



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of BUILDING & Civil engineering

UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING

TCV 4428 TRANSPORTATION TECHNOLOGY

SPECIAL / SUPPLEMENTARY EXAMINATION

SERIES: APRIL – MAY 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) Clearly explain how fixed costs and variable costs for rail transport system affect its suitability for transportation. Give examples (8 marks)
- b) Briefly explain the roles played by Tresguet (of France), Telford and Macadam in the evolution of the transport system. (5 marks)
- c) Define the term “transportation system” and, clearly explain with examples, its components (8 marks)
- d) Outline SIX goals and objectives of transport policy plan. (6 marks)
- e) State TWO unique characteristics of pipelines as a system of transportation. (3 marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a) List and explain the steps followed in the preparation of National Level Transport Sector Planning (NLTSP). (12 marks)
- b) Draw the structure and explain the different levels of the hierarchy of Transport Plans in the overall development plan of a country. (8 marks)

QUESTION THREE (20 Marks)

- a) Define Net Present Value (NPV) and explain how it is used in economic evaluation of transport projects (5 marks)
- b) The cost of rehabilitating an existing 40km road is Ksh. 2.5 million per km. Road user, accidents and maintenance costs for a 10-year period after the completion of rehabilitation are given in the table below:

Table for NPV computations

Year (t)	Road user cost		Accidents costs		Maintenance costs		Benefits (Bt)	Bt-Ct	<u>Bt-Ct</u> <u>(1+0.1)^t</u>
	With Impr.	Without impr.	With impr.	Without impr.	With impr.	Without impr.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0	-	-	-	-	-	-			
1	105.5	126.5	1.1	3.1	3.5	2.5			
2	110.3	132.2	1.1	3.1	3.5	2.5			
3	115.8	138.9	1.2	3.5	3.5	2.5			
4	121.6	145.8	1.2	3.7	3.5	2.5			
5	127.6	153.0	1.3	3.8	3.5	2.5			
6	134.0	161.0	1.3	4.0	3.5	2.5			
7	140.7	168.9	1.4	4.0	3.5	2.5			
8	147.8	177.0	1.5	4.4	3.5	3.5			
9	155.1	186.2	1.6	4.7	3.5	2.5			
10	162.9	195.2	1.6	4.9	3.5	2.5			

Assume discount rate of 10% per year. Determine whether the project is justifiable using the NPV method and the benefit cost method. (10 marks)

- c) Effective transportation planning should lead to the development of environmentally sustainable transportation system (E.S.T). i) What is E.S.T? ii) List FIVE main impact elements resulting from effects of traffic on the environment. (5 marks)

QUESTION FOUR (20 Marks)

- a) What are FIXED FACILITIES of the transportation system and, what do they constitute. (10 marks)
- b) What is a “system” and what is “systems analysis”? How are these concepts important in transportation planning? (10 marks)

QUESTION FIVE (20 Marks)

- a) Briefly discuss the following systems of transportation giving examples in each:
- Air transportation
 - Water transportation
 - Land transportation
 - Pipeline transportation (8 marks)
- b) Explain FOUR difficulties that may arise as a result of existence of a number of railway gauges of different measurements, especially within a common market region. (6 marks)
- c) Mention and briefly explain the following O - D study surveys and data collection techniques:
- Household or home surveys
 - Cordon survey
 - Screen-line surveys
 - Travel diary surveys (6 marks)