SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF AGRICULTURAL ENGINEERING

QUESTION BANK

VI SEMESTER

PAG503 – SOIL FERTILITY AND FERTILIZERS

B.TECH. AGRICULTURAL ENGINEERING

Regulation – 2023

Academic Year: 2025– 2026 (EVEN SEM)

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SEMESTER: 06 **REGULATION-2023** **YEAR: B. TECH /VI**

UNIT – I: INTRODUCTION TO SOIL FERTILITY AND PRODUCTIVITY			
Soil fertility and productivity - factors affecting - features of good soil management - problems of supply and availability of nutrients - relation between nutrient supply and crop growth - organic farming - basic concepts and definitions.			
PART – A			
Q. No	**Questions**	**BT Level**	**Competence**
1.	Define soil fertility.	BT-1	Remember
2.	What is soil productivity?	BT-1	Remember
3.	List two factors affecting soil fertility.	BT-1	Remember
4.	What are macronutrients? Give two examples.	BT-1	Remember
5.	What is soil organic matter?	BT-1	Remember
6.	Define nutrient leaching.	BT-1	Remember
7.	What is nutrient imbalance?	BT-1	Remember
8.	Define organic farming.	BT-1	Remember
9.	What is green manuring?	BT-1	Remember
10.	State two characteristics of good soil management.	BT-1	Remember
11.	What is critical nutrient level?	BT-1	Remember
12.	List two problems related to nutrient availability in soils.	BT-1	Remember
13.	Interpret the Liebig's law of minimum.	BT-2	Understand
14.	Describe how soil pH affects plant nutrient uptake.	BT-2	Understand
15.	Discuss the role of nitrogen in crop development.	BT-2	Understand
16.	Classify plant nutrients based on quantity required.	BT-2	Understand
17.	Identify one cause and one consequence of nutrient imbalance.	BT-2	Understand
18.	Compare soil fertility and soil productivity.	BT-2	Understand
19.	Describe the contribution of organic matter to soil structure.	BT-2	Understand
20.	Summarize the relationship between nutrient supply and crop yield.	BT-2	Understand
21.	Describe two advantages of combining organic and inorganic fertilizers.	BT-2	Understand
22.	Discuss the role of soil microorganisms in nutrient availability.	BT-2	Understand
23.	Contrast organic fertilizers with chemical fertilizers.	BT-2	Understand
24.	Outline two features of sustainable soil management.	BT-2	Understand
PART – B			
Q. No	**Questions**	**BT Level**	**Competence**
1.	Explain the history of soil fertility.	BT-3	Apply
2.	Explain in detail about factors affecting soil fertility.	BT-3	Apply
3.	Illustrate about elements of plant nutrition with neat sketch.	BT-3	Apply
4.	Explain in detail about factors affecting soil productivity.	BT-3	Apply
5.	Explain the features of good soil management and discuss how	BT-3	Apply

	fertilizers, manure, crop rotation, green manuring, and organic matter contribute to soil fertility.		
6.	If population in 2050 will be 10 billion, how much yield and total production would be required, by assuming a constant 750 million ha of cropland in cereal production. Also determine the additional production needed when the cereal cropland is reduced to 650 million ha in 2050.	BT-5	Evaluate
7.	What are fertilizers? Explain different types of fertilizers—organic, inorganic, biofertilizers, straight, complex, and mixed fertilizers—with suitable examples.	BT-1	Remember
8.	Explain the role of essential plant nutrients (macro and micro) in improving soil fertility. Describe the deficiency symptoms of any five nutrients.	BT-3	Apply
9.	Describe in detail the relationship between nutrient supply and crop growth. Explain Liebig's Law of Minimum, Law of Diminishing Returns, and Law of Optimum.	BT-3	Apply
10.	Describe the role of organic manures in soil fertility. Compare farmyard manure (FYM), compost, and vermicompost in terms of nutrient value and benefits.	BT-3	Apply
11.	Discuss the environmental impacts of overusing chemical fertilizers. Suggest sustainable practices to reduce soil degradation.	BT-3	Apply
12.	Explain the process of nutrient cycling (N, P, K cycles) in soil. How does proper nutrient cycling improve soil fertility?	BT-3	Apply
13.	Describe Integrated Soil Fertility Management (ISFM). Explain how combining organic, inorganic, and biological inputs improves long-term soil health.	BT-3	Apply
14.	Discuss the role of micronutrient fertilizers (Zn, Fe, Mn, Cu, B, Mo). Explain deficiency symptoms and corrective measures for any four micronutrients.	BT-3	Apply
15.	Describe the process of composting and vermicomposting. Explain their role in nutrient recycling and soil fertility maintenance.	BT-3	Apply
16.	What are the major causes of soil fertility depletion in modern agriculture? Discuss the remedies to restore and maintain soil fertility.	BT-3	Apply
17.	Describe the role of biofertilizers in improving soil fertility. Explain different types like Rhizobium, Azospirillum, Azotobacter, PSB, and VAM.	BT-3	Apply

