

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
<b>Course Code and Title</b>	<b>: CVX4344 Engineering Geology</b>
Academic Year	: 2023/2024
Date	: 17 <sup>th</sup> March 2025
Time	: 0930-12.30 hrs
Duration	: <b>3 hours</b>

### 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. All questions carry equal marks.
  4. Answer for each question should commence from a new page.
  5. Relevant charts/ codes are provided.
  6. This is a Closed Book Test (CBT).
  7. Answers should be in clear hand writing.
  8. Do not use Red colour pens.
-

**Q1.** As Civil Engineers, it is imperative to have an understanding on the origin of the Earth and its internal structure.

(a) Briefly explain how Earth's motion, atmosphere, and position in the solar system have contributed to the existence of life on Earth. (05 Marks)

(b) Provide a brief description of the "Planetesimal Hypothesis" in the formation of the solar system.

(05 marks)

(c) Provide a brief explanation of the most widely accepted theory on the formation of the solar system and compare it with other existing theories to support your answer. (10 marks)

**Q2.** Rocks are neither created nor destroyed but are redistributed and transformed from one rock type to another.

(a) Briefly explain the above statement with appropriate diagrams. (05 marks)

(b) Classify Igneous rocks in detail based on their texture and silica content. (10 marks)

(c) List and briefly describe the components of a Clastic Sedimentary rock. (05 marks)

**Q3.** Write short notes on the following:

(a) Types of Neosilicate minerals (4 marks)

(b) Fold Mountains (4 marks)

(c) Unconformities (4 marks)

(d) Mechanical weathering of rocks (4 marks)

(e) River bed erosion (4 marks)

**Q4.** Mineralogical composition and its distribution govern the engineering properties of a particular rock.

(a) Provide a brief explanation of the above statement. (05 marks)

(b) List five (5) factors that reduce the strength of a mineral. (05 marks)

(c) Explain how the mineralogical composition affects the weathering resistance of rocks. (10 marks)

**Q5.** Rivers and streams cause erosion, transportation and deposition of sediments.

- (a) List and define three (03) main sediment transportation mechanisms in rivers. (06 marks)
- (b) Briefly describe the formation of three (03) main depositional features with appropriate sketches. (08 marks)
- (c) Write a short account on Dune formation in Sri Lanka. (06 marks)

**Q6.** The geological background of Sri Lanka has evolved through a progressive process, beginning with geomorphological concepts and advancing to more detailed mineralogical and petrological studies.

- (a) Briefly explain the above statement with appropriate sketches. (10 marks)
- (b) Explain the basement geology of Sri Lanka with appropriate sketches. (10 marks)

**Q7.** The geology of a region determines the presence and distribution of groundwater in that area.

- (a) Define the following geological occurrences:
  - i. Aquifer (02 marks)
  - ii. Aquiclude (02 marks)
  - iii. Aquiclude (02 marks)
  - iv. Aquifuge (02 marks)
- (b) A well renowned shallow sedimentary rock aquifer is located in Jaffna Peninsula of Sri Lanka.
  - i. List the key features of this aquifer (03 marks)
  - ii. Identify the current challenges faced by this aquifer (03 marks)
- (c) Provide a brief description on the regolith aquifers found in Sri Lanka. (06 marks)

**Q8.** Suppose you are appointed as the Geotechnical Engineer for an Engineering Geological Investigation programme.

- (a) List four (04) factors that should be considered when determining the depth of exploration. (04 marks)

In your investigation programme, a borehole was drilled at the site and extended 3.00 m into the bedrock. Table 01 presents the lengths of intact rock core samples recovered in the core barrel.

**Table 01: Length of the Rock Core samples recovered after drilling 3.00 m into the bedrock**

Sample Number	Length of the Samples Recovered (cm)
1	05
2	08
3	14
4	12
5	32
6	06
7	46
8	82
9	15
10	04

- (b). Based on the data given in Table 01, calculate the;

- (i) Core Recovery (CR) of the Core-run (05 marks)  
(ii) Rock Quality Designation (RQD) of the Core-run (05 marks)
- (c) Provide a brief description of the Standard Penetration Test (SPT), which is widely used in this type of investigation programme. (06 marks)