TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECE 2411: TRAFFIC ENGINEERING II

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: SEPTEMBER 2018
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) (i) State the objective of road hierarchy

(ii) Outline how road hierarchy reduces overall impact of traffic (11marks)

b) State reasons why vehicle routing is one of the areas that is ripest to be the beneficiary of revolutionary advances in information and communications technologies (4mrks)

c) The capacity of a highway link suddenly reduced by a width restriction at road works to a maximum flow of 1000veh/h and the speed of all vehicles to 5km/h. During off-peak periods the flow may be represented by a block of demand which increases instantaneously to a flow of 1500 veh/h and which before it reaches the width restriction has an average speed of 80km/h. the flow continues for a period of 20 minutes and then falls instantaneously to the off-peak level of flow. Calculate the maximum length of queue which occurs at deriving the appropriate formula from first principles; determine the maximum length of queue which occurs at the restriction during peak periods.

(15mrks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

a) i) Explain what is meant by the term 'minimum path'

ii) Explain how this minimum path is selected (13mrks)

b) Outline the two general types of traffic bottlenecks (7mrks)

QUESTION THREE (20 Marks)

a) Enumerate the six methods that have been developed for undertaking traffic assignment (6mrks)

b) State for purposes of traffic assignment (7½ mrks)

c) Explain what the choice of assignment procedure to be adopted in any particular transportation study depends on (2mrks)

d) The relationship between journey time and volume on a 2km link is given by the model;

$$T = T_0\left[2 + 0.18\left[\frac{\text{Assigned volume}}{\text{Practical capacity}}\right]\right]^4$$

Where T= journey time at which assigned volume can travel on the appropriate link.

T_0= base journey time at zero volume and is given 0.95 times the journey time at practical capacity.

The link has a practical capacity of 60,000 vehicles per day and a capacity speed of 80km/h.

After the network has been loaded the link is observed to have 100,000 vehicles per day assigned to it.

Determine the travel time in minutes for the assigned volume (4½ mrks)

QUESTION FOUR(20 Marks)

a) Outline the four levels of road hierarchy for network planning and development (8mrks)

b) Outline areas where four level road hierarchy can be used in areas of transport planning and road network management (10mrks)

c) Enumerate the scales contained in continuum modelling (2mrks)

QUESTION FIVE (20 Marks)

a) Explain the following terms used in graph theory;

i) Adjacent edges

ii) Parallel edges

iii) Simple graph

iv) Empty graph

v) Null graph

vi) Trivial graph (9mrks)

b) Distinguish between the following in graph theory;

i) Forest and sub forest

ii) Tree and subtree

iii) Spanning tree and co spanning tree (6mrks)

c) Outline a capacity restraint assignment (5mrks)