UNIT – II: ESSENTIAL PLANT NUTRIENTS

Criteria of essentiality of nutrients; Essential plant nutrients – their functions, nutrient deficiency symptoms- transformation and dynamics of major plant nutrients - Preparation and use of farmyard manure- compost, green manures, vermicompost.

PART – A

Q. No	Questions	BT Level	Competence
1.	Define essential plant nutrient.	BT-1	Remember
2.	State any two criteria for essentiality of plant nutrients.	BT-1	Remember
3.	Who proposed the criteria of essentiality of nutrients?	BT-1	Remember
4.	Why is sodium not considered an essential nutrient for all plants?	BT-1	Remember
5.	List the primary macronutrients required by plants.	BT-2	Understand
6.	Mention any two functions of nitrogen in plants.	BT-2	Understand
7.	Write two important functions of phosphorus in plant metabolism.	BT-2	Understand
8.	State any two roles of potassium in crop plants.	BT-2	Understand

9.	Name any two secondary nutrients and one function of each.	BT-2	Understand
10.	Mention any two micronutrients and their functions.	BT-2	Understand
11.	What is meant by nutrient deficiency symptom?	BT-1	Remember
12.	Write any two deficiency symptoms of nitrogen in crops.	BT-2	Understand
13.	State two characteristic symptoms of phosphorus deficiency.	BT-2	Understand
14.	Mention any two deficiency symptoms of potassium.	BT-2	Understand
15.	Why do micronutrient deficiencies generally appear in younger leaves?	BT-1	Remember
16.	What is meant by nutrient transformation in soil?	BT-1	Remember
17.	Name any two forms of nitrogen present in soil.	BT-2	Understand
18.	What is nitrification?	BT-1	Remember
19.	Mention two factors affecting phosphorus availability in soil.	BT-2	Understand
20.	State any two losses of nitrogen from soil.	BT-2	Understand
21.	Define farmyard manure (FYM).	BT-1	Remember
22.	Mention any two benefits of FYM application to soil.	BT-2	Understand
23.	What is green manuring? Give one example of a green manure crop.	BT-1	Remember
24.	Define vermicompost and name one species of earthworm used.	BT-1	Remember

PART – B

Q. No	Questions	BT Level	Competence
1.	Explain the criteria of essentiality of plant nutrients and justify each criterion with suitable examples.	BT-3	Apply
2.	Classify essential plant nutrients based on their requirement and explain the physiological significance of each group.	BT-3	Apply
3.	Discuss the functions of primary macronutrients (N, P, K) in plant growth and development.	BT-3	Apply
4.	Explain the role of secondary nutrients (Ca, Mg, S) in plant metabolism with field examples.	BT-3	Apply
5.	Describe the functions of micronutrients in plants and explain their role in enzyme activation.	BT-3	Apply
6.	Analyze the interrelationship between nutrient functions and plant physiological processes such as photosynthesis and respiration.	BT-3	Apply
7.	Explain how nutrient imbalance affects crop growth and productivity.	BT-3	Apply
8.	Describe the general and specific deficiency symptoms of major plant nutrients with suitable sketches.	BT-3	Apply
9.	Discuss the hidden hunger concept and its significance in crop nutrition.	BT-3	Apply
10.	Explain the transformation and dynamics of nitrogen in soil with a neat flow diagram.	BT-3	Apply
11.	Describe the phosphorus cycle in soil and factors affecting its availability to plants.	BT-3	Apply
12.	Describe the preparation, composition, and uses of farmyard manure (FYM) in agriculture.	BT-3	Apply
13.	Explain the composting process, types of compost, and factors affecting compost quality.	BT-3	Apply
14.	Explain the preparation of vermicompost, role of earthworms, and its advantages over FYM.	BT-3	Apply
15.	Compare FYM, compost, green manure, and vermicompost in terms of nutrient content, availability, and crop response.	BT-3	Apply

