produced. The collected data is shown in the table given below.
   (i) Develop matrices connecting monthly income vs cars available (use the table Q2 below)

(03 Marks)

   (ii) Draw a graph connecting trips per household vs monthly income.

(06 Marks)

   (iii) How many trips per day will be made by a household with a monthly income of Rs.10, 000 and owning one car?
(06 Marks)

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Table Q6-b: Collected data

Household no	Trips	Monthly income (Rs)	Cars per household
1	2	4000	0
2	4	6000	0
3	10	17000	2
4	5	11000	0
5	5	4500	1
6	15	17000	3
7	7	9500	1
8	4	9000	0
9	6	7000	1
10	13	19000	3
11	8	18000	1
12	9	21000	1
13	9	7000	2
14	11	11000	2
15	10	11000	2
16	11	13000	2
17	12	15000	2
18	8	11000	1
19	8	13000	1
20	9	15000	1

Question 07

(a) Assume that for the purposes of a transport study the population of a certain area has been classified according to two income categories, and that there are only two modes of transport available (car and bus) for the journey to work. Let us also assume that the ratio of population distribution is given by:

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	Low income	High income	Total
Bus user	0.45	0.15	0.60
Car user	0.20	0.20	0.40
Total	0.65	0.35	1.00

(i) Calculate the probability of a low-income traveler using bus when a sample is of 75% low income and 25% high income travelers. (03 Marks)

(ii) Calculate the probability of a bus user having low income when a sample is of 75% bus users and 25% car users. (03 Marks)

(iii) Calculate the probability that a high-income traveler selects car for the given population. (03 Marks)

(b) Explain the usage of regression analysis in trip generation.

(05 Marks)

(c) If the generalised cost is measured in money units then is sometimes interpreted as the value of time (or more precisely the value of in-vehicle time) as its units are Rupees/time.

Briefely describe about the methodology that you would carry out to estimate the value of time of the passengers in the Galle road between Fort and Moratuwa .

Hint – assume that you have collected data to represent monthly travel behaviours of the passengers,
Only procedures need to be discussed. (06 Marks)

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Question 08

(a)   State three (03) factors that affect travel mode choice in general.

(06 Marks)

(b)   Explain the term traffic congestion using traffic flow theorem.

(05 Marks)

(c)   Write short notes for the following topics:

   (i) Three challenges in data collection for freight demand modeling

   (ii) Aggregate data

   (iii) Brief description of utility function in modeling trip assignment

(3*3 Marks)

--------------------END OF THE QUESTION PAPER----------------

Year 4 Semester II   08
REPEAT EXAMINATION
Modeling in Transport and Logistics–MOTL310310

- This paper consists of EIGHT questions on six (06) pages.
- Answer FIVE Questions including Question 1.
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.03.12   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

(a)   A travel demand model is given as
$$Tij = \alpha_c \, P_i^{2.5} P_j^{0.9} \, / \, D_{ij}^{1.6}$$
Where;
Tij = daily demand for passengers between i and j (both directions)
P_i = population of city i in thousands, where ($P_i > P_j$)
P_j = population of city j in thousands
D_{ij} = minimum distance between i and j in km
$\alpha_c = 3.2 \times 10^{-4}$

Assume that a month has 30 days.

(i)   Find the total number of passengers per month between two cities A and B, situated 150 km apart, when the population of city A is 1.5 million and the population of city B is 1.2 million.

(ii)   If a new road connecting the two cities is built such that the distance between them is reduced to 100 km, what will be the new monthly passenger demand between the two cities?

(06 Marks)

(b)   What do you understand by
(i)   Time headway

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(ii)   Space headway

(04 Marks)

(c)   What are home-based trips?   (02 Marks)

(d)   Identify if the data obtained from the following sources are aggregate or disaggregate __and__ cross-sectional or time-series data.

	Aggregate/Disaggregate	Cross-sectional/Time-series
Annual Reports		
Household Surveys		
Transport interviews		
Transport counts		

(08 Marks)

Question 02

The center of most travel demand models is the "Four Step Model". Describe each step in this model.   (20 Marks)

Question 03

(a)   Passenger trips can be classified by trip purpose. Identify six such trip purposes.
(06 Marks)

(b)   The trip rate (y) of a zone is explained by the household size (x). The trip rates of the corresponding households are as shown in the table below.

