



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY MAIN EXAMINATIONS
2023/2024 ACADEMIC YEAR**

THIRD YEAR FIRST SEMESTER EXAMINATIONS

**FOR THE DEGREE
OF
BACHELOR OF SCIENCE IN CIVIL AND STRUCTURAL
ENGINEERING**

COURSE CODE: CSE 341

COURSE TITLE: TRAFFIC ENGINEERING

DATE: 20TH DECEMBER 2023

TIME: 3 P.M – 5 P.M

INSTRUCTIONS:

1. This paper contains **FOUR** questions
2. Answer questions **ONE** and **any other two**
3. Marks for each question are indicated in the parenthesis.
4. Examination duration is **2 Hours**

MMUST observes **ZERO** tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

Question 1: 30 marks

- (a) The present O-D matrix is given in Table Q1 below. The future generated trips in zones 1, 2, and 3 are 925, 850 and 1050 respectively. Distribute the number of future trips between each zone using the average factor method. Carry out only one iteration step. **(6 marks)**

Table Q1

O \ D	1	2	3
1	100	400	200
2	400	200	100
3	200	100	150

- (b) You are tasked with estimating the future traffic demand for a transportation planning exercise. Describe the two main methods that you can use in this exercise giving some specific examples. **(4 marks)**
- (c) (i) Given the following set of headway values, calculate the flow **(2 marks)**
h: 1.6, 1.5, 1.4, 1.4, 1.6, 1.7, 1.8, 2.8, 1.9, 2.0, 2.1, 2.4, 2.8, 1.7, 1.9
(ii) If the above data was observed on a highway section having an average spacing of 55m. Estimate:
i. Density **(1 mark)**
ii. Speed **(1 mark)**
- (d) There are a number of roadway factors that affect the capacity of a highway. State and briefly describe any FOUR. **(6 marks)**
- (e) There are two main types of traffic signal controllers. State and briefly describe them. **(4 marks)**
- (f) One of the ways of transportation management is to manage travel demand and this can be achieved through reducing the travel demand. Mention and describe any three methods that can be employed to achieve this. **(6 marks)**

Question 2: 20 marks

- (a) Explain any FIVE factors that contribute to growth in traffic. **(5 marks)**
- (b) Using the example of Kakamega town and based on the four-step model, briefly explain how you can go about developing a model to estimate the 10-year travel demand of the town. **(10 marks)**
- (c) You have been appointed by the Kenya National Highways Authority (KENHA) to evaluate the performance (qualitative) of its road network in the Western region by determining their level of service. Explain what parameters you will measure to classify the performance of the selected road sections. **(5 marks)**

Question 3: 20 marks

- (a) There are several methods that can be used to carry out traffic assignment. Name and describe any four. **(10 marks)**
- (b) From an in-out survey conducted for a parking area consisting of 50 bays, the initial count was found to be 27. Table Q3 gives the number of vehicles coming in and out of the parking lot for a time interval of 5 minutes. Find:
- i. Accumulation **(3 marks)**
 - ii. Parking load **(3 marks)**
 - iii. Occupancy **(3 marks)**
 - iv. Total parking load in vehicle hours **(1 mark)**

Table Q3: in-out survey data

Time	In	out
5	4	5
10	3	4
15	5	2
20	6	3
25	7	7
30	8	3
35	3	2
40	5	1
45	6	4
50	3	2
55	4	5
60	1	2

Question 4: 20 marks

- (a) Outline any six functions served by traffic islands especially at intersections. **(6 marks)**
- (b) Define the following terms in relation to signalised intersection flow
- (i) Cycle **(1 mark)**
 - (ii) Phase **(2 marks)**
 - (iii) Interval **(1 mark)**

(c)

(i) Define peak hour factor

(2 marks)

(ii) Given the traffic flow data in Table Q4 below calculate the 15-minute peak hour factor.

(4 marks)

Table Q4

4:00- 4:15	4:15- 4:30	4:30- 4:45	4:45- 5:00	5:00- 5:15	5:15- 5:30	5:30- 5:45	5:45- 6:0
500	450	390	400	411	480	510	398

(d) With your knowledge of Nairobi City traffic which two parking management strategy

you would propose to mitigate the high congestion levels.

(4 marks)