THE OPEN UNIVERSITY OF SRI LANKA

00136

Bachelor of Technology (Civil) - Level 5

CEX5232 – Engineering Geology

Final Examination –2013

Date: 23-07-2013 (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) Thorough knowledge in minerals is essential for civil engineers in the assessment of engineering properties of rocks.

(i) Classify different groups of minerals **in detail.** *(10marks)*

(ii) Write down at least **one (01)** example for **each** mineral group mentioned in ***Question (Q1) (i)*** *(08 marks)*

(iii) Write down **two (02)** common occurrences of commercially available clay minerals that are mined for ceramic ware production in Sri Lanka *(02 marks)*

(Q2) Foundation design and construction is very complex in sedimentary rocks due their inherent complex nature of formation.

(i) Briefly explain the main stages of formation of sedimentary rocks. *(08 marks)*

(ii) What is meant by **clastic** sedimentary rocks and **chemical** sedimentary rocks? *(08 marks)*

(iii) Write down at least **two (02)** examples for **each** type mentioned in ***Question (Q2) (ii)***. *(04 marks)*

(Q3) Geologic structural features play an important role in the assessment of rock mass characteristics.

(i) What is meant by a **fold** and briefly **describe** the following geometrical features of a **fold** with neatly sketched diagrams.
(a) Limbs (b) Axial plane (c) Axis of the fold (d) Plunge of the fold
(e) Crest and trough *(12 marks)*

(ii) Briefly explain the following features related to **folds** with neatly sketched diagrams.
(a) Anticline fold *(02 marks)*
(b) Syncline fold *(02 marks)*
(c) Dome *(02 marks)*
(d) Basin *(02 marks)*

(Q4) (i) State **four (04)** major aspects that can be obtained from a geological map. *(08 marks)*

(ii) Draw the **standard symbols** used in geological mapping for following features with neat sketches.

(a) Fill area *(02 marks)*
(b) Clay layer *(02 marks)*
(c) Limestone bedrock *(02 marks)*
(d) Granite bedrock *(02 marks)*
(e) Schist type bedrock *(02 marks)*
(f) Strike and dip of a bedding plane *(02 marks)*

(Q5) Understanding the behavior of groundwater flow is necessary when designing dewatering systems and tube wells.

(i) Explain about **four (04)** types of hydro-geological boundaries **with neat sketches** *(08 marks)*

(ii) Write a brief **account** on aquifers in sedimentary rocks. *(08 marks)*

(iii) What is meant by;
(a) Effluent stream
(b) Influent stream *(04 marks)*

(Q6) Application of mitigatory measures at initial stages is a prime need to avoid landslide disasters.

(i) State **four (04)** types of landslides *(04 marks)*

(ii) Identify **four (04)** factors that favor landslides. *(04 marks)*

(iii) Briefly explain about **four (04)** mitigatory measures that can be used in mitigating landslides. *(12 marks)*

(Q7) (i) Write down **five (05)** important factors that should be evaluated during the investigations and design stages of **Dam** construction. *(10 marks)*

(ii) How do you address following aspects in a detailed geotechnical investigation program for **Bridge** construction.
(a) Positions of exploratory drill holes
(b) Depth of exploration
(c) Field in-situ tests
(d) Laboratory tests *(10 marks)*

(Q8) The planning of any subsurface investigation method depends on the purpose and the economy.

(i) Briefly describe **one (01)** geophysical investigation method. *(08 marks)*

(ii) Classify the **"drive samplers"** used in **soil** sampling in geotechnical investigations. *(08 marks)*

(iii) State **four (04)** methods used to stabilize the boreholes during site investigation process. *(12 marks)*