CEX 5232 - Engineering Geology

FINAL EXAMINATION - 2007

Time Allowed: Three (03) Hours

Date: 2008 - 04 - 25 (Friday)   Time: 1300 - 1600 hrs.

Answer Five (05) out of Eight (08) questions.
Answers should be illustrated with sketch maps and diagrams where appropriate.

Q1.

(i.) Give a general view of the internal structure of the Earth as revealed by seismological evidences.

(05 marks)

(ii.) Briefly describe the different methods that have been used for determining the age of the Earth.

(05 marks)

(iii.) *'Earthquakes occur frequently at or near plate margins'*. Comment on the statement using your knowledge on the plate tectonics.

(05 marks)

(iv.) Write an account on the hypotheses regarding the origin of the solar system.   (05 marks)

Q2. The groundwater investigations are extremely difficult in crystalline terrains like Sri Lanka.

(i.) Design the field methods that you would follow during the groundwater investigations in Sri Lankan highlands.

(7.5 marks)

(ii.) Describe the electrical resistivity method that you use to investigate groundwater?   (7.5 marks)

(iii.) *'Sandstones are best aquifers whereas clay beds are good aquicludes'*. Discuss the statement with respect to groundwater storage.

(05 marks)

Q3. Differentiate between the following.

(i.) Confined and unconfined aquifers   (05 marks)
(ii.) Crystalline rocks and non-crystalline rocks   (05 marks)
(iii.) Active and passive geophysical methods   (05 marks)
(iv.) Igneous rocks and metamorphic rocks   (05 marks)

Q4. For many engineering purposes a solid and as near as possible continuous rock core is required. The consistency of rock core obtained from drilling purposes is given below for a run of 150cm. The length of core pieces are in cm: 6, 3, 20, 12, 10, 17, 13, 4, 8, 15, 9.

(i.) Compute core recovery and Rock Quality Designation (RQD).   (05 marks)

(ii.) Describe how RQD expressed in percentage could be used to assess the quality of the rock mass.

(05 marks)

(iii.) Describe the method of core drilling operation, which will provide you the above results. (05 marks)

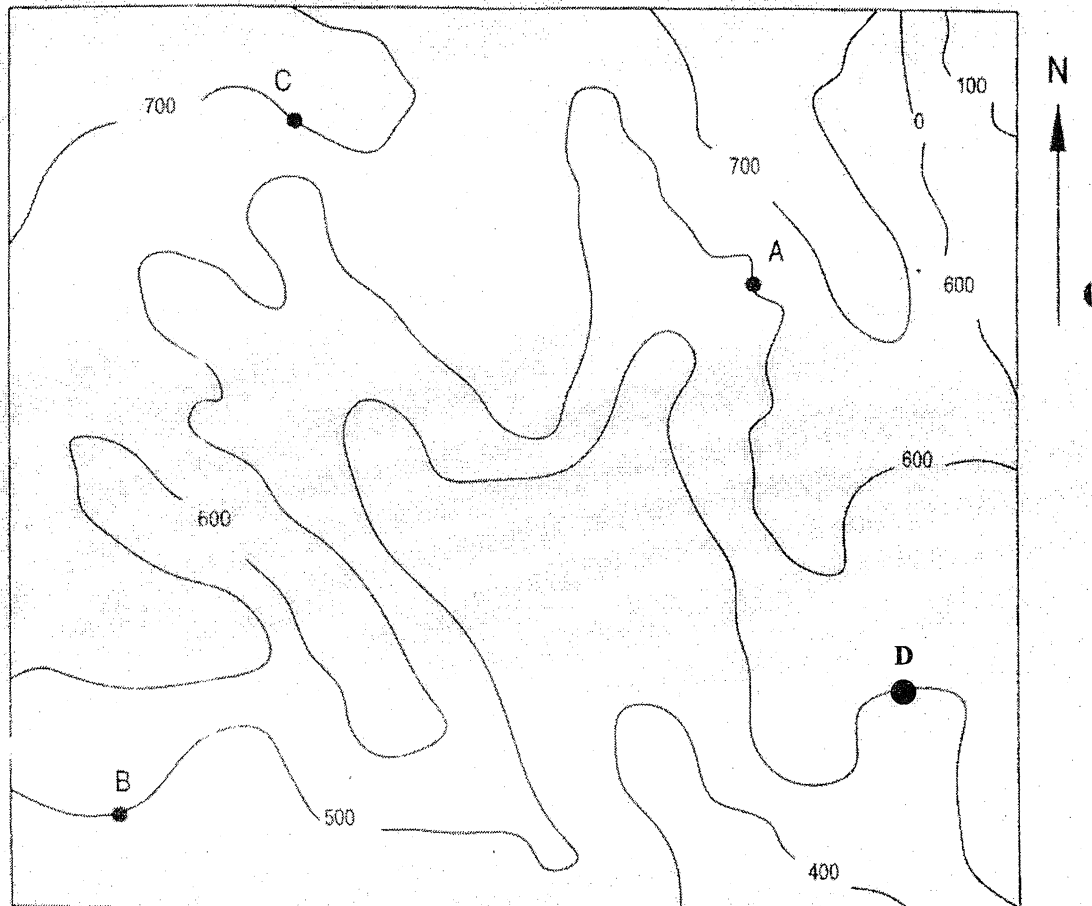(iv.) List the methods that could be used to stabilize boreholes.   (05 marks)

Q5. The government of Sri Lanka designed a series of hydropower and irrigation projects under Mahaweli Development Project.

(i.) List and classify the hydropower/irrigation projects in the entire catchment of river Mahaweli.

(05 marks)

(ii.) What factors would you considers when you design the dam site, reservoir and power plant?

(7.5 marks)

(iii.) Write a short note on possibility of reservoir leakage problems encountered in Sri Lanka?

(7.5 marks)

Q6. The government has decided to construct a five-storied building in an adjacent land of the Muthurajawela marshy area. Assume that you are entrusted to carryout the geotechnical investigations by the consultant.

(i.) State the objectives of detail engineering geological investigations.

(05 marks)

(ii.) Considering the given site is underlain by the top layer of peaty soil and lower layer is a faintly weathered bed rock, which is lie above the hard bed rock, give a brief site investigation programme.

(7.5 marks)

(iii.) Describe a suitable method of in-situ testing to design a safe foundation for the above building.

(7.5 marks)

Q7. A particular location in a landslide prone area is to be investigated for possible threat to a village. The area concerned has experienced landslides during prolonged periods of rainfall.

(i.) Describe the different types of landslides occur in Sri Lanka (05 marks)

(ii.) Explain how water contributes to the slope failures. (05 marks)

(iii.) State other factors that may contribute towards such slope failures. (05 marks)

(iv.) List out the signs of possible future landslides you may observe during such survey. (05 marks)

Q8. Shafts are sunk at A, B, and C to a coal seam. At a point A coal seam is 200m from the surface and at point B & C 300m and 400m from the surface respectively (refer Fig 1).

(i.) Draw a schematic cross section perpendicular to AB line showing the coal seam. (05 marks)

(ii.) Find the dip angle, direction of dip and strike of the coal seam (7.5 marks)

(iii.) At what depth would the coal seam be found if a shaft was sunk at point D. (7.5 marks)

This page should be detached from the question paper and attached to the answer script, if you answer Q8.

Figure 1

Please attach this to your answer script.

fig . 1

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