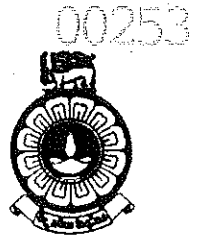


The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Civil Engineering



Study Programme	: Bachelor of Technology Honours in Engineering
Name of the Examination	: Final Examination
Course Code and Title	: CVX4344 Engineering Geology
Academic Year	: 2020/2021
Date	: 05 th February 2022
Time	: 1400-1700 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. All questions carry equal marks.
 4. Answer for each question should commence from a new page.
 5. This is a Closed Book Test (CBT).
 6. Answers should be in clear hand written.
 7. Do not use red colour pen.
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Q1. Textural features of a rock are a major factor in determining the mechanical behaviour during the load applications.

(a). State the basic textural features of the following rock types;

- (i) Igneous rocks (3 marks)
- (ii) Sedimentary rocks (3 marks)
- (iii) Metamorphic rocks (3 marks)

(b). Discuss the possible impacts of above-mentioned textural features on the *deformation behaviour* of rocks under the following loading conditions in the given rocks.

- (i) Telecommunication Tower Foundation on a Limestone rock (6 marks)
- (ii) Bridge Pier founded on a sloping Biotite Gneiss rock abutment (5 marks)

Q2. Plate tectonics has become a highlighted topic in many professional forums due to the occurrence of recent earth tremors in Sri Lanka.

- (a). Briefly describe the plate tectonic theory with evidences to support the theory. (7 marks)
- (b). What are Divergent Boundaries of the Earth's Crust? (5 marks)
- (c). Explain the Convergent Boundaries of the Earth's Crust (8 marks)

Q3. Write short notes on the following:

- (a). Folds (4 marks)
- (b). Body Waves to discover the interior of the Earth (4 marks)
- (c). Geological Time Scale (4 marks)
- (d). Physical identification of Minerals (4 marks)
- (e). Silicate Minerals (4 marks)

Q4. A comprehensive and accurate Knowledge on river erosion process is essential in finding engineering solutions to present day river bank erosion problems.

- (a). Briefly describe the process of river bed erosion. (6 marks)
- (b). Explain how different rock textures and structures affect the arrangement of the tributary streams of a river (10 marks)
- (c). Describe four (04) counter measures against surface erosion of river banks. (04 marks)

Q5. The factors such as rock texture, structure, weathering and erosion alter the groundwater potential of a particular rock mass.

- (a) Discuss on the impacts of weathering on rock texture and structure. (8 marks)
- (b) Explain how the rock texture and structure facilitate the occurrence of groundwater in the three (03) major rock types. (7 marks)
- (c) Briefly describe how the groundwater potential of a particular rock could be enhanced or diminished due to the impacts of weathering (5 marks).

Q6. A sound background knowledge on local geology is essential to be a successful geotechnical/ groundwater engineer.

- (a). Briefly describe the Adam's Three Peneplains Theory on Sri Lankan morphology. (5 marks)
- (b). Explain in detail the basement geology of Sri Lanka. (7 marks)
- (c). Discuss the relationship between the basement geology and the distribution of the crystalline aquifers in Sri Lanka (8 marks)

Q7. Adopting the most appropriate sampling technique/s is crucial during a geotechnical investigation programme.

- (a). Discuss about the different categories of soil sampling techniques and the laboratory applications of the same. (6 marks)
- (b). Tabulate *different types of soil samplers* against their most appropriate application on *different types of soils* encounter in the field. (8 marks)
- (c). Briefly discuss about the *different rock sampling mechanisms* used in geotechnical investigations and their specific applications based on the *conditions of the rock*. (6 marks)

Q8. Effective planning of geotechnical investigation programme is essential to obtain accurate and sufficient geotechnical parameters within the budgetary limits.

- (a). List the activities that will need to be performed during the preliminary and detailed stages of a geotechnical investigation programme. (5 marks)
- (b). Briefly discuss how the appropriate use of different geotechnical investigation techniques can minimise the work listed under activities mentioned in (Q8(a)) (10 marks)
- (c). Explain the possible cost impacts of the above-mentioned strategies in (Q8(b)) and their impact on the accuracy of the obtained geotechnical data. (5 marks)