Uka Tarsadia University

B. Tech.

CSE / CSE (AI&ML) / CSE (CC) / CSE (CS) / CE / CE (SE) / IT

Semester VI

Program Elective -IV

INTRODUCTION TO INTERNET OF THINGS
OC5001

Effective from December-2024

Syllabus version: 1.00

Subject Code	Subject Title
OC5001	**Introduction to Internet of Things**

Teaching Scheme				Examination Scheme			
Hours		**Credits**		**Theory Marks**		**Practical Marks**	**Total Marks**
Theory	Practical	Theory	Practical	Internal	External	CIE	
3	0	3	0	25	75	-	100

Objectives of the course:
- To focus on significant components of the Internet of Things.
- To cover the prototype and key components of networking for development of applications based on the concept of Internet of Things.
- To design and implement IoT circuits and solutions.

Course outcomes:

Upon completion of the course, the student shall be able to,

CO1: Understand general concepts of Internet of Things.

CO2: Analyze various M2M and IoT architectures.

CO3: Understand different IoT models.

CO4: Identify different sensors which can measure different parameters or activity.

CO5: Create IoT solutions using sensors, Arduino and Raspberry Pi.

CO6: Learn genesis and impact of IoT applications in the real world.

Sr. No.	Topics	Hours
	Unit – I	
1	**Introduction to IoT:** Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I, Basics of Networking: Part-II, Part III, Part IV, Communication Protocols: Part I, Part II.	6
	Unit – II	
2	**IoT Communication Architectures and Protocols:** Communication Protocols: Part III, Part IV, Part V, Sensor Networks: Part I, Part II, Sensor Networks: Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications.	6
	Unit – III	
3	**Arduino and Raspberry Pi:** Interoperability in IoT, Introduction to Arduino programming: Part I, Part II, and Integration of sensors and actuators with Arduino: Part I, Part II, Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi.	6

	Unit – IV	
4	**IoT to Cloud:** Introduction to SDN, SDN for IoT, SDN for IoT, Data handling and analytics, Cloud computing, Sensor-Cloud.	6
	Unit – V	
5	**IoT to Web of Things:** Fog computing, Smart cities and smart Homes connected vehicles, Smart grid, Industrial IoT.	6
	Unit – VI	
6	**Applications of IoT:** Case Study: Agriculture, Healthcare, Activity monitoring.	6

Text Book:
1. S. Misra, A. Mukherjee, and A. Roy – "Introduction to IoT" Cambridge University Press, 2020.
2. S. Misra, C. Roy, and A. Mukherjee, 2020 – Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.

Reference Books:
1. Vasudevan, Nagrajan and Sundaram – "Internet of Things", Wiley India.
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle – "From Machine-To-Machine to The Internet of Things: Introduction to a New Age of Intelligence", Academic Press.

Course objectives and Course outcomes mapping:
- The course focuses on significant components of the Internet of Things: CO1, CO2, CO3, CO4.
- The course covers the prototype and key components of networking for development of applications based on the concept of Internet of Things: CO2, CO3, CO4
- To design and implement IoT circuits and solutions: CO4, CO5, CO6

Course units and Course outcomes mapping:

Unit No.	Unit Name	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Introduction to IoT	√					
2	IoT Communication Architectures and Protocols		√				
3	Arduino and Raspberry Pi			√			
4	IoT to Cloud				√		
5	IoT to Web of Things					√	
6	Applications of IoT						√

Programme outcomes:

PO 1: Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.

PO 2: Problem analysis: An ability to identify, formulates, and solves engineering problems.

PO 3: Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.

PO 4: Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.

PO 5: Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.

PO 6: The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.

PO 7: Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.

PO 8: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

PO 9: Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.

PO 11: Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: A recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	√	√	√			
PO2				√	√	
PO3	√	√	√			
PO4				√		
PO5						√

PO6				√		√
PO7	√	√	√			
PO8						√
PO9					√	√
PO10			√	√		
PO11		√			√	
PO12						√