15IT422E	INTERNET OF THINGS	L	T	P	C
		2	2	0	3
Co-requisite:	NIL				
Prerequisite:	NIL				
Data Book / Codes/Standards	NIL				
Course Category	E | PROFESSIONAL ELECTIVE				
Course designed by	Department of Information Technology				
Approval	32nd Academic Council Meeting, 23rd July 2016				

PURPOSE	We are surrounded by millions of things and devices. Internet of Things (IoT) is a technological need to interconnect all such devices, things with us anywhere, anytime. This course attempts to address the paradigm shift in technologies, standards and tools needed to achieve the interoperability and thereby develop applications

INSTRUCTIONAL OBJECTIVES		**STUDENT OUTCOMES**						
At the end of the course, student will be able to								
1.	Understand the basics of IoT and its application sectors	a						
2.	Understand M2M and IoT	a						
3.	Understand and become proficient in IoT platforms	a	i					
4.	Understand and apply IoT protocols appropriately	a	i					
5.	Design and develop IoT based applications	c	l					

Session	Description of Topic	Contact Hours	C-D-I-O	IOs	Reference
UNITI : INTRODUCTION AND CONCEPTS OF IOT		**5**			
1.	Introduction to IOT, definition and characteristics of IOT, Overview of the syllabus	1	C	1	1
2.	Architecture of Internet of Things, Physical and logical design of IOT, IOT enabling technologies, IOT levels and deployment templates	2	C	1	1
3.	Domain specific IOTs, home automation, cities, environment, Domain specific IOTs, Energy, retail, agriculture, industry, health and lifestyle	2	C	1	1
UNIT II : IOT AND M2M COMMUNICATION		**8**			
4.	M2M, difference between IOT and M2M, ETSI M2M Architecture, system architecture	2	C	2	1
5.	ETSI M2M SCL resource structure, Security in ETSI M2M framework, SDN and NFV for IOT, IOT system management, need for IOT system management	3	C	2	1

Session	Description of Topic	Contact Hours	C-D-I-O	IOs	Reference
6.	SNMP, Network operator requirements, NETCONF-YANG, IOT system management with NETCONF-YANG, IoT Design methodology-case study on IOT system for Weather Monitoring	2	C,I	2	1
UNIT III : IoT PLATFORMS		**6**			
7.	Introduction to Hardware used for IoT: Microcontrollers, Microprocessors, SoC, Sensors	2	C,I	3	1
8.	Introduction to Arduino, Pi, Spark, Intel Galileo	3	C,I	3	1
UNIT IV: IoTTECHNICAL STANDARDS AND PROTOCOLS		**5**			
9.	RF Protocols: RFID, NFC;IEEE 802.15.4: ZigBee, Z-WAVE, THREAD; Bluetooth Low Energy (BLE), IPv6 for Low Power and Lossy Networks (6LoWPAN) and Routing Protocol for Low power and lossy networks (RPL)	2	C	4	1,2
10.	CoAP ,XMPP, Web Socket, AMQP, MQTT, WebRTC, PuSH	2	C	4	1,2
11.	Architectural Considerations in Smart Object Networking	1	C	4	5
UNIT V: DEVELOPING INTERNET OF THINGS		**6**			
12.	IoT platforms design methodology, IoT Physical devices and endpoints,	2	C	5	1
13.	IoT Systems: Logical design using Python, IoT physical servers and cloud offerings (Cloud computing for IoT)	3	C,I	5	1
	Total contact hours	30*			
	Tutorial hours	30			

Sl. No.	LEARNING RESOURCES
1.	ArshdeepBahga, Vijay Madisetti, “Internet of Things, A Hands -on Approach”, 1st Edition 2015, University Press, ISBN: 978-81-7371- 954-7
2.	Oliver Hersent, David Boswarthick, Omar Elloumy, “The Internet of Things”,1st Edition ,2015,ISBN: 978-81-265-5686-1
3.	Michael Miller, “The Internet of Things, How Smart TVs, Smart Cars, Smart Homes, and Smart Cities are changing the World”, First edition ,2015, Pearson , ISBN:978-93-325-5245-6
4.	https://thingsee.com/blog/quality-hardware-list-for-your-iot-projects, as on date: 25/04/16
5.	https://tools.ietf.org/html/rfc7452, as on date: 25/04/2016
6.	http://dret.net/lectures/iot-spring15/protocols, as on date: 25/04/2016
7.	http://iot.intersog.com/blog/overview-of-iot-development-standards-and-frameworks, as on date: 25/04/2016

Course nature					**Theory +Tutorial**	
Assessment Method (Weightage 100%)						
In-semester	**Assessment tool**	Cycle test I	Cycle test II	Cycle Test III	Tutorial	**Total**
	Weightage	**10%**	**10%**	**15%**	**15% [Experiments (10%) + Mini Project(5%)]**	**50%**
End semester examination Weightage :						**50%**

* - Excluding Assessment Hours

Course Designed by		**Department of Information Technology**												
1	Students Outcome	a	b	c	d	e	f	g	h	I	j	*k*	*l*	*m*	*n*
		X		X						X					
2	**Category**	**GENERAL (G)**			**BASIC SCIENCES (B)**			**ENGINEERING SCIENCES AND TECHNICAL ART (E)**			***PROFESSIONAL SUBJECTS (P)***			
								X						
3	Broad Area(for p only)	Programming		Networking		Data base		Web System		Human Computer Interaction		Platform Technologies		
		X		X		X						X		
		Not Applicable												
4	Staff coordinator													