TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR:
INSTITUTION BASED PROGRAMME

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2318: TRANSPORTATION ENGINEERING I

END OF SEMESTER EXAMINATION
SERIES: AUGUST 2017
TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of five questions.
Attempt question ONE (Compulsory) and any other TWO questions.
Do not write on the question paper.

QUESTION ONE (COMPULSORY) 30 Marks

a) Clearly outline the differences between stratified and cluster sampling [4 marks]

b) Explain the basic assumption on which the development of predictive travel demand models is based and give the general strategy and procedure in travel demand forecasting [3 marks]

c) Briefly explain the nature and purpose of trip generation models [3 marks]
d) Describe the 'regression model' used in trip generation studies [4 marks]
e) List the factors which should be considered when choosing modeling approaches [3 marks]

f) Explain the term "multimodal transportation network" [2 marks]

g) Explain the terms: i) sample

ii) Sampling methods

How and why is sampling important in transportation studies (6 marks)

h) Describe Travel diary surveys as used in O-D surveys and data collection [5 marks]

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

a) Differentiate clearly between physical models and abstract models, giving appropriate examples for each case. How are mathematical models important in transportation engineering? [5 marks]

b) With the aid of a flow chart, briefly describe the sequential travel demand modeling process [5 marks]

c) The following correlation matrix contains the simple correlation coefficients between pairs of variables computed by equation $Y_p = \alpha + \beta_1 x_1 + \beta_2 x_2 + \ldots \beta_k x_k$ using base year data. Discuss the question of which explanatory variables x should be included in a linear multiple regression models. Write the five alternative linear multiple regression models which may be considered. [10 marks]

	Y	X_1	X_2	X_3	X_4
Y	1.00	0.32	0.92	0.95	0.62
X_1		1.00	0.25	0.19	0.03
X_2			1.00	0.99	0.29
X_3				1.00	0.33
X_4					1.00

QUESTION THREE (20 Marks)

a) Transportation engineering and traffic engineering are clearly related. Discuss [3 marks]

b) There are two types of errors which may occur during the sample design, sampling and data collection process and thereby contribute to the measurement error of data. Clearly explain them and give their characteristics [4 marks]

c) Clearly explain the characteristics of transport supply [5 marks]

d) What are the exotic systems of transportation [3 marks]

e) Clearly explain the characteristics of transport demand [5 marks]

QUESTION FOUR (20 Marks)

a) Clearly explain zoning design mentioning the TWO main dimensions of zoning systems [4 marks]

b) The number of production and attractions with a three zone study area are provided here, along with the inter-zonal travel times and corresponding friction factors. Given these data, determine the number of zone –to-zone trips using gravity model. [16 marks]

Trip production and attractions for a three zone study area

Zone	1	2	3	total
Trip productions	140	330	280	750
Trip attractions	300	270	180	750

Travel times between zones (min)

Zone	1	2	3
1	5	2	3
2	2	6	6
3	6	6	5

Travel times vs friction factor

Time (min)	F
1	82
2	52
3	50
4	41
5	39
6	26
7	20
8	13

QUESTION FIVE (20 Marks)

a) Explain TWO methods of accident data analysis and representation [2 marks]

b) The description of a transportation network in a model can be undertaken at different levels of details and requires **THREE** main specifications of the network. Give the **THREE** specifications. [3 marks]

c) A highway network consisting of 4 nodes is given below. A trip table showing the number of vehicles per hour wanting to go from one node to another is provided. Assign the trips to the network using the all-or-nothing method. Calculate the total volume on each link and give relevant diagrams and tabulate the results/computations. [15 marks]

TO / FROM	1	2	3	4
1	0	500	750	350
2	275	0	1050	475
3	650	1870	0	950
4	1250	350	2050	0

Table: trip table

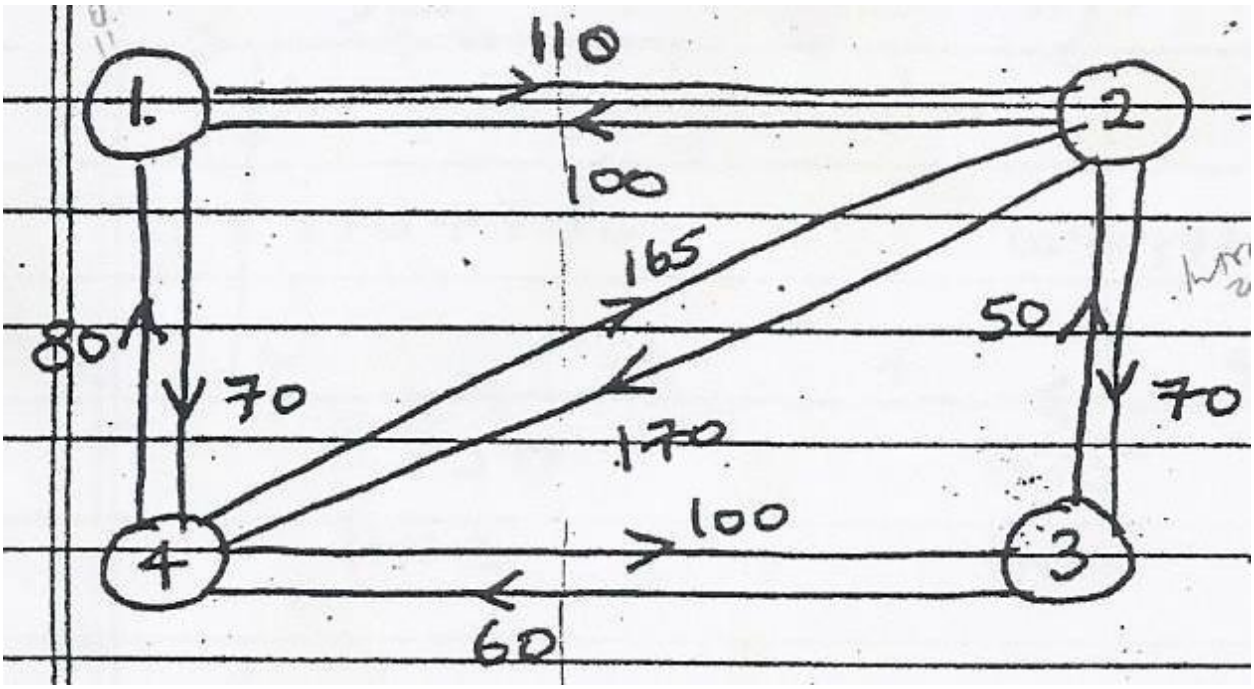

Fig: transport network