TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

ECV 4503: TRANSPORT ENGINEERING II

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: JULY 2025
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) Intra-zonal trips, External trips and accessibility are terms used in transportation planning. Define these three terms (6 marks)

b) In relation to land use and transportation explain why urban areas grow or decline in time. (3 marks)

c) Explain the following terminologies used in transportation:
   (i) Supply
   (ii) Demand
   (iii) Equilibrium (3 marks)

d) With the aid of a flow chart, describe transportation within the urban system. (7 marks)

e) Briefly explain how transportation affect economic development of an area (6 marks)

f) Discuss the following State Roles in Land Use Activities (5 marks)

i) Education/technical assistance

ii) Access management

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 marks)

a) Explain the following terms used in transportation and land-use in urban areas:

(i) Accessibility

(ii) Mobility

(iii) Zoning

(iv) Urban spatial structure

(v) Urban form (10 marks)

b) Explain the relationship between transportation and land development. (7 marks)

c) State the basic assumptions made in the Von Thunen's Regional Land Use Model (3 marks)

QUESTION THREE (20 Marks)

a) Discuss in detail the Burgess Concentric Model of land use (10 marks)

b) Briefly describe the 'location theory' as used in urban planning. (10 marks)

QUESTION FOUR (20 Marks)

a) Describe the urbanization process and how it affects other urban structures such as infrastructure and urban service. (12 marks)

b) Explain briefly the Sector and multiple nuclei land use Models (8 marks)

QUESTION FIVE (20 Marks)

a) The description of a transportation network in a model can be undertaken at different levels of details and requires **THREE** main specifications of the network. Give the **THREE** specifications. (3 marks)

b) Clearly explain zoning design mentioning the **TWO** main dimensions of zoning systems (4 marks)

c) In the quantification of transport demands explain the criteria that can be used to delineate zones (3 marks)

d) A market segment of 900 individuals served by route from town A to town B. A multinomial logit choice model is calibrated for this market segment resulting in the following utility function:

$$U = ßm - 0.50C - 0.01T$$

Where:

C = out of pocket cost in Kenya pounds

T = travel time in minutes, and the values of the mode specific parameter ßm are given as:

Bus transit = 0.00

Rail transit = 0.20

Auto/Car transit = 2.40

For a particular O-D pair, the cost of car trip which takes 12min is k£3.00

Rail trips which take 20 minutes cost 2.00 k£

Bus transit which takes 40 minutes cost 1.25 k£

Predict the number of trips from this segment that use each mode (10 marks)