INTERNATIONAL UNIVERSITY OF EAST AFRICA
"Learning to Succeed"

DEPARTMENT OF CIVIL ENGINEERING AND ARCHITECTURE

PROGRAMME: CIVIL ENGINEERING

COURSE UNIT: BCE4203- TRAFFIC ENGINEERING AND MANAGEMENT

PROGRAMME : Bachelor of Civil Engineering
YEAR/SEM : Two (2), Semester II
COURSE CODE : BCE4203

NAME : **TRAFFIC ENGINEERING AND MANAGEMENT**

DATE: 23/04/2025 **TIME: 09:00 AM – 12:00 Pm**

INSTRUCTIONS TO CANDIDATES:

1. THIS EXAMINATION CONSISTS OF TWO SECTIONS; SECTION A AND SECTION B.
2. ALL QUESTIONS CARRY EQUAL MARKS
3. ATTEMPT ANY THREE (3) QUESTIONS FROM SECTION A AND TWO (2) QUESTIONS FROM SECTION B. YOU SHALL HAVE FIVE QUESTIONS IN TOTAL
4. DO NOT OPEN THIS EXAMINATION UNTIL YOU ARE TOLD TO DO SO
5. ALL ROUGH WORK SHOULD BE IN YOUR ANSWER BOOKLET
6. THE TIME ALLOWED FOR THIS EXAMINATION IS STRICTLY THREE HOURS

7. ON THE FIRST PAGE OF YOUR ANSWER BOOKLET

    - WRITE YOUR REGISTRATION NUMBER PROPERLY
    - WRITE THE COURSE NAME AND COURSE CODE
    - WRITE EXAMINATION VENUE
    - DO NOT WRITE, DRAW OR SCRATCH ANYTHING ELSE ON THE FIRST PAGE
    - WRITING UNNECESSARY INFORMATION LIKE PHONE NUMBERS IN THE FIRST PAGE SHALL ANNUL YOUR EXAM
    - ANSWER BOOKLETS THAT DO NOT CARRY THE REQUIRED INFORMATION, OR THAT HAVE UNNECCESSAY WRITING IN THE FIRST PAGE SHALL NOT BE MARKED

SECTION A

CHOOSE THREE QUESTIONS

Question 1:

a) Define traffic control devices and elaborate their significance on roads.

b) What are the requirements of traffic control devices?

c) Explain the elements used to convey messages on roads.

d) Explain the major classifications of traffics signs, stating further sub classifications where applicable.

e) Explain the different classifications of road markings.

Question 2:

a) Define the following terms in relation to traffic signals, giving the formulae where applicable.

i. Green interval

ii. Cycle length

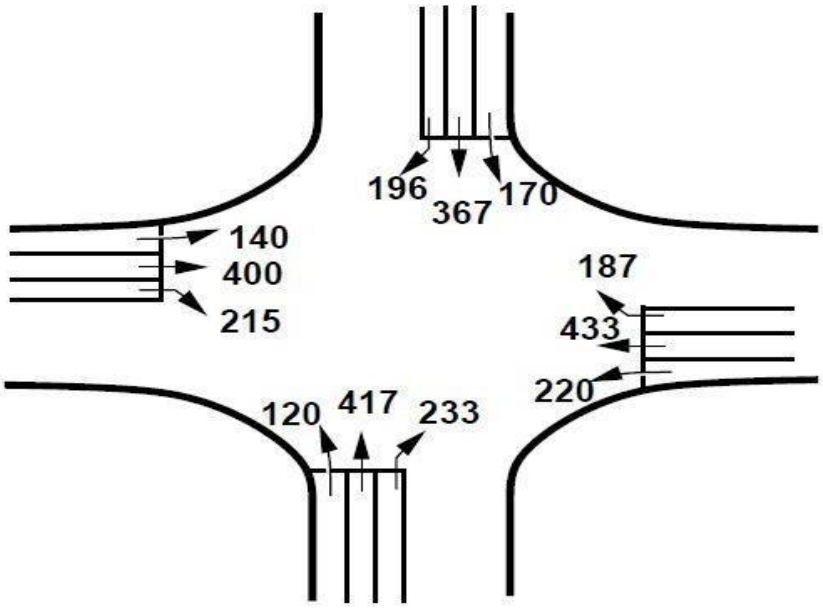
iii. Phase

iv. Lost time

v. Lane capacity

b) Give the different types of phase designs.

c) The traffic flow for a four-legged intersection is as shown in the figure 1 below. Given that the lost time per phase is 2.4 seconds, saturation headway is 2.2 seconds, amber time is 3 seconds per phase, find the cycle length, green time and performance measure (delay per cycle). Assume critical v=c ratio as 0.9.



