



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR
BACHELOR OF SCIENCE IN CIVIL ENGINEERING
TCV 4312 / ECV 4414: TRAFFIC ENGINEERING I
SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: JULY 2025

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination: Answer Booklet, Drawing Instruments, Scientific calculator, examination pass and student ID.

This paper consists of five questions. Attempt question ONE (Compulsory) and any other TWO questions. All diagrams should be clearly drawn and labeled.

USE OF MOBILE PHONES & PROGRAMMABLE CALCULATORS IS NOT ALLOWED.

Each question should be on a fresh page of the answer booklet.

Question One (Compulsory)

- (a) What is “ITS”? Explain its roles and the obstacles associated with its implementation as a traffic control technology? (3 marks)
- (b) Explain the concept of ‘Shock Waves’ and clearly explain how ‘Positive’ and ‘Negative’ shock waves do occur. (7 marks)
- (c) Differentiate between the following as applied in traffic engineering:
- i. Spacing and clearance
 - ii. Volume and flow rate
 - iii. Headway and gap (9 marks)

- (d) A student riding his bicycle from campus on a one-way street takes 50 minutes to get home, of which 10 minutes was taken talking to the driver of a stalled vehicle. He counted 42 vehicles while he rode his bicycle and 35 vehicles while he stopped. What are the travel time and flow of the vehicle stream? (6 marks)
- (e) What is a 'time – space' diagram? Draw a clearly labeled time-space diagram. (5 marks)

QUESTION TWO

- (a) i. What is 'space mean speed'? (1 mark)
- ii. Show the fundamental equation of traffic flow explaining each element of the equation. (2 marks)
- (b) The relation between flow and density, density and speed, speed and flow, can be represented with the help of some curves referred to as the 'fundamental diagram' of traffic flow. Draw this fundamental diagram and clearly explain these relationships. (12 marks)
- (f) The spot speeds of five (5) vehicles at mid-point of a straight stretch of a road are 50, 40, 60, 54 and 45km/hr respectively. Find the time mean speed and space mean speed of the vehicles. (5 marks)

QUESTION THREE

- (a) Explain "queue discipline" and outline the various types of queue disciplines (3 marks)
- (b) Derive the equation for the flow of vehicles in the measurement of traffic volume using 'moving car observer method' and explain all the elements of the formula. (9 marks)
- (c) Name and briefly describe the two types of speed limits commonly used in traffic management. (8 marks)

QUESTION FOUR

- (a) Every law, regulation or operating instruction in traffic control must be communicated through the use of devices / technologies that fall into three broad categories. Explain these categories. (2mks)
- (b) Mention and explain the two categories in which vehicle flow on transportation facilities may be generally classified. (6 marks)
- (c) Define the following terms:
- i. Diverted traffic
 - ii. Converted traffic
 - iii. Induced traffic (3 marks)
- (d) Describe the six basic steps that are recommended in any detailed traffic accident study. (9 mks)

QUESTION FIVE

- (c) i. Explain the term “Level of Service” (LOS) in relation to traffic movement on roads or highways? (2 marks)
- ii. Draw a diagram to show the six levels of service in a road segment and explain each level of service. (7 marks)
- (a) State the two types of traffic delays that could lead to vehicles queuing and explain their causes. (5 marks)
- (b) Outline three (3) driver characteristics which influence his / her behavior on the road when driving. (6 marks)