BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

AGC 227

Department of Crop Science
BSc Agricultural Science (Hons) Part II Examination
Soil Fertility Management

3 HOURS (100 Marks)

INSTRUCTIONS

Answer any ***FOUR*** questions. Each question carries 25 marks.

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1. (a) Explain the factors that affect the nitrification process. **[5 marks]**

   (b) Describe how nitrogen can be lost from the soil. **[5 marks]**

   (c) Suggest ways of enhancing biological nitrogen fixation. **[15 marks]**

2 Various soil microbes play a fundamental role in soil fertility and plant nutrition. Discuss. **[25 marks]**

3 Some of the consequences of poor soil fertility management are :

(i) sodicity (ii) eutrophication (iii) soil compaction
(iv) nutrient mining (v) global warming

(a) Define each of the above terms and explain why it is a problem. **[10 marks]**

(b) Describe how crop and soil management practices bring about each of the problems stated above. **[10 marks]**

(c) Recommend practical management steps for reducing each of the negative consequences highlighted above, whilst maintaining high production. **[5 marks]**

4 Examine any five factors affecting availability and retention of Phosphorus in soil. **[25 marks]**

5 Write notes on how the following management regimes can influence the short term nutrient cycling on a smallholder farm:

i) burning of plant residues, **[5 marks]**

ii) application of ammonium nitrate, **[5 marks]**

iii) cattle manure application, **[5 marks]**

iv) application of termitaria soil. **[5 marks]**

v) application of biochar **[5 marks]**

6 (a) Define soil pH **[2 marks]**

(b) Write notes on any four possible sources of soil acidity. **[8 marks]**

(c) You want to establish a hectare plot of potatoes on a sandy loam soil of pH 5.0. However, the soil pH of the upper 25 cm has to be raised to 5.5. Calculate the lime requirement [2.5 cmol of lime/kg soil is required to change soil pH by 1.0; the $CaCO_3$ has an equivalence value of 90%; Bulk density = 1500 Kg/m^3]. **[15 marks]**

END OF PAPER