

Wks Mapped with the Course

WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
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Mark Distribution

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	40	60	2.5 hrs

Continuous Internal Evaluation Pattern

Attendance	: 5 marks
Continuous Assessment Test	: 20 marks
Continuous Assessment Assignment / Field visit report	: 15 marks

SYLLABUS**Module 1 (12 hours)**

Introduction to Internet of Things (IoT): Definition, evolution, and components, IoT architecture: sensing layer, network layer, application layer, Role of sensors and actuators in IoT systems, Basic concepts of measurement, Signal types.

Module 2 (14 hours)

Temperature sensors, Humidity sensors, soil moisture sensors, Light sensors, Gas sensors (CO₂, NH₃, methane) for agricultural environments, IoT-based water quality monitoring, ultrasonic sensors, PIR sensors, Sensor characteristics, calibration, and selection criteria for agricultural use. Sensor-based pest and disease monitoring,

Module 3 (15 hours)

Introduction to microcontrollers: Arduino, ESP32, Raspberry Pi (overview), Interfacing sensors with microcontrollers, Actuators: relays, motors, solenoid valves used in agriculture, Power supply requirements and energy management in IoT devices, Basics of data acquisition and local data storage, Smart greenhouse climate control, Temperature & humidity tracking in warehouses

Module 4 (15 hours)

Basics of IoT communication protocols, Data transmission from sensors to cloud platforms (conceptual overview), Introduction to agricultural IoT systems: Smart irrigation systems, Crop health and climate monitoring, Automated greenhouse systems, Challenges in agricultural IoT: environmental conditions, power constraints, connectivity, IoT-based precision irrigation scheduling, Smart fertigation systems, Real-time groundwater monitoring systems.

Field visit

Field visits /Industry exposure to Smart greenhouse facility/Precision farming demonstration farm/Micro-irrigation automation company/Agricultural research station with sensor networks/Cold storage facility with monitoring systems/ Meteorological observation station.

Textbooks

1. Kamal, R. (2017). *Internet of things: Architecture and design principles* (Indian ed.). McGraw-Hill Education.
2. Dixit, U., & Singh, S. (2010). *Internet of things: Concepts, techniques and applications* Wiley India.
3. Sharma, V., & Gupta, R. (2021). *Fundamentals of IoT sensors and devices*. Khanna Publishing House.

Reference Books

1. Ghosh, S., & Ray, S. (2020). *Smart IoT sensors and agricultural monitoring systems*. CRC Press/Taylor & Francis.
2. Patil, R. S., & Kulkarni, S. S. (2022). *IoT and wireless sensor networks: Agriculture and environment applications*. Narosa Publishing House.
3. Verma, A., & Singh, B. (2021). *Embedded systems and IoT with sensor applications*. Oxford University Press

END SEMESTER EXAMINATION - MODEL QUESTION PAPER (STC 2025 SCHEME)

Course Code	25UAGT304
Course Name	BASIC IOT SENSORS AND DEVICES
Max. Marks: 60	Duration: 2.5 Hours

Part A (Answer all questions. Each question carries 3 marks)				
Qn No.	Question	Marks	CO	BL
1.	Explain IoT and list its three architectural layers.	3	CO1	L2
2.	Explain the role of sensors and actuators in an IoT system.	3	CO1	L2
3.	Explain suitable sensors for monitoring soil moisture and temperature in a field.	3	CO2	L2
4.	Describe the selection criteria for gas sensors in an agricultural environment.	3	CO2	L2
5.	Explain the role of a microcontroller such as Arduino in an IoT device.	3	CO3	L2
6.	Describe how actuators like relays and solenoid valves are used in agriculture.	3	CO3	L2
7.	Describe IoT concepts to outline a smart irrigation	3	CO4	L2

	system for a field.			
8.	Explain IoT concepts to describe an automated greenhouse monitoring setup.	3	CO4	L2
Part B (Answer any one full question from each Module. Each question carries 9 marks)				
Module I				
Qn No.	Question	Marks	CO	BL
9	Explain the architecture of an IoT system and the relevance of its components in Agricultural Engineering.	9	CO1	L2
OR				
10	Explain the basic concepts of measurement and the different signal types used in IoT systems.	9	CO1	L2
Module II				
Qn No.	Question	Marks	CO	BL
11	Explain the working and selection of soil moisture, temperature and humidity sensors for agricultural applications.	9	CO2	L2
OR				
12	Explain the sensors suitable for sensor-based pest and disease monitoring in crops.	9	CO2	L2
Module III				
Qn No.	Question	Marks	CO	BL
13	Explain the working of microcontroller platforms (Arduino/ESP32/Raspberry Pi) and the interfacing of sensors with them.	9	CO3	L2
OR				
14	Explain power supply requirements and energy management in IoT devices used in the field.	9	CO3	L2
Module IV				
Qn No.	Question	Marks	CO	BL
15	Apply IoT concepts to design a smart irrigation system and explain its working.	9	CO4	L3
OR				
16	Apply IoT concepts to an automated greenhouse system and explain how environmental parameters are controlled.	9	CO4	L3