Household Size (x)	1	2	3	4
Trips/day (y)	1	2	4	6
	2	4	5	7
	2	3	3	4

(i)   Fit a linear equation relating trip rate and household size.

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08

(ii)   Compute the trip rate if the average household size is 3.25.
(All answers should be accurate to two decimal places)

(14 marks)

Question 04

Discuss the following road traffic data collection equipment.
(a)   Pneumatic road tube
(b)   Magnetic loops
(c)   Manual counts
(d)   Ultrasonic and passive acoustic
(e)   Piezoelectric sensors

(20 Marks)

Question 05

The base year trip matrix for a study area consisting of three zones is given below.

	1	2	3	O_i
1	30	45	42	117
2	54	48	36	138
3	33	51	39	123
d_j	117	144	117	378

The productions from the zone 1, 2 and 3 for the horizon year are expected to grow to 147, 159 and 183 respectively. The attractions from these zones are expected to increase to 153, 177 and 159 respectively. Compute the trip matrix for the horizon year using doubly constrained growth factor model. (All figures should be accurate to 2 decimal places)

(20 Marks)

Question 06

(a)   A zone has 200 households with cars and 300 households without cars. The average trip generation rate for each group is 6.0 and 3.5 trips per day

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respectively. Assuming that in the future all households will have a car, and that population and income will remain constant, calculate

(i)   Current trip rate
(ii)   Growth factor
(iii) Estimated number of future trips
(iv)   Actual number of trips generated

(08 Marks)

(b)   Discuss the advantages and disadvantages of the following data collection techniques used in transportation surveys.

(i)   Case Studies
(ii)   Mail Surveys
(iii) Personal Interviews

(12 Marks)

Question 07

(a)   Explain "Generalized Cost" with respect to transportation.

(05 Marks)

(b)   Factors influencing mode choice can be listed under 03 groups. What are they?

(03 Marks)

(c)   The total number of trips from zone i to zone j is 4200. Currently all trips are made by car. The government is considering two alternatives – to introduce a train or a bus. The travel characteristics and respective coefficients are as shown.

	t^v_{ij}	t^w_{ij}	t^t_{ij}	F_{ij}	Φ_{ij}
Coefficient	0.05	0.04	0.07	0.2	0.2
Car	25	-	-	22	6
Bus	35	8	6	8	-
Train	17	14	5	6	-

The travel cost is represented by

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$$c_{ij} = a_1 t^v_{ij} + a_2 t^w_{ij} + a_3 t^t_{ij} + a_4 F_{ij} + a_5 \Phi_{ij}$$

(i)   Calculate the cost of travel by car, bus and train

Considering introduction of bus,
(ii)   What is the probability of choosing car? How many trips will be made by car?
(iii)   What is the probability of choosing bus? How many trips will be made by bus?

Considering introduction of train
(iv)   What is the probability of choosing car? How many trips will be made by car?
(v)   What is the probability of choosing train? How many trips will be made by train?

(vi)   Which would be the best alternative in terms of trips carried?

(12 Marks)

Question 08

(a)   Transportation demand is studied by stratifying data. Identify two such stratifiers.

(02 Marks)

(b)   The table below presents the data collected in a household (HH) survey.

Type	Household Size	Annual income ($ '000)	No. of non-workers	No. of workers departing in the peak hour
1	2	30	1	1
2	3	45	1	0
3	4	55	2	1

The total number of household types is given in the table below.

Household type	No. of households
1	200

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| 2 | 250 |
| 3 | 375 |

The following linear regression model estimates the number of social trips.
$Y_1 = 0.06 + 0.03\,X_1 + 0.005\,X_2 + 0.08\,X_3$

The following linear regression model estimates the number of recreational trips.
$Y_2 = 0.4 + 0.01\,X_1 + 0.002\,X_2 + 0.02\,X_3$

Where
X_1 = Household annual income in '000
X_2 = Household size
X_3 = Number of non-working household members

Using the data above calculate the total number of peak hour work-based trips, social trips and recreational trips. (All answers should be accurate to 3 decimal places)

(18 Marks)

--------------------END OF THE QUESTION PAPER----------------

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000027

Year 4 Semester II
SEMESTER END EXAMINATION
Modelling in Transport and Logistics-MOTL310310

- This paper consists of EIGHT questions on Six (06) pages.
- Answer Five Questions <u>including Question 01</u>
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.01.16   Pass mark: 50%   Time: 03 Hours

Question 01: (Compulsory)

(a)   The table below presents the data collected in a household (HH) survey.

