

Subject Code: 1ET2030210	Subject Title: INTERNET OF THINGS (Elective – II)
Pre-requisite	Fundamentals of Computer Networking and Embedded System

Course Objective:

The Internet of Thing (IoT) network allows the things to communicate with each other in order to make the human life easy. Communication could be machine 2 machine or machine 2 men. After completion of this course students would be able to understand the building block, protocols and application areas of IoT. Understand what IoT technologies are used for today, what will be used in future. Realize the uprising of Internet in Mobile Devices, Cloud & Sensor Networks. Recognize challenges and research areas of IoT.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
2	-	2	4	60	40	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	INTRODUCTION TO IOT Definitions and Functional Requirements, Motivation, Architecture - Web 3.0 View of IoT, IoT Applications, Four Pillars of IoT, DNA of IoT, The Toolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security	7	29	
2	IOT PROTOCOLS – IoT protocol Stack - M2M and WSN Protocols – SCADA and RFID Protocols –Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – IoT gateway Protocols - Modbus and MQTT — ZigBee Architecture –Bluetooth low energy Protocol -	7	29	
3	TECHNIQUES FOR WRITING EMBEDDED CODE Memory management for IoT devices- Types of memory– Performance and Battery Life of IoT enabled Embedded Devices – Libraries to write Embedded Code – Debugging	6	25	
4	IoT SECURITY Importance of Security in IoT – Security Services - IoT Security Vs Traditional Network Security – IoT Security Issues – Privacy – Integrity – Availability Issues – Solutions	4	17	

Review Presentation: The student is expected to spend minimum 2 hours per week (as mentioned in the teaching and evaluation scheme) to refer at least two peer reviewed journal papers related to this domain/subject. The student is expected to identify issues/challenges and emerging trends in the domain/subject. Student is supposed to explore various video lectures (E.g. NPTEL) available in the domain/subject. Student is required to make a review-presentation on the work carried out for the same.

Recommended sites for journal papers are (1) dl.acm.org (2) springer.com (3) sciencedirect.com (4) elsevier.com (5) ieeexplore.ieee.org (6) scholar.google.co.in (7) scopus.com or others of similar repute.

Course Outcome:

At the end of this course, the student would be able to

- Identify and design the new models for market strategic interaction
- Design business intelligence and information security for IoT, analyze various protocols for IoT
- Design prototype and develop embedded code for IoT, Analyze and design different models for network dynamics.

List of References:

1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press –2012
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press – 2010
4. Designing the Internet of Things - Adrian McEwen, Hakim Cassimally
5. Information Security Theory and Practice – Securing Internet of Things – Springer

List of Experiments:

Note: The experiment list provided beneath is for reference only. The course teacher may change/formulate it as per his/her methodology and requirement.

Following are the case study based practical which can be further more explored by course teacher and students.

1. Smart Parking
Monitoring of parking spaces availability in the city.
2. Smart Home
Home automation using IoT
3. Structural health
Monitoring of vibrations and material conditions in buildings, bridges and historical monuments.
4. Noise Urban Maps
Sound monitoring in bar areas and centric zones in real time.
5. Smartphone Detection
Detect iPhone and Android devices and in general any device which works with WiFi or Bluetooth interfaces.
6. Electromagnetic Field Levels
Measurement of the energy radiated by cell stations and Wi-Fi routers.
7. Traffic Congestion
Monitoring of vehicles and pedestrian levels to optimize driving and walking routes.
8. Smart Lighting
Intelligent and weather adaptive lighting in street lights.