

The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Civil Engineering



Study Programme	: Bachelor of Science Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: CVX4344 Engineering Geology
Academic Year	: 2024/2025
Date	: 10 th March 2026
Time	: 0930-12.30 hrs
Duration	: 3 hours

General Instructions

1. Read all instructions carefully before answering the questions.
 2. This question paper consists of **Eight (8)** questions in **Three (3)** pages.
 3. Answer any **Five (5)** questions only.
 4. All questions carry equal marks.
 5. Answer for each question should commence on a new page.
 6. This is a Closed Book Test (CBT).
 7. Relevant tables / codes (if necessary) are provided in the last page of the exam paper.
 8. Answers should be in clear handwriting.
 9. Do not use Red colour pens.
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- (01)** Mineralogical characteristics significantly influence soil and rock behaviour, thereby affecting foundation strength, compressibility, durability, and overall performance.
- (i) Define what a Mineral is. **(04 marks)**
 - (ii) State three (03) methods used for mineral identification. **(03 marks)**
 - (iii) Describe the term lustre of a mineral with appropriate examples. **(04 marks)**
 - (iv) Classify minerals in detail and provide at least three (03) examples for each category **(09 marks)**
- (02)** Plate tectonics involves the movement of lithospheric plates, while oscillatory crustal movements are cyclic displacements caused by tectonic forces and seismic activity, leading to crustal deformation and stress redistribution.
- (i) Explain Wegener's theory of Plate tectonics and its limitations. **(05 marks)**
 - (ii) Describe divergent plate boundaries with examples. **(05 marks)**
 - (iii) Define orogenic and epeirogenic movements in the earth crust. **(04 marks)**
 - (iv) Briefly describe the occurrence and origin of volcanoes. **(06 marks)**
- (03)** The attitude of a rock strata or a geological feature describes its spatial orientation in three-dimensional space, which controls its geometric relationship with the surrounding ground and influences its structural behaviour and engineering performance.
- (i) List four (04) main parameters defining the orientation of a bedding plane. **(06 marks)**
 - (ii) Define geological folds and explain how they are formed. **(04 marks)**
 - (iii) Describe the structural elements of folds with neat, labelled illustrations. **(05 marks)**
 - (iv) Explain Anticlines and Synclines, and describe how these two types of folds are related to Domes and Basins. **(05 marks)**
- (04)** Write short notes on the following:
- (i) Position of the Earth in the solar system and its contribution to life existence **(04 marks)**
 - (ii) Mantle of the Earth **(04 marks)**
 - (iii) Plutonic Igneous Rocks **(04 marks)**
 - (iv) Perched Water Table **(04 marks)**
 - (v) Rock Quality Designation **(04 marks)**

(05) Weathering of rocks involves the progressive physical disintegration and chemical alteration of rock material due to environmental factors, leading to changes in strength, stiffness, durability, and overall engineering behaviour.

(i) Classify the various types of weathering with detailed explanations. **(06 marks)**

(ii) Briefly describe the process of Mechanical Weathering. **(06 marks)**

(iii) List five (05) factors that govern the soil formation process. **(05 marks)**

(iv) Describe “Exfoliation” in the context of rock weathering. **(03 marks)**

(06) Hydrogeology is essential in groundwater prospecting as it helps identify and evaluate aquifers based on subsurface geology and groundwater flow characteristics.

(i) List four (04) ways in which the groundwater table is recharged. **(05 marks)**

(ii) Differentiate between Effluent and Influent Streams. **(04 marks)**

(iii) Briefly describe the Coastal Sand Aquifers found in Sri Lanka. **(05 marks)**

(iv) Briefly describe geological Lineaments and discuss their role in the occurrence of groundwater in Crystalline Rocks of Sri Lanka. **(06 marks)**

(07) Subsurface exploration is essential in foundation design as it provides critical information on soil and rock stratigraphy, engineering properties, and groundwater conditions, enabling accurate assessment of bearing capacity, settlement behaviour, and overall foundation performance.

(i) Describe in detail on the following subsurface exploration techniques.

(a) Excavation Methods of Advance. **(06 marks)**

(b) Continuous Sample Methods of Advance **(04 marks)**

(ii) Identify five (05) factors to consider when selecting a Boring Method. **(05 marks)**

(iii) List five (05) ways a soil sample can become disturbed. **(05 marks)**

(08) In-situ test results are essential in foundation design as they provide direct and representative measurements of subsurface conditions, enabling accurate evaluation of soil strength, stiffness, and deformation characteristics for safe and reliable engineering performance.

(i) Briefly describe on following in-situ tests and their applications in foundation engineering.

(a) Standard Penetration Test (SPT) . **(06 marks)**

(b) Field Vane Shear Test (FVST) **(06 marks)**

(ii) List four (04) factors to consider when preparing an investigation plan for a general infrastructure development project. **(04 marks)**

(iii) The depth of exploration is determined by the “depth of the zone of influence” of the structure. List four (04) factors that govern the depth of the zone of influence. **(04 marks)**