FACULTY OF ENGINEERING & TECHNOLOGY

First Year Master of Engineering
Semester II

Course Code: 102430205

Course Title: Internet of Things and its Applications

Type of Course: Program Elective -III

Course Objectives: It is a subject to give the awareness about how to use various sensors to set the automation and controls in real life. It gives understanding about how to process various signals generated from sensors to operate the multiple devices in parallel.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	30 / 15	20 / 10	70 / 35	30 / 15	150 / 75

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	IoT & Web Technology The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization.	8
2	M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.	10
3	IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.	10
4	IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT for Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth	10
5	Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security	8

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
5%	15%	15%	15%	10%	10%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1	Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014
2	Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
3	Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493- 9357-1

Course Outcomes (CO):

Sr.No.	Course Outcome Statements	%weightage
CO-1	Understand the vision of IoT from a global context	15
CO-2	Understand the application of IoT.	20
CO-3	Determine the Market perspective of IoT.	10
CO-4	Use of Devices, Gateways and Data Management in IoT.	20
CO-5	Building state of the art architecture in IoT.	15
CO-6	Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints	20

List of Practical / Tutorials:

1	Familiarization with Arduino and perform necessary software installation and basic syntax.
2	Familiarization with Raspberry Pi and perform necessary software installation and basics of Raspberry Pi programming.
3	To interface LED/Buzzer with Arduino and write a program to turn ON LED for 1 sec after every 2 seconds.
4	To interface Push button with Arduino and write a program to turn ON LED when push button is pressed or at sensor detection.
5	To interface DHT11 sensor with Arduino and write a program to print temperature and humidity readings.
6	To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
7	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
8	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
9	Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
10	Give overview of Zetta.

Supplementary learning Material:

1	https://github.com/connectIOT/iottoolkit
2	https://www.arduino.cc/
3	http://www.zettajs.org/
4	Contiki (Open source IoT operating system)
5	Zetta (Based on Node.js, Zetta can create IoT servers that link to various devices and sensors)

Curriculum Revision:

Version:	**1**
Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22