16.	Discuss the principles and benefits of green manuring in soil fertility management.	BT-3	Apply
17.	Analyze the effect of organic manures on soil physical, chemical, and biological properties.	BT-3	Apply

UNIT – III: BIOFERTILIZERS

Biofertilizers and other organic concentrates their composition - availability and crop responses- recycling of organic wastes and residue management – Commercial fertilizers - composition, relative fertilizer value and cost; crop response to different nutrients - residual effects and fertilizer use efficiency - fertilizer mixtures and grades; agronomic, chemical and physiological methods of increasing fertilizer use efficiency; nutrient interactions.

PART -A

Q. No	Questions	BT Level	Competence
1.	Define biofertilizer.	BT-1	Remember
2.	Name any two nitrogen-fixing biofertilizers used in agriculture.	BT-2	Understand
3.	What is phosphate solubilizing microorganism (PSM)?	BT-1	Remember
4.	Mention any two advantages of biofertilizers.	BT-2	Understand
5.	What are organic concentrates? Give two examples.	BT-1	Remember
6.	State any two factors affecting the efficiency of biofertilizers.	BT-2	Understand
7.	What is meant by nutrient availability?	BT-1	Remember
8.	Define crop response to applied nutrients.	BT-1	Remember
9.	Mention any two factors influencing crop response to fertilizers.	BT-2	Understand
10.	What is residual effect of fertilizers?	BT-1	Remember
11.	What is recycling of organic wastes in agriculture?	BT-1	Remember
12.	Give two examples of agricultural residues used for nutrient recycling.	BT-2	Understand
13.	State any two benefits of crop residue management.	BT-2	Understand
14.	What is meant by in-situ residue incorporation?	BT-1	Remember
15.	Define commercial fertilizer.	BT-1	Remember
16.	What is meant by fertilizer grade?	BT-1	Remember
17.	Give the nutrient composition of urea.	BT-2	Understand
18.	What is relative fertilizer value (RFV)?	BT-1	Remember
19.	Mention any two factors affecting fertilizer cost.	BT-2	Understand
20.	Define fertilizer use efficiency.	BT-1	Remember
21.	Mention any two agronomic methods of improving fertilizer use efficiency.	BT-2	Understand
22.	What is meant by split application of fertilizers?	BT-1	Remember
23.	Define fertilizer mixture.	BT-1	Remember
24.	What is meant by nutrient interaction? Name any one type.	BT-1	Remember

PART –B

Q. No	Questions	BT Level	Competence
1.	Explain the types, composition, and mode of action of biofertilizers and discuss their effect on nutrient availability and crop response.	BT-3	Apply
2.	Describe organic concentrates used in agriculture, their nutrient composition, and advantages over bulky organic manures.	BT-3	Apply
3.	Compare biofertilizers and chemical fertilizers in terms of nutrient supply, crop response, and sustainability.	BT-3	Apply
4.	Describe the recycling of organic wastes in agriculture and discuss	BT-3	Apply

	its role in sustainable nutrient management.		
5.	Explain the concept of nutrient availability and discuss soil, crop, and management factors influencing crop response to nutrients.	BT-3	Apply
6.	Explain the residual effect of fertilizers and its significance in cropping systems.	BT-3	Apply
7.	Analyze crop response curves to nitrogen, phosphorus, and potassium with suitable diagrams.	BT-3	Apply
8.	Explain crop residue management practices, their benefits, and limitations under different farming systems.	BT-3	Apply
9.	Explain the classification of fertilizers and discuss their suitability for different crops and soils.	BT-3	Apply
10.	Explain the concept of fertilizer use efficiency and discuss agronomic, chemical, and physiological methods to improve it.	BT-3	Apply
11.	Explain fertilizer mixtures and grades, and discuss their importance in balanced fertilization.	BT-3	Apply
12.	Discuss the principles involved in the preparation of fertilizer mixtures with examples.	BT-3	Apply
13.	Discuss the advantages and limitations of straight, complex, and mixed fertilizers.	BT-3	Apply
14.	Analyze the factors affecting the efficiency of biofertilizers and suggest measures to improve their field performance.	BT-3	Apply
15.	A field shows low fertilizer response despite adequate application. Analyze the possible causes related to nutrient interactions, residue management, and fertilizer use efficiency.	BT-3	Apply
16.	Analyze the long-term effects of continuous fertilizer application on soil fertility, crop response, and nutrient balance.	BT-3	Apply
17.	Explain how recycling of organic wastes can reduce dependency on commercial fertilizers and improve soil health.	BT-3	Apply

