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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

Ph.D. (Second Semester-Summer) Examinations, May – 2025

23SPPEMT2012 - Mathematical Modeling and Algorithm Design for IoT-Based Agricultural Management

(Mathematics)

Time: 3 hrs Maximum: 70 Marks

The figures in the right hand margin indicate marks.

	Answer *ANY FIVE* Questions. **(14 x 5 = 70 Marks)**	**Marks**
1.a.	Describe how differential equations can be used to model crop growth.	8
b.	Illustrate a real-world problem in agriculture that can be modeled with optimization.	6
2.	Discuss FIFO vs. priority queues in the context of weather data buffering.	14
3.a.	Design a gateway-based data collection strategy for crop monitoring.	7
b.	Discuss how MQTT enables real-time control in fertilizer application	7
4.	Explain how Model Predictive Control can improve water usage efficiency.	14
5.a.	Discuss the integration of neural networks in disease outbreak prediction.	7
b.	Design a time-series model to forecast crop yield over seasons.	7
6.a.	Explain the concept of sets and functions with respect to soil nutrient classification.	7
b.	Analyze the computational complexity of a typical agricultural IoT control system.	7
7.	Describe the role of LoRa in long-range agricultural communication.	14
8.a.	Discuss the integration of neural networks in disease outbreak prediction.	7
b.	Analyze the effect of latency on real-time pest control decisions.	7

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