MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

FIFTH YEAR SECOND SEMESTER EXAMINATION

BACHELOR OF SCIENCE (CIVIL ENGINEERING)

ECV 517: DESIGN OF BRIDGES

DATE: **TIME:**

INSTRUCTIONS

This paper consists of **FIVE** questions.

i. Attempt QUESTION ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) With clear sketches, clearly discuss five types of reinforced concrete bridges. (10 marks)

b) A consultancy firm has been tasked to provide an optimum point for locating a bridge across a stream. Discuss five requirements that the firm will adhere while locating the bridge. (10 marks)

c) Design a reinforced concrete slab deck which has 6m wide carriageway and the deck spans 34m centre to centre of bearings. The deck should be designed to carry 30 units of HB load in load combination 1.
(10 marks)

QUESTION TWO (20 MARKS)

A bridge super-structure is of reinforced concrete deck type supported on medium span pre-stressed girders. The bridge has three spans, the middle span being 280m, and two end spans at

145m each. The bridge deck total width is 15m in total inclusive of the footway and cycle way on either side. Design the bridge assuming that it is also to carry 30 units of HB loading.

QUESTION THRE (20 MARKS)

a) Discuss the HA and HB loading as applied to bridge engineering design. (10marks)

b) Clearly discuss the five major basic types of inspections that can be performed on a bridge structure. (10 marks)

QUESTION FOUR (20 MARKS)

a) Discuss five duties of the bridge inspection team under the different stages involved. (10 marks)

b) Discuss how preventive maintenance can be achieved in the following reinforced concrete bridge parts:

i) Deck (5 marks)

ii) Expansion joints (5 marks)

QUESTION FIVE (20 MARKS)

Design a reinforced concrete slab deck to suit the following data:

Carriageway = 7.5m wide
Foot paths = 1 m on either side
Clear span = 6m
Wearing coat = 80mm
Width of bearing = 400mm