



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 2520: TRAFFIC ENGINEERING III

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 **FIVE** 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 (Compulsory)

a) Explain in details the following human behavior encountered in queues:

- (i) Balking
- (ii) Reneging
- (iii) Jockeying

(6 marks)

b) Name and explain the **THREE** main factors that characteristics the input source of a queue

(10 marks)

c) In relation to queue configuration briefly describe the queuing process

(4 marks)

- d) (i) Explain the 'shock wave' method used in traffic flow studies (5 marks)
(ii) Name and briefly explain the TWO categories in which queue discipline is divided into (5 marks)

Question Two

- a) In reference to the queuing systems describe 'saturation and under-saturation' (5 marks)
- b) A Supermarket has a mean arrival rate of 4 persons per minute and a service rate of 5 persons per minute. Using the information given below calculate the characteristics of the system using a M/M/1 model by determining:
- (i) Mean number of persons in the system (L)
 - (ii) Mean time in the queuing system (W)
 - (iii) Mean time in the queue (W_q)
 - (iv) Percentage idle time (I) (15 marks)

Question Three

- a) In relation to traffic arrival to a facility explain the following:
- (i) Static arrival
 - (ii) Dynamic arrival (10 marks)
- b) The size of calling population can be classified into THREE categories. Name and explain them in details (10 marks)

Question Four

- a) The pattern of arrival at a system is categorized into two. Name and explain them (10 marks)
- b) Customers arrive at a ticket counter at a rate of 150 persons per hour at 3.00pm. After 20 minutes the arrival rate declines to 30 persons and continues for 10 minutes. If the time required to serve one customer is 10 minutes describe the performance of the queue (10 marks)

Question Five

- a) In reference to a signalized intersection explain the deterministic queuing analysis. Support your explanation with a sketch (15 marks)
- b) Briefly describe Traffic Engineering and outline the fundamental flow characteristics of traffic and associated analytical techniques that are essential in planning, design and operation of transportation systems (5 marks)