



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECV 4413 : TRANSPORT ENGINEERING I

END OF SEMESTER EXAMINATION

SERIES: APRIL 2025

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) In the quantification of transport demands:-
 - i) Give **TWO** reasons why delineation of the country into suitable zones or regions is necessary (2 marks)
 - ii) Explain the criteria that can be used to delineate zones (3 marks)
- b) Clearly explain zoning design mentioning the **TWO** main dimensions of zoning systems (3 Marks)
- c) 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)
- d) In Transport systems planning/Management (TSM), state **FOUR** Measures that can be considered to reduce demand (4 marks)

- e) Give **FOUR** uses/importance of Origin and destination data. What is the main goal of Transportation demand analysis? (5 marks)
- f) With examples, differentiate between Home-based trips and non-Home based trips (4 marks)
- g) With the use of sketches illustrate the following types of transportation networks (6 marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 marks)

- a) List **SIX** Factors which have commonly been used to predict trip productions (person trip production) (3 marks)
- b) With respect to transportation demand modelling and forecasting for transportation engineering applications, clearly explain **FOUR** main errors that may occur during the modelling process, giving appropriate examples in each case. (8 marks)
- c) A calibrated utility function for travel in a medium-sized city by automobile, bus and light rail is:

$$U = a - 0.002X_1 - 0.05X_2$$

Where X_1 = is the cost of travel (cents), and X_2 is the travel time in (min), calculate the modal split for the given value

Mode	a	X1	X2
Automobile	-0.30	130	25
Bus	-0.35	75	35
Light rail	-0.40	90	40

If a parking fee of 1.00 shillings per trip is imposed, what would be the split to the other two modes? (9 marks)

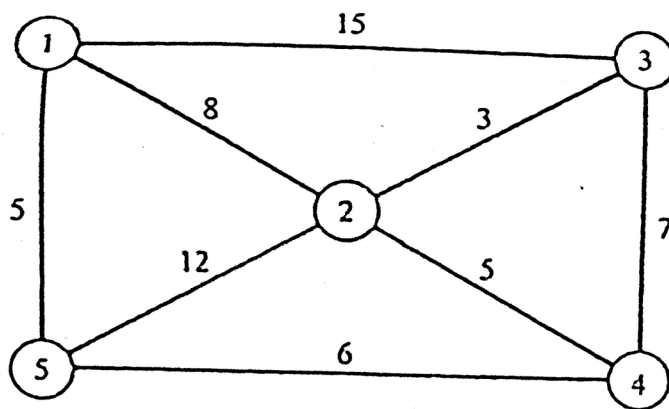
QUESTION THREE (20 Marks)

- a) List the factors which should be considered when choosing modeling approaches (3 marks)
- b) Describe the 'regression model' used in trip generation studies (4 marks)

- c) 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 (6 marks)
- d) Explain the term “multimodal transportation network” (2 marks)
- e) Explain **THREE** methods of accident data analysis and representation. (3 marks)
- f) Explain the term “statistics” as used in transportation engineering (2 marks)

QUESTION FOUR (20 Marks)

A highway network consisting of five nodes and eight links is shown in the figure below. The cost of transportation is also shown. A trip table showing the numbers of vehicles per hour wanting to go from one node to another is also provided. Assign the trips to the network using the all-or-nothing method. All the links are two-way. Find the total volume on each individual link and the total cost of all the trips.



Trip-Table

From \ To	1	2	3	4	5	
1	0	50	60	70	30	210
2	40	0	30	60	80	210
3	90	40	0	20	50	200
4	80	70	90	0	30	270
5	30	40	50	60	0	180
	240	200	230	210	190	1070

QUESTION FIVE (20 Marks)

- a) Explain the following terms used in transportation and land-use in urban areas: (3 marks)
- b) i) State the **THREE** essential components of transportation. (3 marks)
- ii) With the aid of a sketch, explain the interaction between the **THREE** components in a(i) above. (3 marks)
- c) Explain the nature of transportation demand. (3 marks)
- d) Land use models are broadly classified into **TWO** categories. Name them (2 marks)
- e) Briefly explain how transportation affect economic development of an area (6 marks)