Type	Household Size	Annual income ($ '000)	No. of non-workers	No. of workers departing in the peak hour
1	3	30	2	1
2	4	45	2	2
3	5	55	3	2
4	3	75	1	0

The total number of household types is given in the table below.

Household type	No. of households
1	150
2	200
3	275
4	75

The following linear regression model estimates the number of recreation trips.
$Y_1 = 0.08 + 0.02 X_1 + 0.008 X_2 + 0.02 X_3$

The following linear regression model estimates the number of retail trips.

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$Y_2 = 0.5 + 0.02 X_1 + 0.004 X_2 + 0.01 X_3$

Where
X_1 = Household annual income
X_2 = Household size
X_3 = Number of non-working household members

Using the data above calculate the total number of peak hour work-based trips, retail trips and recreation trips.

(12 Marks)

(b) Data for transport demand modeling can be obtained from several sources. Briefly explain two such sources. (04 Marks)

(c) Identify the travel movement types illustrated in the following figure.
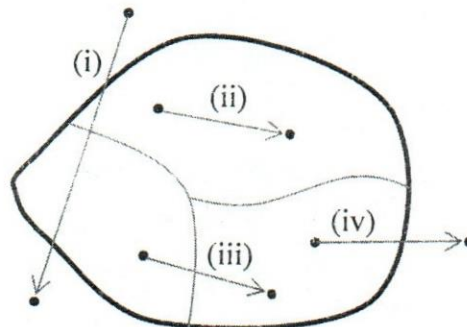
(04 Marks)

Question 02

Travel surveys can take many forms. Describe five such types of travel surveys giving examples of their common applications. (20 Marks)

Question 03

(a) Distinguish between the following types of transport data giving examples.
(i) Aggregate and disaggregate data (04 Marks)
(ii) Time-series, cross-sectional and pooled data (06 Marks)

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(b)   The trip rate (y) and the corresponding household sizes (x) from a sample are shown in the table below.

Household size (x)	1	1	2	2	2	3	3	3	3	4	4	4
Trips per day (y)	1	2	2	3	4	2	3	4	5	4	6	7

(i)   Fit a linear equation relating trip rate and household size.
(ii)   Compute the trip rate if the average household size is 3.75

(10 Marks)

Question 04

(a)   Identify the advantages and disadvantages of each of the following transport data collection techniques.
(i)   Use of existing information
(ii)   Group administered surveys
(iii)   Observations

(12 Marks)

(b)   Describe the concept of generalized cost, with reference to the differences between generalized cost of using public transport and private transport.

(06 Marks)

(c)   The center of most travel demand models is the "Four Step Model". Identify the four steps in this model.

(02 Marks)

Question 05

(a)   Discuss non-intrusive technologies used in transport data collection.

(08 Marks)

(b)   Growth factor models have the basic equation, $T_i = f_i t_i$ where T_i is the number of future trips in the zone, t_i is the number of current trips in that zone and f_i is a growth factor.

(i)   Identify two explanatory variables that the growth factor depends on.

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A zone has 300 households with cars and 275 households without cars. The average trip generation rate for each group is 6.0 and 3.0 trips per day respectively. Assuming that in the future all households will have a car, and that population and income will remain constant,

(ii)   Find the growth factor
(iii) Calculate the estimated future trips from that zone
(iv)   What will be the actual number of trips generated?

(08 Marks)

(c)   What are the advantages and limitations of the growth factor model?

(04 Marks)

Question 06

The base year trip matrix for a study area consisting of three zones is given below.

	1	2	3	O_i
1	20	30	28	78
2	36	32	24	92
3	22	34	26	82
d_j	88	96	78	252

The productions from the zone 1, 2 and 3 for the horizon year are expected to grow to 98, 106 and 122 respectively. The attractions from these zones are expected to increase to 102, 118 and 106 respectively. Compute the trip matrix for the horizon year using doubly constrained growth factor model.

