

1. What is hydroponics? Describe the technique & give its use.
2. What would happen if solution (nutrient) was poorly aerated in hydroponics?
3. What are the 3 criteria for essentiality of an element?
4. What are the macronutrients & micronutrients required by plants?
5. What are 4 broad categories of essential elements of plants on basis of their diverse functions?
6. Give various forms in which these mineral elements are absorbed. Give their functions also – Nitrogen, Phosphorus, Potassium, Calcium, Magnesium, Sulphur, Iron, Manganese, Zinc, Copper, Boron, Molybdenum and chlorine.
7. What is critical concentration of essential elements?
8. Which elements show deficiency symptoms of: Chlorosis, necrosis, Inhibition of cell divisions & delay in flowering?
9. Give deficiency symptoms of various macro elements & microelements.
10. Write short note on toxicity of micronutrients. Or  
Why toxicity symptoms of plants nutrients are difficult to identify.
11. Differentiate between 'outer space' & 'inner space'.
12. What are 2 different phases of absorption of elements?
13. Give schematic representations of N<sub>2</sub> cycle.
14. Define nitrogen fixation. In which way N<sub>2</sub> gets fixed?
- 15(a) Define nitrification. (b) Name the nitrifying bacteria present in soil. Why are they called chemoautotroph?
16. Give 2 names for each:- (i) Free living nitrogen fixing cyanobacteria.  
(ii) Free living aerobic nitrogen fixing bacteria. (iii) Symbiotic nitrogen fixing bacteria.
17. What is meant by symbiotic nitrogen fixation?
18. A section of root nodule of chickpea plant appears pink  
(i) What is the colour due to?  
(ii) What type of condition does the pigment create in the nodule?  
(iii) Name the elements present in nitrogen enzyme.
19. Describe process of development of root nodules in leguminous plant. Name O<sub>2</sub> scavenger molecule present in root modules.
20. Describe the process of progressive reduction of one molecule of N<sub>2</sub> during nitrogen fixation in leguminous plants.
21. What is denitrification? Name denitrifying bacteria?
22. What are two main ways in which NH<sub>3</sub> is used to synthesize amino acids in plants?