FIJI NATIONAL UNIVERSITY

COLLEGE OF AGRICULTURE, FISHRIES AND FORESTRY (CAFF)

Department of Soil Science & Agricultural Engineering

School of Agricultural Sciences

Bachelors of Science in Forestry–Year I

FINAL EXAMINATION: 2017

Trimester II, 2017

SAC 504 -CHEMISTRY AND FERTILITY OF FOREST SOILS

TOTAL MARKS: 100 **TIME DURATION: 3:00 HOURS**

INSTRUCTIONS TO STUDENTS

1. This paper consists of six (6) pages. Please check to see that your paper is complete.
2. You are allowed 10 minutes extra reading time in which you are NOT permitted to write.
3. Attach all the sheets used as your answer paper in their correct sequence and secure with a string.
4. Use both sides of the answer sheet and write your candidate number on each sheet.
5. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
6. Candidates are not allowed to carry any textual material, printed or written material, bits of papers, inside the Examination Room/Hall

"MOBILE PHONES ARE STRICTLY NOT ALLOWED"

SECTION NO.	TYPE OF QUESTIONS	TOTAL MARKS
A	PART1: TRUE OR FALSE	40
	PART2: MATCHING	
	PART3: MCQS	
	PART4: FILL IN BLANKS	
B	PART5: DIFFERENTIATE	60
	PART6: SHORT ANSWER	
	PART7: LONG ANSWER	
Total marks		**100**

SECTION A

PART- 1 **(10X1=10 MARKS)**

STATE TRUE OR FALSE (EACH 1 MARK)

1. Organic matter breaks down in the soil to form humus.
2. The plant contents may be classified on the basis of their availability and on the basis of mobility in plant.
3. Increase in temperature decreases the absorption of ions.
4. Grey colour of top soil may be due to high organic matter content.
5. Agriculture soils have more diverse and active soil fauna and flora than forest soils
6. Nutrient available in air and water like C, H and O are also called essential minerals.
7. Plants take nutrients from soil for their growth only through root interception and diffusion.
8. On the basis of mobility in plant the nutrients Chlorine and Sulphur are immobile nutrients.
9. Diffusion is a much slower process than mass flow, but is an extremely important pathway in the replenishment of the soil solution.
10. Phosphorus plays important role in energy transfer as part of ATP, constituent of many proteins, coenzymes, nucleic acids, and metabolic substrates.

PART 2 : **(10X1=10 MARKS)**

MATCH THE FOLLOWING (EACH 1 MARK)

COLUMN "A"		COLUMN "B"
1. Cation 2. Mineralization 3. Micro nutrients 4. Macro nutrients 5. Secondary nutrients 6. Essential non minerals 7. 1:1 Type Mineral 8. 2:2 Type Mineral 9. Nutrient taken by plant by Mass flow and diffusion 10. Nutrient taken by plant by Mass flow method only		A. Nitrogen, Phosphorus & Potassium B. Carbon, Oxygen & Hydrogen C. An ion that carries a positive charge D. Conversion of organic carbon substance to inorganic form of carbon E. Magnesium, Calcium, Sulfur F. Zinc, Copper, Manganese G. Kaolinite H. Chlorite I. Magnesium J. Calcium

PART 3 : **(10X1=10 MARKS)**

MULTIPLE CHOCICE QUESTIONS (1 mark each)

1. Chief factors which influence soil microorganisms are.....

(a) Fertility level

(b) Soil moisture

(c)Soil air

(d) None of these

(e) All

2. The un-decomposed plant material present on forest soil surface is called.....

(a) Mulch

(b) Litter

(c) Compost

(d) None of these

(e) All

3. Forest mis- management is caused by.....

(a) Over grazing

(b) Rainfall

(c) Forest fire

(d) Both a & c

(e) All

4. .....are the mechanisms of movement of ions from soil to roots.

(a) Mass flow

(b) Diffusion

(c) Root interception

(d) Both a & c

(e) All

5. Young leaves of terminal buds dieback at the tip and margins is deficiency symptoms of ..... .

(a) Nitrogen

(b) Potassuim

(c) Calcuim

(d) Magnesium

(e) All

PART 4 **(10X 1=10 MARKS)**

FILL THE BLANK SPACE WITH PROPER WORD (EACH 1MARK)

1. In ---------- substitution replacement of one atom by another of similar size but of lower valence takes place.
2. ----------property is not influenced by soil organic matter.
3. The plant nutrient may be classified on the basis of their availability and --------- in plant.
4. ----------is the hyphae often form swellings (vesicle) and minute branches (arbuscles) within the cell of the host.

5. The condition called ----------in deficiency of Magnesium in brassica is chlorosis with interveinal mottling uniformly distributed in older leaves while the other vascular tissues remain green.
6. Tree canopy shades soil and makes --------during the day and warmer at night than cultivated soils.
7. In order to protect our ----------we need to protect our trees and forests.
8. Deficiency symptom of ---------- are that leaves may develop purple coloration; stunted plant growth.
9. Nitrogen ----------in which N containing organic complexes are decomposed and converted into inorganic compounds for use by plants.
10. ---------- may be referred to as inoculants after the name of microorganisms they contain, viz. Rhizobium inoculant or Azospirillum inoculant

SECTION B

PART 5 **(3X5=15 MARKS)**

Differentiate the Following Questions Attempt any THREE(3) questions only.

1. Agricultural soils and forest soils
2. Active and passive uptake
3. Mass flow and diffusion
4. Macro and micronutrient
5. Fertilizers and bio fertilizers
6. Organic matter and humus

PART 6 **(3x5=15 MARKS)**

Short answer: Attempt any THREE(3) questions only.

1. What do you understand by bio fertilizers? Give few examples.
2. Explain mechanism of nutrient uptake from soil to root.
3. Explain the importance of studying forest soils.
4. What is cation exchange capacity? Give few examples 1:1 and 2:1type minerals.
5. What are secondary nutrients and their deficiency symptoms?

PART 7

Descriptive Type Questions **(3x10=30 MARKS)**

Note: Attempt any three(3) questions only.

1. Discuss plant nutrients and analyse factors affecting the nutrient availability to plants.
2. What is organic matter? How soil organic matter addition influences soil properties?
3. Draw nitrogen cycle and provide details of nitrification process of nitrogen cycle.
4. Analyse essential contribution of forests and forest soils to agricultural production and global food security.
5. Write briefly on soil microbial communities (microorganism) in forest soil and their importance.
6. Analyse briefly, deficiency symptoms of any three important plant nutrients.

END OF EXAMINATION PAPER