(20 Marks)

Question 07
(a)   In the context of traffic flow models, what do you understand by
   (i)   Space headway
   (ii)   Time-mean speed
   (iii) Flow rate
   (iv)   Density

(08 Marks)

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(b) Describe mode choice as part of the four stage model, with reference to the main factors which influence mode choice. (06 Marks)

(c) A travel demand model is given as

$$T_{ij} = \alpha_c \, P_i^{2.6} \, P_j^{1.1} \, / \, D_{ij}^{2.0}$$

Where;

T_{ij} = daily demand for passengers between i and j (both directions)

P_i = population of city i in thousands, where ($P_i > P_j$)

P_j = population of city j in thousands

D_{ij} = minimum distance between i and j in km

$\alpha_c = 3.6 \times 10^{-4}$

(i) Find the total number of passengers per month between two cities M and N, situated 108 km apart, when the population of city M is 1.2 million and the population of city N is 800,000.
Clearly state any assumptions you make in your calculation.

(ii) If the population of city N is doubled, what will be the new daily passenger demand between the two cities?

(06 Marks)

Question 08

(a) What are the factors that affect route choice? (06 Marks)

(b) How are vehicle trips different from person trips? (02 Marks)

(c) A joint trip destination/mode vehicle based social trip logit model is estimated with the following coefficients

	By Car	By Bus
Constant	0.9	0.2
Travel time (mins)	-0.22	-0.22
Population (in '000)	0.16	0.16
Leisure floor space (in '000m)	1.1	1.1

It is known that 1000 recreational trips will depart from a residential area during the peak hour. There are two possible trip destinations with the following characteristics.

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	Car travel time (mins)	Bus travel time (mins)	Population (in '000)	Leisure floor space (in '000m)
Dest 1	14	17	12.4	1.3
Dest 2	5	8	8.2	0.92

Determine the distribution of trips by mode and destination.

(12 Marks)

--------------------END OF THE QUESTION PAPER----------------

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000 02

Year 4 Semester II
SEMESTER END EXAMINATION
Chinese Language and Culture-CLAN421586

- This paper consists of EIGHT questions on Five (05) pages.
- **Answer ALL Questions**
- Only non-programmable calculators are allowed.
- You may use appropriate graphs, diagrams, equation/s to prove or justify the answers.
- If you have any doubt as to the interpretation of the wording of a question, make your own decision, but clearly state it on the script.

Date: 2016.01.17	Pass mark: 50%	Time: 02 Hours and 45 Minutes

Question Number 01

(a) Write the Suitable **Chinese Character** for below Pinyin
(i) Nǐ hǎo ma?   ....
(ii) Wǒ hěn hǎo   ....
(iii) Zhōngguó rén   ....
(iv) Māmā zài běijīng...............
(v) Zhè wǒ bàba   ....

(15 Marks)

(b) Find the odd words and underline
(i) 牛肉Niúròu / 鱼yú / 哥哥gēgē
(ii) 姐姐jiějiě / 妹妹mèimei / 菜cài
(iii) 海鲜Hǎixiān / 鱼Yú / 面包Miànbāo
(iv) 米饭Mǐfàn / 面条miàntiáo/ 吃Chī
(v) 苹果píngguǒ/ 咖啡kāfēi/ 果汁guǒ zhī

(05 Marks)

(c) Match to the suitable meaning
(i) xīngqí yī   physical training
(ii) Zhōngwén kè   Monday
(iii) Tǐyù   Chinese Class
(iv) Sēng jiā luō wén   Sinhala
(v) Yīngwén   Girls/female
(vi) Nán   no/not
(vii) nǚ   Boys/male
(viii) Méiyǒu   English

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(ix) Wǒmen   We are

(x) Qù   Go   (10 Marks)

(d) Write the Suitable Pin yin for below Chinese Characters

(i) 一 ....

(ii) 五 ....

(iii) 九 ....

(iv) 八 ....

(v) 六 ....