UNIT – IV: MANURES AND FERTILIZERS APPLICATION

Time and methods of manures and fertilizers application - foliar application and its concept - relative performance of organic and inorganic manures - economics of fertilizer use - integrated nutrient management - use of vermincompost and residue - wastes in crops.

PART – A

Q. No	Questions	BT Level	Competence
1.	What is meant by time of fertilizer application?	BT-1	Remember
2.	Mention any two methods of fertilizer application.	BT-2	Understand
3.	What is basal application of fertilizers?	BT-1	Remember
4.	Define top dressing.	BT-1	Remember
5.	What is band placement of fertilizers?	BT-1	Remember
6.	Mention any two advantages of placement method over broadcasting.	BT-2	Understand
7.	What is foliar application of nutrients?	BT-1	Remember
8.	State any two advantages of foliar application.	BT-2	Understand
9.	Mention any two limitations of foliar feeding.	BT-2	Understand
10.	Name any two nutrients commonly applied through foliar spray.	BT-2	Understand
11.	What is meant by organic manure?	BT-1	Remember
12.	Give any two examples of inorganic fertilizers.	BT-2	Understand
13.	Mention any two differences between organic and inorganic manures.	BT-2	Understand

14.	What is meant by economics of fertilizer use?	BT-1	Remember
15.	Define optimum dose of fertilizer.	BT-1	Remember
16.	What is benefit–cost ratio (B:C ratio)?	BT-1	Remember
17.	Mention any two factors affecting profitability of fertilizer use.	BT-2	Understand
18.	What is meant by relative performance of manures?	BT-1	Remember
19.	Define integrated nutrient management (INM).	BT-1	Remember
20.	Mention any two objectives of INM.	BT-2	Understand
21.	State any two advantages of INM in crop production.	BT-2	Understand
22.	What is vermicompost?	BT-1	Remember
23.	Mention any two benefits of vermicompost application.	BT-2	Understand
24.	What is meant by crop residue recycling?	BT-1	Remember

PART B

Q. No	Questions	BT Level	Competence
1.	Explain the composting and vermicomposting of crop wastes and discuss their agronomic importance.	BT-3	Apply
2.	Compare broadcasting, placement, band application, and split application of fertilizers with suitable field examples.	BT-3	Apply
3.	Explain the concept, principles, and advantages of foliar application of nutrients. Discuss its limitations.	BT-3	Apply
4.	Describe the suitability of foliar fertilization for correcting nutrient deficiencies and explain precautions to be followed.	BT-3	Apply
5.	Compare the relative performance of organic and inorganic manures in terms of nutrient availability, crop response, and soil health.	BT-3	Apply
6.	Analyze the short-term and long-term effects of organic and inorganic nutrient sources on soil fertility and productivity.	BT-3	Apply
7.	Explain the economics of fertilizer use and discuss factors influencing profitability of fertilizer application in crops.	BT-3	Apply
8.	Describe the concept of optimum fertilizer dose and explain the economic response curve of crops to fertilizer application.	BT-3	Apply
9.	Define Integrated Nutrient Management (INM) and explain its principles, objectives, and advantages in sustainable agriculture.	BT-3	Apply
10.	Design an INM strategy for a cereal-based cropping system, integrating organic manures, fertilizers, and biofertilizers.	BT-3	Apply
11.	Explain the preparation, nutrient composition, and agronomic benefits of vermicompost in crop production.	BT-3	Apply
12.	Discuss the use of crop residues and organic wastes in nutrient recycling and their role in improving soil fertility.	BT-3	Apply
13.	Explain the in-situ and ex-situ management of crop wastes and compare their advantages and limitations.	BT-3	Apply
14.	Explain the impact of improper disposal of crop wastes on soil health, environment, and crop production.	BT-3	Apply
15.	Explain how time and method of fertilizer application interact with organic manure use to influence crop response.	BT-3	Apply
16.	Discuss the role of INM in improving economics of fertilizer use and reducing environmental pollution.	BT-3	Apply
17.	Explain the types of agricultural wastes generated in crop production and discuss their nutrient potential and management options.	BT-3	Apply

