

※ 注意：請於試卷內之「非選擇題作答區」標明題號依序作答。

1. Describe one of the major forms (by chemical formula) of N, P, K fertilizer? (6 points)
2. What are the (a) substrates, (b) the enzymes, and (c) the primary products of C3 and C4 plants? (6 points)
3. What is the **Nernst equation** of an ion? (No need to show the equation, 8 points)
4. Why do acidic soil and alkali soil restrict the bioavailability of phosphorus in plants? (10 points)
5. Describe typical deficiency symptoms of N, P, K, Ca, Mg in leaves or fruits (or ears). (10 points)
6. Introduce (a) The theory of mineral nutrition of plants; and (b) The Law of the Minimum? (10 points)
7. (a) How do plants get their nitrogen from the air? (6 points); (b) Name the proteins that maintain the functioning of nitrogen fixation in legumes. (4 points); (c) Nitrogen is taken up as NO_3^- by roots and converted first into NO_2^- , and then to NH_4^+ , and the amide nitrogen of glutamine. What are the main enzymatic steps of this assimilatory process? (8 points); (d) Which parts of the leaf store nitrate? (2 points)
8. Name three factors that affect potassium uptake by plants. (6 points)
9. Which nutrients are considered mobile and immobile within the phloem of plants? (Name two mobile and two immobile nutrients, 4 points)
10. Explain the meaning of the following terms. (10 points)
 - (a) Mineralization
 - (b) Phytosiderophore
 - (c) Chlorosis
 - (d) Whiptail symptom
 - (e) Ion antagonism
11. Name the respective mineral nutrient element(s) that..... (10 points)
 - (a) Forms the core constituent of the ring structure of chlorophyll
 - (b) Involves in the protection against herbivory in accumulator plants
 - (c) Requires for nodulation in legumes
 - (d) Synthesis of rhamnogalacturonan II
 - (e) Forms a component of plant urease
 - (f) Involves in Hill reaction
 - (g) Forms a component of cobalamin
 - (h) Involves in plant protein synthesis
 - (i) Involves in pollen formation and development
 - (j) Enhances the resistance of plants to diseases