(vi) 十 ....   (06 Marks)

Question 02

Mark the time on the given clock

两点

六点

四点

七点

(10 Marks)

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000 02
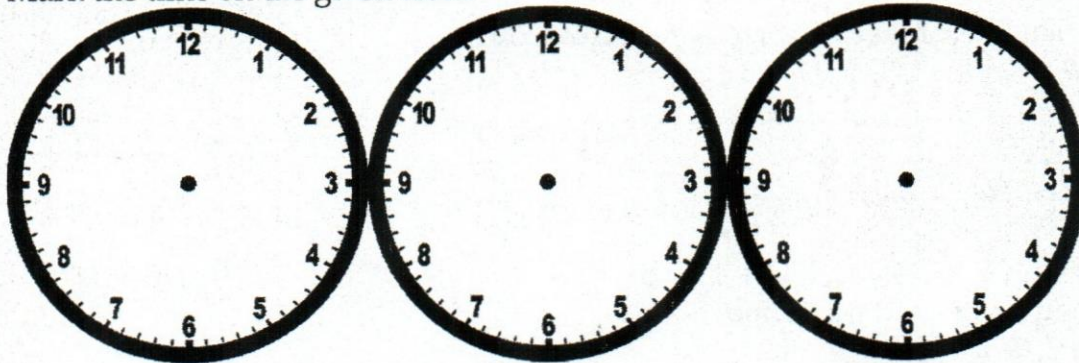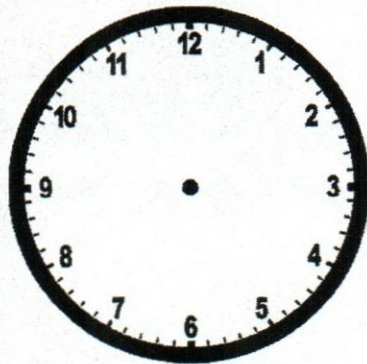
Question 03
Answer the below questions using ping yin
    (a) 你的生日是几月几号 / nǐ de shēngrì shì jǐ yuè jǐ hào?

    ....

    (b) 今天是星期几 / jīntiān shì xīngqí jǐ

    ....

    (c) 你爸爸几岁？/ Nǐ bàba jǐ suì?

    ....

    (d) 今天冷吗？/ Jīntiān lěng ma?

    ....

    (e) 明天是星期天吗？Míngtiān shì xīngqítiān ma?

    ....

(10 Marks)

Question Number 04
Filling the blanks using below words
(是/ shì , 医生/ yīshēng , 那儿/ nà'er , 喝/ hē , 想/ xiǎng)
    (a) 你爸爸是……吗？Nǐ bàba shì ………ma?
    (b) 他……不是画家/ tā ……bùshì huàjiā?
    (c) 他在…….工作 / tā zài ……. Gōngzuò?
    (d) 你…….咖啡吗? / nǐ …….kāfēi ma?
    (e) 我……做演员. Wǒ …… zuò yǎnyuán

(10 Marks)

Question 05
Rewrite the correct sentence
    (a) 电影diànyǐng / 好看hǎokàn /这个zhège / 很hěn

    ....

    (b) 爱好àihào / 我Wǒ/ 的de/ 音乐yīnyuè/ 是shì

    ....

    (c) 他Tā /爱好àihào / 什么shénme/ 的de / 是shì

    ....

    (d) 会huì/ 你Nǐ/ 打dǎ/ 吗ma?/ 网球wǎngqiú

    ....

    (e) 天天tiāntiān/ 我Wǒ/ 电视diànshì/ 看kàn

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.... (10 Marks)

Question Number 06

Match to the correct meaning

(a) Zuǒbiān		right side
(b) Yòubiān		left side
(c) Hòubian		front side
(d) Qiánbian		behind side
(e) Pángbiān		next to / close by

(10 Marks)

Question Number 07

Translate in to English

(a) 他有两只狗Tā yǒu liǎng zhī gǒu

....

(b) 我有一只猫Wǒ yǒuyī zhǐ māo

....

(c) 哥哥有一只小猫，没有狗。Gēgē yǒuyī zhǐ xiǎo māo, méiyǒu gǒu.

....

(d) 你姐姐有猫吗？Nǐ jiějiě yǒu māo ma?

....

(04 Marks)

Question Number 08

Write about yourself in Chinese in pin yin - 10 sentences

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000 02

(10 Marks)

--------------------END OF THE QUESTION PAPER-----------------