UNIT – V: MICRONUTRIENTS			
Micronutrients – critical limits in soils and plants - factors affecting their availability and correction of their deficiencies in plants - role of chelates in nutrient availability.			
Q. No	**Questions**	**BT Level**	**Competence**
1	What are micronutrients? Name any two essential micronutrients.	BT-1	Remember
2	Why are micronutrients required in small quantities by plants?	BT-1	Remember
3	List any two essential micronutrients required for plant growth.	BT-2	Understand
4	What is meant by critical limit of a nutrient in soil?	BT-1	Remember
5	Define critical concentration of a micronutrient in plants.	BT-1	Remember
6	Mention the critical limit of zinc in soil.	BT-2	Understand
7	State the critical limit of iron in plant tissue.	BT-2	Understand
8	Mention any two soil factors affecting micronutrient availability.	BT-2	Understand
9	How does soil pH influence micronutrient availability?	BT-1	Remember
10	State the effect of organic matter on micronutrient availability.	BT-2	Understand
11	How does soil aeration and moisture affect micronutrient availability?	BT-1	Remember
12	What is meant by micronutrient deficiency?	BT-1	Remember
13	Mention any two deficiency symptoms of zinc in crops.	BT-2	Understand
14	State any two deficiency symptoms of iron.	BT-2	Understand
15	Name any two methods of correcting micronutrient deficiencies.	BT-2	Understand
16	Why is foliar application preferred for correcting micronutrient deficiencies?	BT-1	Remember
17	What is a chelated micronutrient?	BT-1	Remember
18	Give two examples of chelating agents used in agriculture.	BT-2	Understand
19	State any two advantages of chelated micronutrients over inorganic salts.	BT-2	Understand
20	How do chelates help in improving micronutrient availability in alkaline soils?	BT-1	Remember
21	What is meant by hidden hunger of micronutrients?	BT-1	Remember
22	Why is zinc deficiency common in calcareous soils?	BT-1	Remember
23	Mention any two crops highly sensitive to micronutrient deficiencies.	BT-2	Understand
24	State any two sources of micronutrient fertilizers.	BT-2	Understand
PART - B			
Q. No	**Questions**	**BT Level**	**Competence**
1.	Discuss the concept of critical limits of micronutrients in soils and plants and explain their role in diagnosing deficiencies.	BT-3	Apply
2.	Explain the critical levels of Fe, Mn, Zn, Cu, B, and Mo in soils and plant tissues with suitable examples.	BT-3	Apply
3.	Compare soil test critical limits and plant tissue critical limits and justify their importance in nutrient management.	BT-3	Apply
4.	Analyze the soil factors affecting micronutrient availability, with special reference to soil pH and organic matter.	BT-3	Apply
5.	Discuss the influence of soil pH on availability of Fe, Mn, Zn, Cu, B, and Mo.	BT-3	Apply
6.	Examine the role of organic matter and microbial activity in regulating micronutrient availability.	BT-3	Apply

7.	Evaluate the effect of soil moisture, aeration, and redox conditions on micronutrient availability.	BT-3	Apply
8.	Describe the deficiency symptoms of major micronutrients and suggest suitable corrective measures.	BT-3	Apply
9.	Analyze the causes, symptoms, and correction of zinc deficiency in crops grown on Indian soils.	BT-3	Apply
10.	Discuss the iron chlorosis problem in calcareous soils and suggest management strategies.	BT-3	Apply
11.	Explain various methods of correcting micronutrient deficiencies in plants with suitable examples.	BT-3	Apply
12.	Explain the role of chelates in improving micronutrient availability in soils and plants.	BT-3	Apply
13.	Analyze the mechanism of chelation and its importance in correcting micronutrient deficiencies.	BT-3	Apply
14.	Compare chelated micronutrient fertilizers with inorganic salts in terms of efficiency and field performance.	BT-3	Apply
15.	Discuss the types of chelating agents (EDTA, DTPA, EDDHA) and their suitability under different soil conditions.	BT-3	Apply
16.	Discuss the micronutrient disorders in intensive cropping systems and suggest remedial measures.	BT-3	Apply
17.	Explain how soil testing, plant analysis, and chelation together help in effective micronutrient management.	BT-3	Apply