



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

**UNIVERSITY EXAMINATION FOR THE DEGREE IN SCIENCE IN CONSTRUCTION
MANAGEMENT**

2ND YEAR 1ST SEMESTER 2023/2024 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TCB 1201

COURSE TITLE: SOIL MECHANICS

EXAM VENUE:

STREAM: BSc. CONSTRUCTION MGT

DATE: /12/2023

EXAM SESSION:

DURATION: 2 HOURS

Instructions

- 1. Answer question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE (30 Marks)

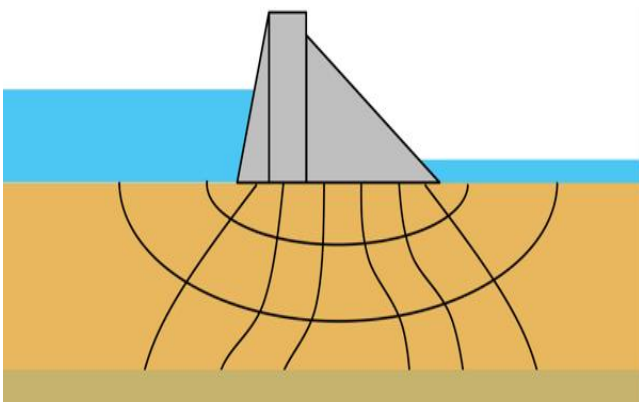
- a. The term "soil" can have different meanings, depending upon the field in which it is considered. Give different meaning as Engineer's, Geologist and pedologist point of view? (5 Marks).
- b. Atterberg limits are based on the concept that a fine-grained soil can exist in any four states depending on its water content. Name and briefly describe FOUR of these Consistency Limits? (9 Marks).
- c. The following properties of soil are taken into consideration while dealing with soil as a construction material. (5 Marks)
 - Cohesion (1 Mark)
 - Angle of internal friction (1 Mark)
 - Capillarity (1 Mark)
 - Permeability (1 Mark)
 - Elasticity (1 Mark)
 - Compressibility (1 Mark)

Briefly explain each of the above properties? (5 Marks)

- d. The amount by which the ground can shrink and/or swell is determined by various factors. List THREE? (4 Marks).
- e. Briefly describe Sieve and Hydrometer Grain Size Analysis? (7 Marks).

QUESTION TWO (20 Marks)

- a. Classification systems are used to group soils according to their order of performance under given set of physical conditions. Soil may be broadly classified into FOUR. Name and describe these classifications? (8 Marks).
- b. A weir is resting on a fine sand soil of permeability 2×10^{-5} m/s. the water level on the upstream of weir is 6.5m and that on the downstream is 0.7m. Determine the amount of seepage per meter through the base of the weir per day. (3 Marks).



- (c) List and describe THREE stages in the consolidation of soil? (6 Marks).
- (d) The compressibility characteristics of a soil mass might be due to any or a combination of various factors. Name THREE? (3 Marks).

QUESTION THREE (20 Marks)

- (a) In general, there are two major categories into which the classification systems can be grouped. Briefly name and describe the TWO? (6 Marks).
- (b) The process, involving a gradual compression occurring simultaneously with a flow of water out of the mass and with a gradual transfer of the applied pressure from the pore water to the mineral skeleton is called Consolidation. Consolidation may be due to different factors. Name FOUR of these factors? (4 Marks).
- (c) Define Shear Strength of soil and its significance? (4 Marks).
- (d) Explain the capillary action on sand phenomenon below? (6 Marks).



QUESTION FOUR (20 Marks)

- (a) Name FOUR tests applied for carrying out Bearing Capacity of soil and describe ONE of the FOUR tests? (5 Marks).
- (b) List FIVE stabilization techniques using different types admixtures and describe ONE of these techniques? (6 Marks).
- (c) List FIVE design objectives required for carrying out site investigations prior project design? (5 Marks).
- (d) A multi-layered drain system that consists of graded of both fine and coarse materials is adopted in the earth dam in order to prevent the seepage of fine materials from the embankment. Various kinds of drains which commonly used in earth dams. List and describe TWO? (4 Marks).

END