TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF BUILDING & CIVIL ENGINEERING

UNIVERSITY EXAMINATION FOR DECREE IN:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING (BSCE)

ECE 2403: TRAFFIC ENGINEERING I

END OF SEMESTER EXAMINATION
SERIES: APRIL 2015
TIME ALLOWED: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*
- *Pocket Calculator*

This paper consists of **FOUR** questions. Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
Use neat, large and well labeled diagrams where required
This paper consists of **TWO** printed pages

Question One

a) Define "Traffic Engineering" and clearly outline the various roles it plays as discipline **(3 marks)**

b) Distinguish the following terms as they are used in reference to traffic engineering studies.: Spot speed, running speed, and journey speed. **(6 marks)**

c) What is ITS? Explain its roles and the obstacles associated with its implementation as a traffic control technology. **(4 marks)**

d) Clearly explain the different functions of the following lines used on a carriageway:
   (i) Centre-line

(ii) Lane-line
(iii) Edge-line **(6 marks)**

e) Explain the "Delay" concept and show how it is linked to queuing using a suitable diagram explain the concept of a queuing system **(6 marks)**

f) Explain the term "Headway" and "spacing" and explain how they relate to flow and concentration **(5 marks)**

Question Two

a) Draw a clearly labeled fundamental diagram of traffic flow (u – q) **(5 marks)**

b) Speed of 5 vehicles at mid-point of 0.5km section of road were observed as 44, 42, 51, 49 and 46km/h respectively. Compute the time mean sped and space mean speed of the vehicles **(5 marks)**

c) In the measurement for traffic volume using moving car observer method, the flow of the vehicles is given by:

Explain the elements of the formula and show how it is derived **(10 marks)**

Question Three

a) Briefly explain the tidal-flow operation as used in traffic engineering **(5 marks)**

b) Describe the three methods used to drain and control the revisable lanes in order to enable tidal flow operations to be carried out safely and efficiently (9 marks)

c) Briefly explain how the following factors in a main road are affected by closing side streets:
(i) Journey time and running speed
(ii) Number of accidents
(iii) Usage of Pedestrian precincts **(6 marks)**

Question Four

a) Clearly distinguish the terms "uninterrupted" and "interrupted" flows as they are used in traffic engineering studies **(6 marks)**

b) Briefly describe the FIVE classes of roads in Kenya **(5 marks)**

c) Given that the relationship between speed (in km/hr) and concentration from empirical data is $U = 54.5 - 0.24K$
, compute the maximum flow (q_m), the optimal speed (U_o) the jam density (K_j) and the free flow speed (U_f). Draw a clearly labeled fundamental flow diagram for the u-q relationship **(9 marks)**

Question Five

a) Briefly explain FOUR advantages of one-way traffic system **(6 marks)**

b) Describe the THREE main types of crash barriers **(9 marks)**

c) Briefly describe the following types of traffic signal lights used at road intersections:

(i) Pre-timed traffic signals

(ii) Traffic actuated signals **(5 marks)**