Reg. No.																

Question Paper Code	13190

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Seventh Semester

Mechanical and Automation Engineering

20MUPE702 - SMART FARMING USING AUTOMATION PRINCIPLES

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	What is the primary goal of smart agriculture? (a) Reduce crop yield (b) Improve soil degradation (c) Optimize resource use and improve yield (d) Increase labor requirements	1	K1	CO1
2.	Which of the following best describes the origin of soil? (a) It is formed from organic matter only (b) It originates from the breakdown of rocks and minerals (c) Soil is formed through chemical processes alone (d) Soil is made from synthetic materials	1	K1	CO1
3.	Which mineral is commonly found in soil and essential for plant growth? (a) Gold (b) Quartz (c) Iron (d) Diamond	1	K1	CO1
4.	How is soil classified based on texture? (a) Based on color (b) By the mineral content (c) By the size of mineral particles (sand, silt, clay) (d) By nutrient levels	1	K1	CO1
5.	Which of the following is an example of an actuator used in smart irrigation systems? (a) Soil moisture sensor (b) Water pump (c) Drone (d) Weather station	1	K1	CO2
6.	Telemetry in agriculture primarily refers to: (a) Remote control of agricultural machines (b) Real-time data transmission from remote sensors (c) On-site manual data collection (d) Soil testing for nutrient levels	1	K1	CO2
7.	Which of these devices can control actuators based on sensor feedback in an automated farming system? (a) Thermometer (b) Central control unit or microcontroller (c) GPS system (d) pH meter	1	K1	CO2
8.	Which of the following would be a benefit of using telemetry in agriculture? (a) Increased manual labor requirements (b) Higher risk of crop loss (c) Remote monitoring and control of field conditions (d) Lower crop yields	1	K1	CO2
9.	Plant health monitoring in agriculture primarily aims to: (a) Increase water usage (b) Detect diseases, nutrient deficiencies, and pest infestations early (c) Reduce crop growth (d) Increase soil acidity	1	K1	CO3
10.	Which technology is often used in plant health monitoring to detect plant stress and disease? (a) Infrared imaging (b) GPS (c) Radio signals (d) Ultrasound	1	K1	CO3
11.	Which type of sensor is commonly used to monitor leaf moisture in plants? (a) pH sensor (b) Soil temperature sensor (c) Humidity sensor (d) Chlorophyll sensor	1	K1	CO3
12.	Chlorophyll sensors are important in plant health monitoring because they: (a) Measure soil compaction (b) Detect the nitrogen content in leaves (c) Monitor water levels in the field (d) Increase crop yields directly	1	K1	CO3

13.	What is the main purpose of precision farming technologies? (a) Increase soil acidity (b) Reduce crop yields (c) Optimize resource use and maximize crop productivity (d) Increase labor requirements	*1*	*K1*	*CO4*
14.	Which of the following technologies is most commonly used for soil analysis in farming? (a) Drone imaging (b) Soil sensors (c) GPS systems (d) Automated tractors	*1*	*K1*	*CO4*
15.	Drones are used in modern farming primarily for: (a) Seed planting (b) Aerial imaging and crop health monitoring (c) Harvesting crops (d) Fertilizer production	*1*	*K1*	*CO4*
16.	Which type of technology helps monitor environmental conditions like temperature, humidity, and light in farming? (a) Soil compaction meter (b) Weather station sensors (c) Thermal imaging cameras (d) Plant canopy sensors	*1*	*K1*	*CO4*
17.	A key benefit of using drones in crop monitoring, as shown in case studies, is: (a) Reduction in crop yields (b) Improved decision-making through real-time data on crop health and growth patterns (c) Increased need for manual labor (d) Reduction in soil moisture	*1*	*K1*	*CO5*
18.	In a case study of autonomous fruit-picking robots, which of the following challenges was highlighted? (a) High energy consumption (b) Difficulty in distinguishing ripe fruits from unripe ones (c) Requirement for manual operation (d) Limited durability	*1*	*K1*	*CO5*
19.	Unmanned ground vehicles (UGVs) are especially useful for tasks like: (a) Flying over fields (b) Soil analysis and automated weeding (c) Manual pesticide spraying (d) Plant breeding	*1*	*K1*	*CO5*
20.	Based on case studies, which of the following technologies in autonomous agriculture helps with identifying weeds using machine vision? (a) GPS (b) Thermal sensors (c) Camera-based vision systems (d) Soil pH sensors	*1*	*K1*	*CO5*

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21.	What is the importance of soil pH in agriculture?	*2*	*K1*	*CO1*
22.	What is the purpose of colorimetry-based detection in soil analysis?	*2*	*K1*	*CO1*
23.	Differentiate between AC and DC motors in terms of typical applications in agriculture.	*2*	*K2*	*CO2*
24.	Name one application of solenoid actuators in agricultural machinery.	*2*	*K2*	*CO2*
25.	What is the importance of measuring leaf health in plant monitoring?	*2*	*K1*	*CO3*
26.	Describe how accurate crop mapping contribute to efficient resource management?	*2*	*K2*	*CO3*
27.	How does a micro-irrigation system benefit crop water management?	*2*	*K1*	*CO4*
28.	What is the role of fencing technology in modern farming?	*2*	*K1*	*CO4*
29.	State primary purpose of sorting machines in agriculture.	*2*	*K1*	*CO5*
30.	List the types of sensors are commonly used in drones for crop health monitoring.	*2*	*K1*	*CO5*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31.	a)	Discuss the role of soil composition and properties in plant health and productivity. How do these properties influence agricultural practices?	*10*	*K2*	*CO1*
		OR			
	b)	Explain the different types of sensors used in smart agriculture.	*10*	*K2*	*CO1*

32.	a)	Interpret how Zig-bee technology can be integrated into a precision agriculture system.	*10*	*K2*	*CO2*
		OR			
	b)	Describe the architecture and working principles of a LoRa-based smart farming in water management agricultural system.	*10*	*K2*	*CO2*
33.	a)	Explain the different methods used to measure chlorophyll content in leaves and their importance in assessing plant health.	*10*	*K2*	*CO3*
		OR			
	b)	Describe the principle, methodology, and applications of the SPAD meter in chlorophyll detection.	*10*	*K2*	*CO3*
34.	a)	Discuss the impact of smart water management on water conservation and sustainability.	*10*	*K2*	*CO4*
		OR			
	b)	Summarize the various types of micro-irrigation systems and their applications.	*10*	*K2*	*CO4*
35.	a)	Interpret the role of drones in precision agriculture, including their applications, advantages, and challenges.	*10*	*K3*	*CO5*
		OR			
	b)	Explain the different types of weeding machines used in agriculture and their working principles.	*10*	*K2*	*CO5*
36.	a) i)	Explain how smart water management systems help in mitigating the impact of water scarcity.	*5*	*K2*	*CO4*
	ii)	What challenges do fruit picking robots face in identifying and harvesting fruits?	*5*	*K2*	*CO5*
		OR			
	b) i)	What is the primary objective of using IoT (Internet of Things) in smart water management?	*5*	*K2*	*CO4*
	ii)	Describe autonomous unmanned ground vehicles (UGVs) typically used for in agricultural applications.	*5*	*K2*	*CO5*