※注意：請務必依照題號順序作答。

1. (a) What forms of nitrogen are absorbed by plants from the soil? (3 points) (b) Name three crops that accumulate silicon. (3 points) (c) What are the three criteria that plant nutrients must meet for them to be designated as essential? (4 points)
2. What are the functions and deficiency symptoms of phosphorous and copper in plants? (10 points)
3. Name the respective mineral nutrient element(s) that……. (10 points)
   (a) Forms the core constituent of the ring structure of chlorophyll
   (b) Activates carboxylase
   (c) Forms the component of nitrogenase
   (d) Synthesis middle lamella of plant cell
   (e) Activates the enzymes involved in respiration
4. Which nutrients are considered mobile and immobile within the phloem of plants? (10 points)
5. Define and explain the following terms, and compare the difference in each of the following groups. (10 points)
   (a) Ammonification and ammoniation
   (b) Immobilization and mineralization
   (c) Denitrification and nitrification
   (d) Antagonism and synergism
   (e) Chlorosis and necrosis
6. Describe (a) Pumps/Transporters (3 points); (b) Channels (3 points); (c) Carriers (4 points).
7. (a) Describe electrical conductivity (EC)? (b) Why excessive uptake of sodium results in toxic symptom in plants? (10 points)
8. Describe the adaptation strategies of 'roots' to enhance nutrient capture under nutrient deficient condition. (10 points)
9. Describe (a) C/N ratio; (b) High affinity and low affinity transporter. (10 points)
10. Describe strategies to improve nitrogen-use efficiency and decrease N pollution. (10 points)

試題隨卷繳回