FACULTY OF AGRICULTURE - UNIVERSITY OF RUHUNA

THIRD EXAMINATION IN B. Sc. Agricultural Resource Management & Technology / B. Sc. Agribusiness Management (PART I) – November 2019

SS3101 Land Resource Management **Time: 03 Hours**

Answer **05 (FIVE)** questions only

Each question carries a total mark of 100

1. I. a) What is meant by land use? *(5 marks)*

b) State **five** major uses of land. *(10 marks)*

c) Differentiate the terms 'land use planning' and 'land suitability evaluation'. (15 marks)

II. a) What is meant by soil spatial variability? *(5 marks)*

b) Give examples for small, medium and large-scale variability of the soil. *(20 marks)*

c) State the **five** steps involved in mapping the soil of a given area. (*20 marks)*

d) List modern technologies used for soil investigations and mapping. *(10 marks)*

e) What are the main steps involved in a soil survey? *(15 marks)*

2. I. a) What do you mean by potential acid sulfate soils (PASS)? (*10 marks*)

b) Describe the formation of saline seeps only using a labeled diagram. (*15 marks*)

c) Write an equation for Sodium Adsorption Ratio (SAR)? (*15 marks*)

II. a) Name **five** liming materials that can be used to ameliorate an acidic soil. (*15 marks*)

b) A 10 ha field of eggplant has shown a soil acidic problem. To ameliorate the soil with a liming material, the following information is given:

Cation Exchange Capacity (CEC) of the prevailing soil is 12 $cmol_c/kg$

prevailing percentage base saturation (% BS) is 40.
bulk density of the soil is $1.8Mg/m^3$
root zone depth is 15cm.
prevailing % BS should be increased up to 70%

liming material is burnt lime (CaO)

i) Calculate the mass of soil in the given field. (*15 marks*)
ii) Assuming that the purity of CaO is 80%, calculate the amount of CaO needed (in kilograms) to achieve the required base saturation level. (*30 marks*)
Note: The molecular weight of CaO is 56.

3. I. a) What is meant by soil erosion? *(5 marks)*

b) Name **three** important factors causing erosion. *(10 marks)*

c) State **three** examples for each factor you mentioned in above I (b). *(15 marks)*

d) Explain briefly the difference between erosion and weathering. *(10 marks)*

II. a) Explain briefly how water erosion of soil occurs. *(10 marks)*

b) Explain briefly the following processes:
i) Shoreline erosion. *(10 marks)*
ii) Stream bank erosion. *(10 marks)*

c) State the Universal Soil Loss Equation and name the basic factors used in the equation. *(10 marks)*

d) The average annual soil loss in a forest land was estimated as 3.45 tons/acre/year. The government has decided to clear that land and then use for cultivation of corn. Considering the crop factor (C) of forested area is 0.01 and in an area with corn at full canopy is 0.25, calculate the average annual soil losses;

i) When the area is fully cleared of tree cover to be a bare land. *(10 marks)*
ii) When the area is covered with corn at full canopy. *(10 marks)*

4. I. a) What is meant by 'erosion control'? *(10 marks)*

b) Explain briefly the following terms that are used in erosion control:
i) Buffer strip *(10 marks)*

ii) Strip farming *(10 marks)*
iii) Reforestation *(10 marks)*
iv) Cover crop *(10 marks)*
v) Zero tillage *(10 marks)*

II. a) Explain water quality problems caused by soil erosion. *(10 marks)*

b) Explain why soil and water conservation is important. *(10 marks)*

c) Explain the impacts of silting and sedimentation of reservoirs. *(10 marks)*

d) Explain briefly an additional advantage of using cover methods for erosion control, considering the agricultural perspective. *(10 marks)*

5. I. a) How do you define land degradation? *(10 marks)*

b) State the main causes of land degradation. *(20 marks)*

c) Out of the list given above (b) and in your view, what is the most severe cause of land degradation in Sri Lanka? *(10 marks)*

II. a) Explain briefly the processes involved in physical degradation of land. *(20 marks)*

b) Differentiate on-site and off-site impacts of land degradation. *(20 marks)*

c) Explain briefly an off-site impact of land degradation using a Sri Lankan example. *(20 marks)*

6. I. a) What is meant by sustainable land management? *(10 marks)*

b) State the principles for sustainable land management in farming systems. *(25 marks)*

c) What are the new technologies/options that could be used in sustainable land management? *(25 marks)*

II. a) Define ecosystem services. *(10 marks)*

b) State the types of ecosystem services generated by sustainable land management. *(30 marks)*