

18PEE64	INTERNET OF THINGS FOR ELECTRICAL ENGINEERS	L	T	P	C
		3	0	0	3
Course Objectives:					
1.	<i>To illustrate the concept of Internet of Things (IoT).</i>				
2.	<i>To familiarize with implementations of IoT for electrical engineering applications.</i>				
Unit I	INTRODUCTION	9	+	0	
Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels &Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management withNETCONF-YANG- IoT Platforms Design Methodology.					
Unit II	ARCHITECTURE	9	+	0	
M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT referencemodel - Domain model - information model - functional model - communication model – IoT reference architecture					
Unit III	IOT PROTOCOLS	9	+	0	
Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFIDProtocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus–Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security					
Unit IV	BUILDING IOT	9	+	0	
Building IOT with RASPERRY PI- IoT Systems - Logical Design using Python – IoT Physical Devices & Endpoints - IoT Device -Building blocks -Raspberry Pi -Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms - Arduino.					
Unit V	APPLICATIONS	9	+	0	
Real world design constraints - Applications - Asset management, Industrial automation, smartgrid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT– Software & Management Tools for IoT Cloud Storage Models & Communication APIs – Cloud for IoT - Amazon Web Services for IoT.					
Total (L+T)= 45 Periods					
Course Outcomes:					
<i>Upon completion of this course, the students will be able to:</i>					
CO1	:	<i>Analyze various protocols for IoT.</i>			
CO2	:	<i>Develop web services to access/control IoT devices.</i>			
CO3	:	<i>Design a portable IoT using Rasperry Pi.</i>			
CO4	:	<i>Deploy an IoT application and connect to the cloud.</i>			
CO5	:	<i>Analyze applications of IoT in real time scenario.</i>			
References:					
1.	<i>The Internet of Things – Enabling Technologies, Platforms, and Use Cases,Pethuru Raj & Anupama C. Raman,CRCPress.</i>				
2.	<i>Internet of Things – A hands-on approach, ArshdeepBahga&Vijay Madiseti, Universities Press.</i>				
3.	<i>From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence, Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Aves & David Boyle, Elsevier.</i>				
4.	<i>The Internet of Things – Key applications and Protocols, Olivier Hersent, David Boswarthick& Omar Elloumi, Wiley.</i>				
5.	<i>The Internet of Things in the Cloud: A Middleware Perspective, Honbo Zhou, CRC Press.</i>				
6.	<i>Integration of Distributed Generation in the Volt/VAR Management System for Active Distribution Networks, Barr, Johanna &RitwikMajumder, IEEE Transactions on Smart Grid, Vol. 6, No. 2, pp. 576-586, 2015.</i>				
7.	<i>Review of Internet of Things (IoT) in Electric Power and Energy Systems, GuneetBedi, Ganesh Kumar Venayagamoorthy, Rajendra Singh, Richard Brooks &Kuang-Ching Wang, IEEE Internet of Things Journal, DOI 10.1109/JIOT.2018.2802704.</i>				

PO CO	CO Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1
CO1	Analyze various protocols for IoT	1	1	1	1	1	1	3	1	1	1	1
CO2	Develop web services to access/control IoT devices.	1	1	3	3	1	1	3	1	1	2	1
CO3	Design a portable IoT using Raspberry Pi.	1	1	2	2	2	1	1	1	1	3	1
CO4	Deploy an IoT application and connect to the cloud.	2	3	2	3	3	1	2	2	1	2	2
CO5	Analyze applications of IoT in real time scenario.	2	2	3	3	3	1	2	3	1	2	2