



TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING & CIVIL ENGINEERING
UNIVERSITY EXAMINATION FOR:
BACHELOR OF TECHNOLOGY IN CIVIL ENGINEERING
TVC 4427: HIGHWAY PAVEMENT DESIGN AND
CONSTRUCTION **PAPER 1**

END OF SEMESTER EXAMINATION

SERIES: APRIL 2025

TIME: 2 HOURS

DATE:

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) 20 Marks

- a) With the aid of a diagram, outline how a bitumen softening point test is done in the laboratory (12 Marks)
- b) A new road is proposed to have a design life of 20 years, average daily number of standard axles of 1,800 with an annual growth rate of 4%. Calculate the cumulative number of standard axles (8 Marks)

ANSWER ANY TWO QUESTIONS FROM THIS SECTION

QUESTION TWO (20 Marks)

- a) Discuss the main purpose of road drainage systems and highlight at least SIX defects caused by Improper Road Drainage (10 Marks).
- b) State at least FIVE advantages and THREE disadvantages of a rigid pavement as compared to a flexible one (8 Marks)
- c) Differentiate between Mechanical and Chemical stabilization (2 Marks).

QUESTION THREE (20 Marks)

- a) With the aid of a diagrammatic representation of the laboratory apparatus, outline how a CBR test is done in the laboratory (13 Marks)
- b) A CBR test on a sample of subgrade yielded the data shown in Table Q3b. Determine the CBR of the subgrade. Refer to Table Q3a for Standard force-penetration relationship (CBR = 100%) (7 Marks)

Table Q3a. Standard force-penetration relationship (CBR = 100%)

Penetration (mm)	Load (kN)
2	11.5
4	17.6
6	22.2
8	26.3
10	30.3
12	33.5

Table Q3b Laboratory CBR results of sample

Penetration (millimetres)	Load (kN)
0.5	1.6
1.0	3.3
1.5	4.9
2.0	6.6
2.5	8.2
3.0	9.3
3.5	10.5
4.0	11.4
4.5	12.2
5.0	13.0

QUESTION FOUR (20 Marks)

With the aid of diagrams illustrate the use of the following rigid pavement joints (20 Marks)

- (i) Contraction joint
- (ii) Expansion joint
- (iii) Warping joint
- (iv) Construction joint

QUESTION FIVE (20 Marks)

With the aid of neat sketches, illustrate the stress and temperature distribution for a flexible pavement under the application of a wheel load. (20 Marks)