



FIJI NATIONAL UNIVERSITY

COLLEGE OF AGRICULTURE, FISHERIES AND FORESTRY
SCHOOL OF AGRICULTURE SCIENCES
DEPARTMENT OF SOIL SCIENCE & AGRIL. ENGINEERING

FINAL EXAMINATION: 2017

B.Sc Agriculture IInd year: Trimester IIIrd

SOIL FERTILITY AND PLANT NUTRITION (SAC 701)

TOTAL MARKS: 100

TIME ALLOWED: 3:10 HOURS

INSTRUCTIONS:

This paper consists of six (6) pages. Please check to see that your paper is complete.

Answer all questions in the answer booklet.

- Number your answers correctly in the provided answer booklet.
- Write your student ID number on all pages that you use including any additional sheet paper.
- Printed or written study materials are not allowed into the examination hall.
- Mark values appear at the end of each question or part thereof.

"MOBILE PHONES ARE STRICTLY NOT ALLOWED"

SECTION NO.	TYPE	TOTAL MARKS
I	TRUE OR FALSE	10
II	FILL IN BLANK	10
III	MULTIPLE CHOICE	10
IV	MATCHING	10
V	DEFINITION	10
VI	LONG ANSWER	50
TOTAL MARKS		100

Part I: State "True" or "False"**10 x 1.0 = (10 marks)**

1. About 10 % of the available nutrients in the soil are considered to be taken up by roots because of root interception.
2. Cation exchange capacity is always higher than anion exchange capacity of soil.
3. Deficiency of calcium causes "Blossom End Rot" in tomato crop.
4. Nitrogen immobilization occurs when organic soil N is converted to inorganic forms through biological activity.
5. Nitrogen is present in the cell wall, is involved in cell division, and is therefore important components of plant structure.
6. Organic colloids are chiefly due to presence of mineral matter in soil.
7. Smectite is the common example of 2:1 non expanding type of clay minerals.
8. Sulphur deficiency may results "dieback in citrus" and in many vegetable crops.
9. The lower the concentration of a solute in the soil solution, the lower the quantity brought to the root surface
10. The level of nutrient element in plant is termed as toxic when the concentration of element is sufficiently low to inhibit the plant growth

Part II. Fill in the blank spaces**10 x 1.0 = (10 marks)**

1. proposed the criteria of essentiality.
2. About of all soil potassium in mineral soil is in unavailable form.
3. If the average concentration of nitrogen is 40 mg / L and 2.5 million water is absorbed, how much nitrogen would be moved to roots by mass flow.....?
4. The behavior of plants in relation to day length is termed as
5. The essentiality of nitrogen was established by

6. What are the available forms of phosphorus
7. What is the carrier for anion in case of active transport of nutrients.....?
8. Which nutrient element is involved in stomatal regulation of cell
9. Write the chemical formula of fertilizer urea
10. Write the chemical formula of dolomite

Part III : Write the letter of your choice**10 x 1.0 = (10 marks)**

1. Liebig's Law of Minimum was given by Justus von Liebig, he was a chemist.
 - a) German
 - b) British
 - c) French
 - d) Russian
2. The cation exchange capacity (CEC) of 2:1 non- expanding type of clay minerals is generally?
 - a) 80- 150 (me/100gm)
 - b) > 150 (me/100gm)
 - c) 15- 40 (me/100gm)
 - d) 3- 15 (me/100gm)
3. Potassium is important in helping plants to adapt environmental stresses and improves following, except
 - a) Drought tolerance
 - b) Winter hardiness
 - c) Tolerance to insect pests
 - d) All of above
 - e) None of above
4. Among given nutrients which one gives odors (pungency) and flavors to garlic, onion, mustard & cabbage?
 - a) Calcium
 - b) Sulfur
 - c) Potassium
 - d) Magnesium
5. K_2O % content in Potassium Chloride (Muriate of Potash)-KCl fertilizer is
 - a) 60 %
 - b) 22 %
 - c) 44 %
 - d) 50 %
 - e) None of these

6. Nitrogen % content in Urea fertilizers is fertilizer is
- a) 18 %
 - b) 24 %
 - c) 46 %
 - d) 58 %
 - e) None of these
7. The nitrogen and phosphorus % content in Di Ammonium Phosphate (DAP) fertilizers is
- a) 11:55:0
 - b) 18:48:0
 - c) 25:25:0
 - d) 13:13:21
 - e) None of these
8. Nitrification process may be influenced by?
- a) Soil reaction
 - b) Soil aeration
 - c) Population of nitrifying organisms
 - d) Pesticides
 - e) All of the above
9. Among given nutrients which one gives odors (pungency) and flavors to garlic, onion, mustard and cabbage?.
- a) Calcium
 - b) Sulfur
 - c) Potassium
 - d) Magnesium
10. Which nutrient element is constituent of chlorophyll and chromosomes?
- a) Magnesium
 - b) Iron
 - c) Phosphorus
 - d) Potassium

Part IV. Match the following**10 x 1.0 = (10 marks)**

	<u>Column A</u>		<u>Column B</u>
1.	Molybdenum (Mo)	A	Carl Sprengel (1839)
2.	Phosphorus	B	Priestly (1800)
3.	Zinc (Zn)	C	Sommer and Lipman (1926)
4.	Carbon	D	Von Liebig (1844)
5.	Potassium	E	Arnon and Stout (1939)
6.	Deficiency symptom of phosphorus	F	Chlorotic light green / yellow appearance similar to N, but develops first on youngest leaves.
7.	Deficiency symptom of Calcium in plants	G	Deficiency symptoms are seen on the growing points & young leaves. In corn young bud turns white or light yellow therefore deficiency is called ' <u>white bud</u> '.
8.	Role of sulfur in plants	H	Hooking of the leaf tips may occur
9.	Role of Zinc in plants	I	It is the constituent of the amino acid methionine, cysteine, & cystine.
10.	Deficiency symptom of Sulfur in plants	J	Some plants develop purple color in their leaves and stems (more in young plants) as a result of P- deficiency

Part V. Define the given terms**(5 x 2 = 10 marks)**

1. Photoperiodism
2. Cation exchange capacity
3. Mineralization
4. Limiting factor
5. Phosphate fixation

Part VI. Write the answers in detail for given questions**(5 x 10 = 50 marks)**

1. Write the aim and objectives of study of soil fertility and plant nutrition. What is growth? List down the important environmental factors which influence plant growth and discuss any two of them in detail.
2. What do you understand with mechanism of ion uptake, explain active and passive ion uptake? Describe how plant nutrients move to roots by mass flow, diffusion and root interception?
3. Explain the importance of cation exchange in soil fertility. Describe the structure and characteristics of important soil colloids and elaborate how clay colloids are different from organic colloids?
4. Draw a rough sketch of the nitrogen cycle and explain the important steps of nitrogen transformation. List down the important nitrogenous fertilizers based on the forms of nitrogen present.
5. What are the roles of phosphorus? Explain the different forms of phosphorus present in soil. List down the important fertilizers supplying calcium and magnesium. Write the name of indicator plants used for magnesium deficiency.

The End
