THE OPEN UNIVERSITY OF SRI LANKA

00103

Bachelor of Technology (Civil) - Level 5

CEX5232 – Engineering Geology

Final Examination -2010

Date: 02-03-2010 (Tuesday) Time Allowed: Three(03) hours

Answer Five (05) questions out of Eight (08) questions.
Answers should be illustrated with sketches and diagrams with assumptions stated, clearly and neatly

(Q1) Substantial level of understanding about the Earth Structure and its Rock forming Minerals is very important for Civil Engineers.

(i) Explain what is meant by 'Geological Time Scale' and its basis.
(ii) Classify the Minerals according to silicate and non-silicate minerals with at least one (01) example for each category.
(iii) Briefly explain about two (02) types of clay minerals presently used in the Industry.

(Q2) The physical and mechanical characteristics of rocks are greatly dependent on the formation conditions of rocks.

(i) Explain the rock forming cycle with a labeled –neatly sketched diagram
(ii) Classify the Igneous rocks according to the acidity and the grain size.
(iii) Classify the Igneous rocks according to the formation conditions
(iv) Briefly explain what is meant by Texture of Igneous Rocks

(Q3) (i) Explain the process of forming Sedimentary rocks
(ii) Classify the Sedimentary rocks giving at least two(02) examples for each category.
(iii) In a neatly drawn map of Sri Lanka, locate the places where you can find above mentioned sedimentary rocks (at least one(01) type from each category should be mentioned).

(Q4) (i) With an associated diagram explain the terms of an earthquake,
(a) Epicenter (b) Focus (c) Anticentre
(ii) What are the types of earthquake and causes associated with.
(iii) Briefly explain the terms, (a) P-Waves (Primary Waves) (b) S-Waves (Secondary Waves) (c) L-Waves(Long Waves) .

(Q5) (i) Explain how you could measure the magnitude of an earthquake.
(ii) What are the evident that can be used to support the 'Continental Drift Hypothesis'.
(iii) Briefly explain your idea about the possibility of occurring an earthquake around Sri Lanka.

(Q6) Write short Accounts on following,
(i) Phreatic Surface
(ii) Perched Water Table
(iii) Aquiclude
(iv) Effluent Stream
(v) Transmissibility

(Q7) (i) Write down the assumptions that are made in rock slope analysis of Plane type failures.

(ii) A slope is having height of 90m with a face angle of 50^0 found to have a bedding plane running through it at a dip angle of 30^0. A tension crack occurs on the of the crest of the slope and from an accurately drawn cross section of the slope, the tension crack is found to have a depth of 50m. The unit weight of material in the rock slope (γ_b) = 24.30 Mg/m^3 and the shear strength parameters of the bedding plane as Angle of internal friction; $\phi = 32^0$ and cohesion/adhesion; c= 100 kN/m^2 . If the tension crack is totally filled with water, determine the factor of safety of the particular slope using classical plane failure analysis techniques and comment on the stability of the slope at this position. You may assume that the unit weight of water ; $\gamma_w = 9.18$ Mg/m^3.

(Q8) (i) Briefly explain the meaning of a Swamp and a Marshy Land.

(ii) Name and explain Four (04) conditions that facilitate the development of Karsts.

(iii) Identify an area in Sri Lanka, that shows similar characteristics to a Karstic conditions and recommend suitable remedial measures that should be adopted in carrying out construction in these types of areas.