Question 3:

a) Define the term Traffic calming and mention four engineering elements used in traffic calming

b) Define the term Bus Rapid Transit and give its characteristics in relation to traffic public transportation.

c) Explain any 4 Regulatory traffic management measures.

d) Explain the 4-steps travel demand model in transport modelling.

Question 4:

e) Define the following terms giving their formulae.

i. Average parking duration,

ii. Parking turnover,

iii. Parking index.

f) Explain the different types of parking surveys.

g) From an in-out survey conducted for a parking area consisting of 40 bays, the initial count was found to be 25. The table 1 above gives the result of the survey. The number of vehicles coming in and out of the parking lot for a time interval of 5 minutes is as shown in the table. Find the accumulation, total parking load, average occupancy and efficiency of the parking lot. 10 marks

h) Define traffic rotaries, giving their advantages & disadvantages and hence the traffic operations involved.

Table 1

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

Question 5:

a) Explain travel demand modelling stating its significance.

b) Describe the categories of information required during data collection.

c) Give the types of trips and hence explain the factors affecting trip generation.

d) Describe the types of modal split models and hence explain the factors affecting choice of mode.

e) Given that, a zone has 275 households with cars and 275 households without cars and the average trip generation rates for each groups is 5.0 and 2.5 trips per day respectively.
Assuming that in the future, all households will have a car, find the growth factor and future trips from that zone, assuming that the population and income remains constant.

Question 6:

a) Explain the different classifications of traffic stream models, giving examples of each type. Explain in detail any model of your choice deriving the traffic stream parameters.8

b) Differentiate between capacity and level of service of a highway.

c) Describe the different classifications of transportation facilities from the engineering perspective based on continuity of flow.

d) State the factors affecting level of service of a road.

e) Explain the different levels of service as per the Highway Capacity Manual. 6 marks

SECTION A

CHOOSE TWO QUESTIONS

Question 1:

a) Explain the different classifications of traffic stream models, giving examples of each type. Explain in detail any model of your choice deriving the traffic stream parameters

b) Differentiate between capacity and level of service of a highway.

c) Describe the different classifications of transportation facilities from the engineering perspective based on continuity of flow.

Question 2:

a) what are the main objectives of accident studies in traffic

b) The various measures to decrease the accident rates may be divided into three groups. Discuss these methods in relation to traffic engineering.

c) The process of eliminating or improving accident blackspots in a road network is composed of several activities, explain the seven steps involved in this process.

Question 3:

a) Mention the Five critical components that interact in a traffic system:

b) Outline any five factors affecting level of service.

c) With the help of an illustration, Describe the six levels of service as defined in the highway capacity manual.

d) Broadly discuss the difference between interrupted and uninterrupted flow in traffic engineering. (4 marks)

e) Explain the five (5) types of speeds used in traffic analysis.

Question 4:

a) With the help of illustrations, discuss the different types of parking in relation to traffic engineering.

b) Discuss the effects parking has on the environment, economy and society.

c) Parking surveys are conducted to collect the parking statistics. Explain the most common parking surveys conducted on highways.

d) Write short notes on the following street furniture in traffic engineering.

i. Road Way Delineators
ii. Safety Barriers
iii. Barricades And Channeliser
iv. Railing
v. Speed Breakers
vi. Hazaed Markers and Object Markers

Question 5:

a) Define the term Reaction time.

b) What are the Basic Components in Traffic Engineering.

c) Discuss the perception-reaction time process.

d) An ambassador car travelling at a speed of 60 K.M.H on a WBM road in good condition is suddenly allowed to coast by switching off the engine and putting the gear in neutral. What is the deceleration caused. (for WBW, f =0.025 =0.025, frontal area= 2.15sqm mass in kgs = 1365 coefficient= 0.39)

e) With the aid of and an illustration, explain forces acting on a moving vehicle.