00253

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	: 05th 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.

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)