071906T4AEN

AGRICULTURAL ENGINEERING LEVEL 6

ENG/OS/AGR/CR/04/6 Perform Soil and Water Conservation Activities November/December 2025

TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

WRITTEN ASSESSMENT

Time: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. This paper consists of **TWO** sections: **A** and **B**.
2. Answer **ALL** questions in section A and **ANY THREE** ons in section B.
3. Marks for each question are indicated in the brackets.
4. Candidates are provided with a separate answer booklet
5. Do not write on the question paper.

This paper consists of THREE (3) printed pages

Candidate should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

SECTION A (40 MARKS)

*Attempt **ALL** the questions in this section.*

1. The rate of soil erosion by water is determined by a combination of natural and human-related factors. Outline FOUR factors contributing to soil erosion by water. (4 marks)
2. Erosion is a process involving the detachment, movement, and deposition of soil particles from one point to another. State FOUR physical evidence of soil erosion by water. (4 marks)
3. Soil and water conservation structures are important in agriculture. State FOUR aims of establishing physical structures for soil and water conservation. (4 marks)
4. NEMA's mandate on soil and water conservation is also upheld through other regulations and practices. Outline FOUR roles of NEMA in soil and water conservation. (4 marks)
5. The adoption of water harvesting structures in Kenya is hindered by several factors. State FOUR Socio economic challenges facing the adoption of water harvesting in rural areas in Kenya. (4 marks)
6. Terracing is the construction of embankments or ridges across the slope of land to reduce runoff velocity and control erosion. State FOUR parameters in designing terraces. (4 marks)
7. Water harvesting structures play a vital role in rehabilitating arid and semi-arid lands which is normally dry and degraded. Outline FOUR ways in which water harvesting structures contribute to the rehabilitation of arid and semi-arid lands. (4 marks)
8. The observed annual runoff from a basin of area $600m^2$ is $150m^3$ and the corresponding rainfall over the basin during the same period is 800mm. Calculate the runoff coefficient. (4 Marks)
9. Juma is an expert in soil and water conservation projects in Baringo County, he intends to construct a Fanya juu terrace. List FOUR types of tools and equipment used in soil and water conservation activities. (4 marks)
10. Regulatory bodies involved in soil erosion control and water conservation each has a role in policy-making, research, and on-the-ground implementation. List FOUR regulatory bodies involved in soil erosion control and water conservation. (4 marks)

SECTION B (60 MARKS)

Attempt Any THREE Questions in This Section

11. Soil conservation refers to practices designed to prevent soil erosion and degradation, and to improve soil fertility and health.

    a) Explain THREE soil conservation measures that can be used to reduce the risk of (6 marks)

    b) Explain SEVEN physical factors that influence the rate of runoff on the land (14 marks)

12. Time of concentration is a fundamental concept in hydrology used to estimate peak runoff for a watershed.

    a) Explain TWO components of design that are affected by time of concentration (4 marks)

    b) A 9-hour storm occurred over a catchment area of 600km^2. Rainfall of 8, 2, and 1 occurred in successive 3 hr unit period. Assuming average infiltration rate as 15 mm/m hour. Calculate the run off volume observed. (6 marks)

    c) With the aid of a sketch describe FIVE components of a trapezoidal channel. (10 marks)

13. Selecting and establishing water harvesting structures is a process that depends on a variety of factors, including the intended use of the water.

    a) Explain FIVE factors considered in selection and establishment of water harvesting structures. (10 marks)

    b) Discuss FIVE methods of water harvesting. (10 marks)

14. Soil erodibility is determined by the physical properties of the soil. A soil that is highly erodible is more likely to experience significant soil loss even during a moderate rainstorm.

    a) Define the following terminologies. (2 marks)

        i. Rainfall erodibility:

        e of concentration:

    b) Explain FOUR rainfall characteristics that determine the erosive power. (8 marks)

    c) Explain FIVE types of water erosion processes (10 marks)