McGill University

Department of Geography

GEOG 305 – Soils & Environment

1½ hours. Answer three (3) questions. **Marks will be given for concise, lucid and well-organized answers.**

1. What are the important components of the cycling of nutrients between vegetation and soils? Compare and contrast the cycling of three nutrients (for example, N, P and Ca or K) under undisturbed and perturbed systems, such as agriculture, fire or forest harvesting.

2. You have been employed to assess the potential of soils of a landscape in Africa (or Asia or South America) to support agriculture. What properties of the soil are important to soil fertility for agriculture and what recommendations would you make for their assessment in this landscape?

3. When nitrogen and phosphorus fertilisers are applied to soils with agricultural crops, what happens to them and how do the properties of the soil affect the fate of the added N and P? What can a farmer do to increase the efficiency of N and P fertilisation and reduce environmental pollution?

4. Soil structure is the spatial organization of solid, liquid and gas phases in the soil and thus plays a critical role in the exchange of water, gases and nutrients. What properties lead to the development and preservation of soil structure and what are the problems of and solutions to soil structure in intensive, agricultural systems?

5. What roles does the clay sized fraction play in soils? For two different clay minerals, describe how the properties and management of the soils dominated by these clay minerals would differ.

6. 'Much of soil science is based on a series of empirical measurements that have no absolute meaning.' Discuss this, by referring to three important soil properties and the way in which they are measured.

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