



## COURSE CONTENT

IOT COMMUNICATION PROTOCOLS								
VI Semester: CSE / CSM								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
2460527	Elective	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 45			
Prerequisites: Internet of Things								

### Course Overview:

The course aims to deliver a sound understanding of the design and analysis of Internet of Things through lectures and practice. The lectures provide the foundational knowledge in sensors and actuators, fusion of data from multiple sensors, sensor data calibration and topics in sensor data analytics: pre-processing and extraction of features in time, series sensor data, and classification methods. The students conduct a major piece of coursework working in pairs to develop an IoT application using the Orient speck platform.

### Course Objectives:

- To learn about various protocols designed for the implementation of the Internet of Things (IoT) applications.
- To understand fundamentals of IoT, including architecture, standards, devices, gateways, networking, and analytics.
- To explore IoT reference architectures, functional, information, and deployment views, along with design constraints.
- To apply knowledge of IoT Data Link Layer protocols such as IEEE 802.11, Zigbee, BLE, DASH7, and WirelessHART in practical scenarios.
- To analyze Network Layer protocols, including IPv4/IPv6, 6LoWPAN, RPL, CARP, and related addressing and routing methods.

### Course Outcomes: After Completion of the Course, Students should be able to

- Understand the IoT architecture, technology fundamentals, devices, gateways, and business process concepts.
- Explain various architectural views, including functional, information, and operational perspectives.
- Implement Data Link Layer protocols in IoT networks using practical examples.
- Analyze Network Layer protocols, comparing their performance, addressing, and routing strategies.
- Evaluate Transport and Session Layer protocols, proposing secure and optimized solutions for IoT communication.

**UNIT - I:** Introduction: IoT architecture outline, standards - IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics.

**UNIT -II:** IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant Architectural views. Real-World Design Constraints- Introduction, Technical Design constraints.

**UNIT - III:** IoT Data Link Layer: PHY/MAC Layer (3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, ZWave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7

**UNIT-IV:** Network Layer Protocols: Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH, ND, DHCP, ICMP, RPL, CORPL, CARP

**UNIT-V:** IoT Transport & Session Layer Protocols: Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)- (TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT

#### TEXT BOOKS:

1. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347- 4, Willy Publications ,2016
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",1st Edition, Academic Press, 2015

#### REFERENCE BOOKS:

1. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer,2016
2. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

#### ELECTRONIC RESOURCES:

1. <http://www.drps.ed.ac.uk/20,21/dpt/cxifr11150.html>.
2. [https://mrcet.com/downloads/digital notes/EEE/IoT & Applications Digital Notes.pdf](https://mrcet.com/downloads/digital%20notes/EEE/IoT%20&%20Applications%20Digital%20Notes.pdf)
3. [https://www.coursehero.com/file/44580892/ IOT,LECTURE,NOTES,CSE,0doc/](https://www.coursehero.com/file/44580892/IOT-LECTURE-NOTES-CSE-0doc/)
4. [https://www.tutorialspoint.com/internet of things/internet of things tutorial.pdf](https://www.tutorialspoint.com/internet_of_things/internet_of_things_tutorial.pdf)
5. <https://lecturenotes.in/subject/370/internet-of-things-iot>

#### MATERIALS ONLINE:

1. Course template
2. Tutorial question bank
3. Tech talk and Concept Video topics
4. Open-ended experiments
5. Definitions and terminology

6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. E-Learning Readiness Videos

